Explaining the Food Stamp Cash-Out Puzzle. By Robert Breunig, Indraneel Dasgupta, Craig Gundersen, and Prasanta Pattanaik. Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture. Food Assistance and Nutrition Research Report No. 12.

Abstract

Empirical studies have shown that food stamp participants spend a higher proportion of their benefit on food than they would with an equivalent amount of cash. Our study demonstrates that this result can be explained by the decisionmaking behavior of multi-adult households. Multi-adult households spend a higher proportion of their food stamp benefit than they would with an equivalent amount of cash. In contrast, single-adult households show little difference in food spending between food stamps and an equivalent amount of cash. Because over 30 percent of food stamp participants are in multi-adult households, switching from food stamps to cash may reduce food purchases of these needy households. If that is indeed the case, the use of food stamps and other in-kind benefits may be more desirable than other forms of assistance.

Keywords: Food Stamp Program, cash transfers, cash-out puzzle, welfare stigma, Cournot model, intra-household distribution, Engel curves

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Summary

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Economists have theorized, since the 1940's, that households would spend the same amount of additional resources on food whether these resources came from food stamps or cash. The one exception, according to theory, would be constrained households, i.e. those that receive in food stamps an amount greater than their desired food expenditures. Consequently, one would see a large overall food consumption effect from food stamps only if a large proportion of households are constrained. However, empirically, one observes that only a small proportion of households are constrained. Despite this small proportion, empirical studies unanimously agree on the greater propensity to buy food out of food stamps rather than cash. Economists refer to this phenomenon as the "cash-out puzzle."

To explain this puzzle, we focused on the decisionmaking process within multi-adult households. While most studies treated all food stamp households alike, we argue that the cash-out propensity arises because food stamps and cash have different effects on the distribution of resources within multi-adult households. We based our analysis on a standard utility maximization approach with complete information, in which no stigma is assumed to be attached to the use of food stamps instead of cash. The theoretical explanation is developed through a non-cooperative game-theoretic model of the intra-household resource allocation mechanism.

We found empirical confirmation of our argument in data from cash-out experiments conducted in San Diego County, California. Those data show no evidence of a cash-out puzzle for single-adult households; the difference in expenditure patterns is seen only in the multi-adult households.

Explaining the Food Stamp Cash-Out Puzzle

Robert Breunig, Indraneel Dasgupta,
Craig Gundersen, and Prasanta Pattanaik[1]

Introduction

The Food Stamp Program (FSP) is one of the largest assistance programs in the United States. From its inception, this program has had an important role in improving the nutritional status of low-income families. An interesting puzzle brought to light by research into the FSP is that an additional dollar of food stamps leads to a larger increase in food consumption than an additional dollar of cash income. In other words, there is a higher marginal propensity to consume food with food stamps than with cash income.[2]

By contrast, the basic theoretical model of the effects of government food subsidy on household expenditure (Southworth, 1945) predicts such a higher marginal propensity to consume only for households that receive, as food stamps, an amount greater than their desired monthly expenditure on food. Consequently, the model predicts large overall effects of food stamps on food spending, relative to effects from money income, only if a large proportion of households is constrained, that is, they receive in food stamps an amount greater than their desired monthly expenditure on food. Empirical studies, however, have universally agreed that large effects of food stamps on food spending, compared with the effect of other income, coexist with small percentages of such constrained households.[3] The large estimated marginal propensity to consume food out of food stamps at the aggregate level, relative to that out of cash income, therefore seems to contradict conventional economic theory.

This report proposes an explanation for this so-called "cash-out puzzle." We question the welfare stigma-based explanation that has been advanced by others. Under this explanation, it is argued that individuals incur some nonpecuniary costs from participation in welfare programs due to social stigma attached to receiving welfare payments. A lump-sum cost of participation due to such stigma has been advanced as an explanation of why many eligible households choose not to participate in welfare programs, such as Temporary Assistance for Needy Families (TANF) and the FSP.[4] Levedahl (1995) has proposed a marginal version of this argument as a theoretical explanation of the cash-out puzzle. He assumes a marginal stigma associated with food stamps in that the marginal utility of an additional dollar of food stamp benefit is less than an additional dollar of cash income, and conjectures that such marginal stigma will explain the cash-out puzzle. Understanding the role of stigma in the food-purchasing decision is crucial since the introduction of Electronic Benefit Transfer (EBT) cards (see Beecroft et al., 1994) instead of coupons is sometimes justified by the presence of marginal and lump-sum stigma.

We address the cash-out puzzle from a completely different perspective. Standard micro-economic theory predicts that the marginal propensities to consume food out of cash and coupons will be identical for an unconstrained individual. Differences in these marginal propensities for an unconstrained household can

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[2]For a review of this literature, see Fraker, 1990.

[3]See, for example, the 17 studies reviewed in Fraker, 1990. Most studies show this group of constrained households to be on the order of 5 to 15 percent.

[4]See, for example, Moffitt (1981 and 1983), Ranney and Kushman (1987), and Gundersen and Andrews (2000). Our criticism of the stigma hypothesis in this report is directed at the marginal stigma concept. We do not dispute the significant evidence that lump-sum stigma is a major reason why many eligible households do not participate in the Food Stamp Program.

be considered puzzling only in the context of the prior assumption that a household behaves as a single individual. The existing literature on the cash-out puzzle typically models the household in this fashion. The broad hypothesis we explore is that this particular modeling strategy provides the major explanation for the cash-out puzzle. Specifically, we hypothesize that once the household is modeled in a non-unitary fashion by explicitly formulating household decisions as the outcome of the interaction between individual members with possibly different preferences and endowments, the cash-out puzzle will become compatible with the standard framework of individual decisionmaking.

To model the effect of cash-out programs on household food consumption in a non-unitary fashion, we develop a non-cooperative, game-theoretic model of intra-household resource allocation. Specifically, we propose a Cournot model of a multi-person household in which individual food consumption has the formal property of being a domestic public good. In this model, each agent takes the other agent's spending on food and availability of food from food stamps, as given, and chooses the optimal allocation of his/her own discretionary cash income between food for own consumption, food for other members' consumption, and other goods. No stigma is assumed to attach to purchases made with food stamps. The household demand functions are not generated through the maximization of a single utility function, as in the standard case, but through the Nash equilibria of the Cournot game. We assume that all goods are normal goods; further, total cash income of the household is divided between the members in such a way that any increase in such income increases both members' access to cash. We show that, in this model, if one agent chooses not to spend any cash on food under the coupon scheme, then, even if the household is unconstrained, replacement of food coupons by an equivalent increase in household cash income must reduce total household expenditure on food. This occurs because the change in the composition of household income effectively alters the intra-household distribution of cash income, providing more cash to the constrained member of the household.

A cash-out experiment conducted in San Diego County allowed us to empirically test both models—the stigma model and the intra-household bargaining model. In this cash-out experiment, a randomly selected group of food stamp recipients was given cash benefits instead of stamps. We reject the stigma-based explanation but find empirical confirmation for the intra-household bargaining model.

In addition to its theoretical and empirical interest, this puzzle has important policy implications. The standard model assumes equivalence between cash income and cash transfers from government sources such as welfare payments. Given this equivalence and the small proportion of constrained households, standard microeconomic analysis suggests that a cash-out program, i.e., a switch to a program of cash distributions instead of in-kind transfers through coupons, should not make a significant difference to food consumption at the aggregate level. The standard theory also predicts that a cash-out program would lead to welfare gains for constrained individuals. Since food stamps and cash transfers would be equivalent in terms of their effect on an unconstrained recipient's consumption, it follows that a cash-out program would achieve welfare gains. Furthermore, a cash-out program may generate savings in administrative and monitoring costs. Consequently, a strong *a priori* case exists for the replacement of the FSP by a system of cash transfers.[5] To justify the present coupon-based system, it is therefore necessary to show that in-kind transfers influence food consumption in a way that provides substantial additional advantages. Clearly, an understanding of the cash-out puzzle is crucial to such an exercise.

[5]If, however, it is expensive to screen potential beneficiaries of welfare programs, then an adverse selection problem exists in the context of cash welfare transfers. In this case, in-kind transfers may be efficient since they function as a self-selection mechanism. See, for example, Blackorby and Donaldson (1988) and Besley and Coate (1992).

Theoretical Framework

Empirical analysis of the effect of the Food Stamp Program on household food consumption has typically involved estimating the relationship between household expenditure on food on the one hand and total money income and income from food stamps on the other. Thus, the procedure involves estimating a demand function:

$$y = y(J - s, s),$$

where y is the total household expenditure on food, J is the total household income from all sources, cash as well as coupons, and s is the value of food stamps received by the household. The total money income of the household is $(J - s)$. The cash-out puzzle is simply the following empirical observation. Estimates derived from samples consisting overwhelmingly of unconstrained households (i.e., households for whom $y > s$) seem to imply that the increase in household expenditure on food from one additional dollar's worth of food stamps is larger than that from one additional dollar of cash income. This in turn generates the following prediction about demand behavior by individual households. Suppose, at some given level of total income, J, and given some amount of food stamps, s, we observe that the household is unconstrained. Now suppose household food stamp income is changed such that total household income from all sources, J, is invariant. Then, at least for relatively small changes, the household will continue to remain unconstrained after the change. However, a relative decrease (increase) in the coupon component of household income will also lead to a fall (rise) in household expenditure on food. Note that there is no cash-out puzzle for constrained households; expenditure is expected to change under a cash-out for them. Thus, the puzzle may be formally defined as the following restriction on the household demand function for food.

For every $J > 0$, there exists a non-empty interval $(\underline{s}(J), \bar{s}(J)) \subset [0, J]$ such that: (a) for all $s \in (\underline{s}(J), \bar{s}(J))$, $y(J, s) > s$, and (b) y is an increasing function of s in this interval.

Our goal is to develop a model of household decisionmaking that generates demand behavior in accordance with this restriction.

In the food stamp literature, the assumption that multi-person households behave as if they are individual decisionmakers is ubiquitous. As the recent literature on intra-household decisionmaking shows, however, this assumption is actually quite questionable.[6] Intra-household distribution of resources may depend on the composition of total household income. Conversion of in-kind welfare income to cash income may simultaneously lead to a change in the intra-household division of resources. This, in turn, may lead to a multi-person household's exhibiting consumption behavior that cannot be explained in terms of the household's maximizing as an individual.

We now develop an alternative theoretical explanation of the cash-out puzzle along these lines. This explanation does not require the presence of any welfare stigma. We formulate our argument by means of a Cournot model of intra-household allocation.[7]

The Model

Assume a household with two adult members M and F.[8] Given any agent k, $k \in \{M, F\}$, we shall refer to the other agent as agent $-k$. Each agent k consumes a composite private good x_k. Each agent also derives utility from the total household purchase (and consumption) of food, y. Agent k's preference ordering defined over alternative combinations of household food purchase and the private good is represented by a strictly quasi-concave utility function $U^k(x_k, y)$.[9]

[6] See, for example, Alderman et al. (1955) for a survey.

[7] Earlier work in this tradition includes Ulph (1988), Woolley (1988), Lundberg and Pollack (1993), Kanbur (1995), and Dasgupta (1999).

[8] Generalization to a household with more than two members is straightforward.

[9] It is, of course, possible that an agent's preference ordering over alternative combinations of the private consumption good and total household purchase of food will depend on the intra-household division of food as well. We abstract from this complication. One simple way of arriving at our formulation through this route is to assume that intra-household distribution of food is determined according to some sharing rule in which each agent's food consumption depends only on total household availability of food. More complicated sharing rules, while compatible with our analysis, make the exposition cumbersome without adding anything substantive to the argument. Of course, the construction of these sharing rules is of interest to other analyses of the Food Stamp Program. Furthermore, estimating such sharing rules is nearly impossible since the data requirements would involve detailed information about which individuals make spending decisions for each good consumed by the household.

Purely for notational simplicity, we shall assume that the prices of all goods are unity. Household availability of food from food stamps is s, $s \geq 0$. Let the total income of the household from all sources, cash as well as food coupons, be J. Then the total cash income of the household is simply $(J - s)$. Each agent k has discretionary control over r^k amount of cash, $r^k \geq 0$. Clearly,

$$r^M + r^F = J - s.$$

Member k takes the other member's contribution to household food purchase, y_{-k}, and the availability of food from food stamps, s, as given, and chooses the allocation of his own discretionary cash income between food (y_k) and the private good, x_k. Let y be total household expenditure on food. By definition, we have:

$$y = y_{-k} + y_k + s.$$

Thus, household food expenditure has the formal characteristic of a domestic public good, and agents play a Cournot game with respect to choice of contributions toward this domestic public good.[10] We assume that a Nash equilibrium exists in this game.[11]

The assumption of food as a domestic public good may appear troubling, since food is often invoked as an example of the classic alienable good. Note that, in our formulation, total household food consumption has the property of being a domestic public good only in a purely formal, and not necessarily substantive, sense. What we are essentially assuming is that each agent's preferences over alternative combinations of the private good and household food purchase is independent of how the total amount of food is distributed within the household (see footnote 9).

Given total household income, its division between cash and coupons, the division of discretionary control over household cash income among agents, and contribution toward household food purchases by the other agent, agent k's optimization problem is that of choosing the optimal levels of y and x_k, so as to maximize:

$$U^k(x_k, y)$$

subject to the budget constraint:

$$(1) \quad r^k + y_{-k} + s = x_k + y,$$

and the additional constraint:

$$(2) \quad y \geq y_{-k} + s.$$

The second constraint incorporates two restrictions. First, food stamps cannot be resold for cash.[12] Second, no agent can divert money allocated by the other agent for food purchase to his/her own private consumption.

Then, the solution to agent k's optimization problem, subject to the budget constraint (1) alone, yields the optimal levels of y and x_k as functions of total income from all sources, i.e., of $[r^k + s + y_{-k}]$. Let these unrestricted individual demand functions be given by:

$$(i) \quad y = g^k(r^k + s + y_{-k}),$$

and

$$(ii) \quad x_k = h^k(r^k + s + y_{-k}).$$

We impose the following restriction on unrestricted individual demand functions (and thus on individual preferences).

(A1): For all $k \in \{M, F\}$, g^k and h^k and are continuous and increasing in r^k.

The continuity assumption, while innocuous, is essentially made for convenience. (A1) merely requires that all goods be normal goods in the standard sense. This assumption suffices to ensure the uniqueness of the Nash equilibrium.[13] Then, the Nash equilibria yield single-valued household demand functions:

$$(3) \quad x_k^N = X^k(r^k, J, s),$$

[10]The model can be made more realistic by allowing other public goods (for example, expenditure on children and housing) as well. This, while complicating the notation, however, does not add anything to the argument.

[11]See Bergstrom et al. (1986) for sufficiency conditions to ensure the existence of a Nash equilibrium.

[12]The no-resale restriction for food stamps is for convenience and can be relaxed to allow partial, but not complete, resale. Legally, food stamps cannot be sold for cash.

[13]See Bergstrom et al., 1986.

and

(4) $y^N = y_k^N + y_{-k}^N + s = Y(r^k, J, s)$.

Since an agent can neither exchange any portion of the food provided through food stamps for cash nor divert the money contributed by the other agent for household food expenses to his own private consumption, it must be the case that in any Nash equilibrium for all $k \in \{M, F\}$,

(5) $Y(r^k, J, s) = \max[g^k(r^k + s + y_{-k}^N), s + y_{-k}^N]$,

and

(6) $X^k(r^k, J, s) = \min[h^k(r^k + s + y_{-k}^N), r^k]$.

An agent k is constrained in a Nash equilibrium if and only if, in that Nash equilibrium,

$[g^k(r^k + s + y_{-k}^N) < s + y_{-k}^N]$.

Clearly, this is equivalent to the requirement:

$[h^k(r^k + s + y_{-k}^N) > r^k]$.

Our next assumption is simply that all adult members of the household receive a share of any increase in cash income of the household.

(A2): For all $k \in \{M, F\}$, $r^k = r^k(J - s)$ and is continuous and increasing in its argument.

(A2), (3) and (4) together imply that the household demand functions generated by Nash equilibria can be rewritten as functions of total income, J, and food stamp income, s. Thus,

$x_k^N = x^k(J, s)$;

and

$y^N = y(J, s)$.

Our key assumption is the following:

(A3): Given any $J > 0$, there does not exist any $s \in (0, J)$ such that [for all $k \in \{M, F\}$, $[g^k(r^k(J - s) + s) = s]$].

Suppose that the other agent spent his/her entire discretionary income on his/her own private good. Then, if the household received s amount of food stamps, the optimal amount of household food expenditure, from agent k's point of view, would be $g^k(r^k(J - s) + s)$. (A3) requires that this cannot be exactly equal to the amount of food stamps for both agents. This assumption introduces a minimal amount of heterogeneity in preferences and/or access to cash income between adult members of the household. To see how minimal such heterogeneity is, note first that (A3) is far weaker than the requirement that $g^k(r^k(J - s) + s)$ be different for the two agents at every possible level of food stamps. Note further that even the latter, stronger assumption (and hence (A3)) will be satisfied even if agents have identical preference orderings, so long as total household cash income is divided unequally. Conversely, even if household cash income is divided equally, the stronger assumption (and hence (A3)) will be satisfied if agents have different preference orderings. Of course, (A3) can also be generated by differences in both preferences and access to cash, combined in various ways.

Proposition 1. Suppose (A1), (A2), and (A3) are satisfied. Then, given any $J>0$, the household demand function for food $y(J, s)$ must satisfy the following:

(i) There exists $\bar{s}(J) \in (0, J)$ such that $[y(J, s) > s]$ for all $s \in [0, \bar{s}(J))$,

and

$[y(J, s) = s]$ for all $s \in [\bar{s}(J), J]$.

(ii) There exists $\underline{s}(J) \in [0, \bar{s}(J))$ such that $y(J, s)$ is an increasing function of s in the interval $(\underline{s}(J), \bar{s}(J))$.

Proof: See the appendix.

The intuition is simply that unconstrained households with a constrained individual will generate the cash-out puzzle. A numerical illustration is provided in the appendix with the proof of proposition 1.

Suppose that a household has some arbitrary amount of total household income, J, consisting of cash income and food coupons. Clearly, different combinations of cash and coupons can generate J, the coupon

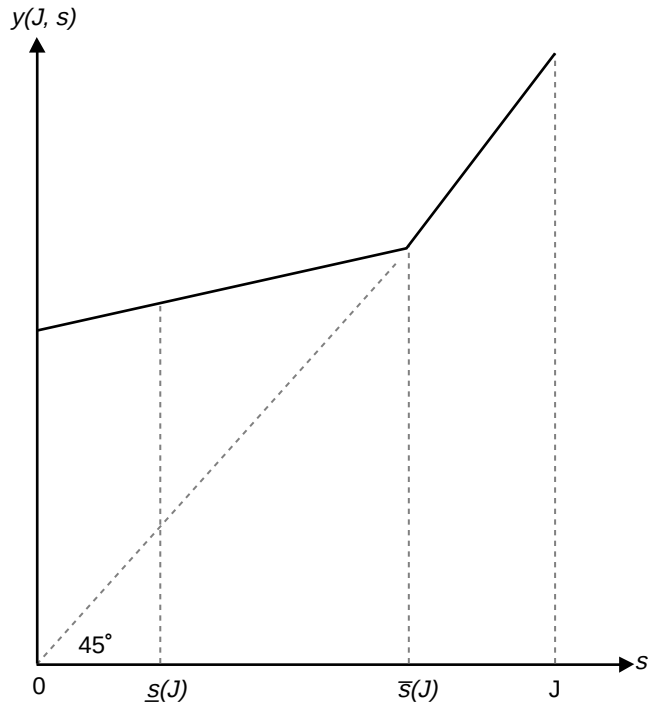
component of such combinations lying in the interval [0, J]. Part (i) of proposition 1 states that, given (A1)-(A3), the household is unconstrained if and only if the amount of food stamps received by it is less than a particular positive number less than J, $\bar{s}(J)$. Part (ii) of proposition 1 implies that, given our assumptions, household demand behavior must necessarily exhibit the cash-out puzzle, as formalized above. There must necessarily exist a non-empty interval of food stamp values, ($\underline{s}(J)$, $\bar{s}(J)$), where the marginal propensity to consume food out of stamp income is larger than that out of money income, despite the fact that the household is unconstrained. In this interval, the larger the cash component in household income, the smaller the magnitude of household spending on food. Any substitution of cash income by food stamps in this region will necessarily increase household food expenditure, while leaving the household unconstrained. Note that it is possible that the demand function for food will be increasing in s throughout the interval [0, $\bar{s}(J)$). Figure 1a below shows how household food expenditure will change with changes in the coupon component of household income in this case.

Intuitively, the mechanism generating the cash-out puzzle in our model is the following. Given total household income, (A1), (A2), and (A3) together imply that there will necessarily exist a region of values of food stamps, ($\underline{s}(J)$, $\bar{s}(J)$), such that, if the actual amount of food stamps received by the household falls in this region, then one agent will be constrained. Furthermore, the other agent will necessarily be unconstrained. The unconstrained agent will contribute a positive amount toward household food expenses. Consequently, total household food purchase will be greater than the amount of food stamps, i.e., the household will be unconstrained. Now, consider a relative increase in household cash income due to a cashing-out of food stamps. This makes a larger amount of cash available to the constrained member, allowing that member to increase his/her nonfood expenditure. So long as the post cash-out amount of food stamps remains within the interval ($\underline{s}(J)$, $\bar{s}(J)$), the constrained agent will continue to stay constrained, preferring to spend all additional cash income on his/her private good. The unconstrained agent will stay unconstrained; consequently, the household will stay unconstrained as well. The unconstrained member of the household will increase his/her cash contribution toward household food purchase to compensate for the reduction due to the fall in the stamp component. However, the conversion effectively reduces the total income (cash and coupons) available to this agent. Since household food expenditure is a normal good, this causes the unconstrained agent to increase his/her cash contribution by less than the magnitude of the reduction in food stamps. Consequently, the total food purchase falls. The exact opposite happens when cash income is converted to food stamps.

If the coupon component is increased to $\bar{s}(J)$ or beyond, both agents and, therefore, the household will become constrained. On the other hand, it is possible, but not necessary, that a large reduction in the coupon component of household income beyond $\underline{s}$ will make the in-kind constraint slack for the agent for whom it was binding earlier. In that case, both agents will become unconstrained. It can be easily shown that further conversions of coupon to cash will leave household demand invariant. This case is depicted in figure 1b. The marginal propensity to consume food out of cash income is exactly the same as that out of food stamps in the interval [0, $\hat{s}(J)$).

The critical assumption driving our results is (A3). If this restriction is violated, then given (A1) and (A2),

Figure 1a.
(A1) - (A3) Hold: Cash-out puzzle



the following can be easily established. There will necessarily exist some value of food stamps between zero and J, say $\breve{s}(J)$, such that both agents will be constrained when the actual amount of food stamps received by the household is greater than $\breve{s}(J)$. Both agents will be unconstrained when it is less. Household demand behavior will be exactly as predicted by the Southworth model. This is depicted in figure 2. Note that the same conclusions can be generated in essentially the same way by modeling the intra-household allocation process as a Stackelberg game.

The model developed in this section implies that, if the proportion of unconstrained multi-adult households with constrained individuals is significant in a sample, then estimates derived from this sample will yield a marginal propensity to consume food out of food stamps significantly larger than that out of cash income. To seek empirical confirmation for the model, we, therefore, need to check whether the cash-out puzzle in the data largely arises from consumption behavior of multi-adult households.

In line with the standard practice in the literature, we have treated cash income from different sources equivalently in our model. This was done purely for simplicity of exposition. The model can be easily generalized to allow different intra-household sharing rules for cash income arising from different sources. Thus, for example, one may assume that cash welfare payments and cash labor income are shared differently. It is intuitively plausible that if households start getting cash instead of stamps, members may collectively decide, perhaps due to inertia, to make only part of that additional cash available for discretionary spending, while continuing to earmark the rest for non-discretionary expenditure on food as before, at least initially. This can be captured in our model at the cost of some increase in notational complexity by the assumption that a welfare check scheme increases each member's discretionary income by an amount less than that when cash-out takes the form of an increase in household non-welfare cash income. It should be intuitively clear that this version would predict a larger propensity to consume food out of welfare checks than out of income. In general, there is no strong *a priori* reason to assume that the intra-household distribution of cash would be independent of the composition of the cash-flow with regard to its source. Our framework is thus consistent with differing marginal propensities to consume food for cash from different sources. On

Figure 1b.
(A1) - (A3) Hold: Cash-out puzzle

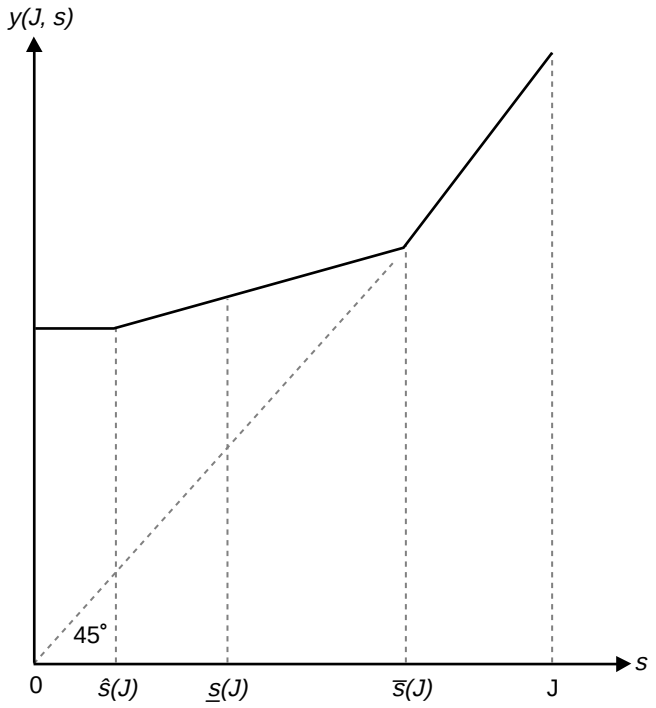
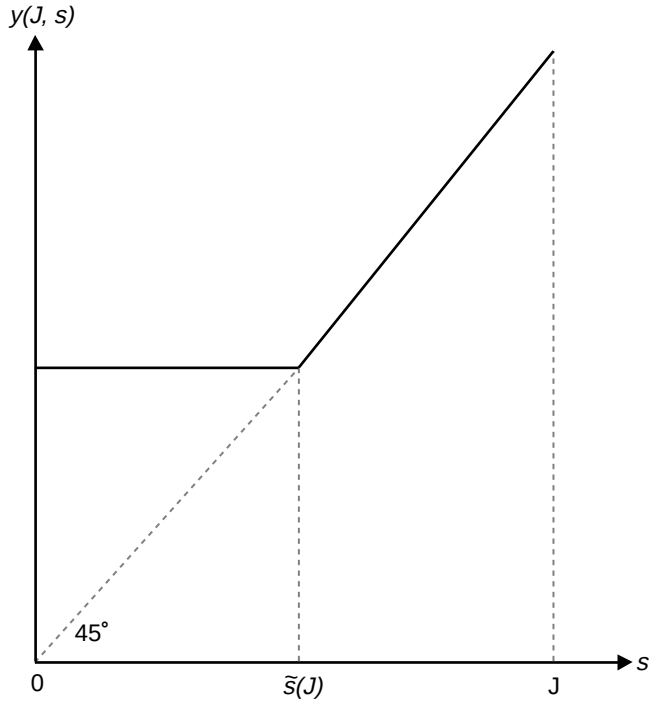


Figure 2.
(A1) and (A2) Hold, (A3) violated: No cash-out puzzle



the other hand, our model would be decisively refuted if it can be shown that the marginal propensity to consume food out of cash income, whether from welfare payments or otherwise, is higher than that out of food stamps.

Analysts have conjectured that while food stamps are not targeted toward women *per se*, since women are the main food purchasers, the delivery mechanism creates an entitlement (in the sense of a right-of-control acknowledged by other household members) to such transfers, unlike cash transfers (Alderman et al., 1997, p. 278).[14] To the extent that this suggestion implies that a significant proportion of cash welfare transfers may be controlled by men, an assumption formalized in (A2) earlier in this section, it is intuitively plausible. It is, however, difficult to see what the notion of entitlement (i.e., effective control) implies in this context, unless one also assumes resale possibility for food coupons. Otherwise, since *de facto* property rights over food coupons can be exercised only through purchase of food, in terms of household food expenditure, it does not matter which member has such property rights (though this may influence its composition). Note that in our model, the cash-out puzzle arises independently of any assumption about the intra-household division of control over food stamps. Note also that the conjecture that men control the entire amount of any cash welfare transfer by itself does not explain the cash-out puzzle, unless it is additionally assumed that men do not contribute to the domestic purchase of food. Indeed, it is intuitively clear and can be shown formally that, with identical preferences, women will be sole contributors to household food purchases only if they earn significantly more than men. If, instead, women earn significantly less, they may not contribute any part of their personal income toward food purchases, choosing to use only the money allocated by men and the available amount of food stamps, even if they are solely responsible for the actual shopping and preparation of food. In that case, if men control the entire amount of any cash welfare transfer, a cash-out will in fact leave household purchase of food invariant.

[14] "Entitlement" is sometimes used to describe programs from which any eligible recipient is entitled to receive benefits. The Food Stamp Program is one such program while, for example, housing assistance programs are rationed such that some eligible households cannot receive benefits. The meaning of "entitlement" here is quite different, and we trust that the reader will not confuse the two definitions.

The Data

The U.S. Department of Agriculture's Food and Nutrition Service undertook four experiments in the late 1980's in which food stamp participants were given cash instead of the traditional coupons. These experiments were conducted in San Diego County, California, Alabama, and Washington State.[15] In this report, we use data from the cash-out experiment in San Diego County. Despite being a rich source of data, this particular data set has been used very little in analyses of the FSP.

For the cash-out experiment, 600 families were selected at random from the food stamp-receiving population and their benefits were converted from coupons to checks. An additional 600 families, who continued to receive benefits in the form of coupons, were selected as a control and comparison group.[16]

The families were interviewed twice several months after the cash-out was implemented.[17] Unlike other studies of food stamp participant behavior, the food stamp benefit data are taken from program records and matched with survey participants.[18] In this report, we will refer to food purchased at a store for preparation and eating at home as food expenditure.[19] This one-time survey of participants does not allow us to follow families who have switched from stamps to checks. However, since the participants in the program were selected at random, comparison across the group of households that received checks and those that received stamps may give some preliminary indication of the presence of the cash-out puzzle (Fraker, Martini, and Ohls, 1995).

[15]The cash-out experiments are described in Fraker, Martini, and Ohls (1995) and Carlson (1993). These were the first large-scale experiments replacing food stamps with cash to be conducted in the United States. Previous cash-out experiments were conducted in Puerto Rico since 1982 and in portions of Utah and Vermont in 1981. Unfortunately, the results from these experiments appear to have limited applicability to the U.S. population as a whole (see Butler, Ohls, and Posner (1985) and Devaney and Fraker (1986)).

[16]We restrict our sample to observations where the reported size of the household unit is the same as the number of people who appear on the roster of household members. Without such a restriction, the age proportion variables (described later) will not sum to one. This procedure eliminates 101 households from the analysis. To include these households, one would need to either assume that the observed age proportion fractions are representative of the household members not listed in the roster or construct new household size variables different from those reported by respondents. Exploring these auxiliary assumptions is beyond the scope of this report. In addition, we deleted observations for group homes and homeless households, as well as observations with invalid/old food data.

[17]The initial interview consisted of detailed explanation of the questionnaire and purpose of the study. The follow-up interview was conducted to verify that all food purchases and consumption data for the survey week were correctly provided. Follow-up was done within 1 week of completion of the survey to ensure participants' ability to recall the necessary information.

[18]While this eliminates problems of misreporting of food stamp benefits, misreporting of other income is still likely to occur in the data.

[19]This somewhat restricted definition approximately matches the purpose of the FSP, which is to provide income for families to purchase groceries that they will use for meal preparation at home. We have used a variable constructed from food used during the week, based upon purchase price and quantities reported by respondents. We have not included home-produced food and gift food, which are not important in this sample. Adding these quantities to our food expenditure variable does not change any of the results reported here. One anomaly is that food expenditure also includes take-away food brought back to the house for consumption. This does not have any effect on our analysis.

Results

The check and stamp households resemble each other in most respects (see app. table 1). Table 1 presents the difference in mean weekly food expenditure between the two groups.[20]

Whether we normalize expenditure by adult male equivalent[21] for calorie intake or by the size of the food consumption unit, we see a significant difference in total food expenditure between the two groups of households. Only about 5 percent of the households had higher food stamp allotments than food expenditures. Thus, we would not expect the measurable difference in food expenditure to be caused by the elimination of the constraint for the check-receiving households.

Another way of verifying the presence of the cash-out puzzle in these data is to consider the marginal propensity to consume out of stamps and compare it with that out of income. We can estimate these parameters through estimation of the Engel curve for food expenditure. Other authors (for example, Levedahl, 1995) have used this approach, but we feel it deserves further explanation. The point of our econometric estimation is to map the expansion path of food expenditure that arises from the utility-maximizing behavior of agents. At different income and benefit levels, we estimate the optimal choice of food expenditure. The problem that arises is that individuals who receive food benefits in the form of food stamps are facing a kinked budget constraint. Stamp-receiving individuals who are observed to be on the kink (food expenditure equal to food stamp benefits) or on the flat portion of the budget constraint (food expenditure less than food stamp benefits) are not at an optimal point for their income level. These constrained individuals presumably would change their behavior if the food stamp benefit were changed to cash/check.

The Engel curve we wish to estimate is one that traces out a behavioral relationship. The behavioral relationship for constrained and unconstrained individuals is thus clearly different. In the former, optimization is constrained, whereas for the latter it is unconstrained. Furthermore, the cash-out puzzle refers only to the behavior of unconstrained individuals. There is no cash-out puzzle for constrained individuals—expenditure is expected to change under cash-out for these individuals. Therefore, the Engel curves we wish to estimate are those of unconstrained stamp households.

Appendix table 2 provides a comparison of the constrained and unconstrained households. The constrained households tend to be much poorer, perhaps indicating that the constraint arises not so much from differences in taste as from a tighter budget constraint.[22] According to the conventional theory, we would expect the marginal propensity to consume food out of food stamps for unconstrained households to be equal to that out of cash income. (This is due to the fact that unconstrained households can substitute food coupons for cash expenditure on food and switch the cash expenditure to other goods. This is precisely the kind of optimization decision that constrained households cannot make.) A difference in these two marginal propensities would provide further evidence of the presence of the cash-out puzzle in these data.

[20]For all parameter estimates in the report, * and ** indicate significance at the 90- and 95-percent confidence levels. Numbers in parentheses below coefficient estimates are standard errors, except where otherwise indicated.

[21]We use household size measured in equivalent nutrition units for food energy, an adult equivalent adjusted for guest meals and number of meals eaten at home. The meals are similar to those reported by Fraker, Martini, and Ohls (1995) when it appears that they use this particular normalization.

Table 1—Food expenditure for stamp and check households

Item	Weekly food expenditure per member of the food consumption unit	Weekly food expenditure per adult male equivalent
Stamp households	$21.38	$35.49
Check households	$20.23	$33.14
Difference	-$1.15*	-$2.34**
(Test statistic)	(-1.84)	(-2.18)

Notes: * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

[22]If differences in tastes were determining constrained/unconstrained households, we would expect to see at least some wealthier households in the constrained group of households. As it is, we only see poor households. Of course, since stamp benefits and income are inversely related, we would expect the constraint to be more important for poorer households.

Many different functional forms have been used to estimate Engel curves for food expenditure. Here, we consider the following three models:

(a) $fexp_i = \alpha + \beta y_i + \gamma fsb_i + X_i'\delta$,

(b) $\ln(fexp_i) = \alpha + \beta \ln(y_i + \gamma fsb_i) + X_i'\delta$, and

(c) $\ln(fexp_i) = \alpha + \beta \ln(y_i + fsb_i) + \gamma \frac{fsb_i}{(y_i + fsb_i)} + X_i'\delta$,

where *fexp* is food expenditure, *y* is cash income, *fsb* is stamp benefits, and *X* is a vector of household characteristics.[23]

To check for the correct functional form, we first impose the condition that food stamps and coupon benefits have the same effect on food expenditure. (This is equivalent to setting $\gamma = \beta$ in model (a), $\gamma = 1$ in model (b), and $\gamma = 0$ in model (c).) We then estimate the bi-variate regression of food expenditure per person on total income per person. We also show the results of including household size as an explanatory variable. These results, presented in table 2, clearly show the importance of returns to scale in household food purchasing and preparation. For the double-log model, we get a marginal propensity to consume food out of total income of 0.067, measured at median values of income and food expenditure. This result is similar to the linear model and is in line with previous surveys.

Figure 3 shows nonparametric regression results for the linear and double-log specifications. The graphs show fitted values of the regression function for values of per-person income between the first and 99th percentiles of income. The regression function is calculated using Nadaraya-Watson kernel regression, and the bandwidth is chosen by leave-one-out cross-validation, which minimizes the sum of squared prediction errors.[24]

Both specifications show some signs of nonlinearity. For larger values of income, we observe the decreasing marginal propensity to consume, including one range that appears to be slightly negative. We did fit a quadratic expenditure system to the data but are unable to reject that the coefficient on income squared is zero. The double-log specification shows moderate signs of nonlinearity, again particularly at larger values of income. For both specifications, the relationship

[23]The linear model (a) is the only one of the three that is consistent with utility maximization; however, models (b) and (c) give a better fit for most data. The linear model does not allow for a decreasing share of food expenditure in total expenditure at higher income levels, an empirical regularity observed in nearly all consumer expenditure surveys. Model (b) is used by Moffitt (1989), while Senauer and Young (1986) and Levedahl (1995) employ model (c); both allow the share of food stamps in total income to affect food expenditure. Levedahl (1995) discusses these and other models and shows that model (c) provides the greatest degree of flexibility, imposing few restrictions on the relationships between the marginal propensities to consume out of stamps and income and their rates of change.

[24]Tail values were used in regression calculations but were discarded from the graph. See Härdle (1990) for details of nonparametric regression analysis. Our method tends to undersmooth somewhat, but we feel that it is easier for the reader to correct this with the eye than to unsmooth an overly smoothed curve.

Table 2—San Diego cash-out experiment: Unconstrained households

	Unconstrained, stamp households (n = 487)			
Model	(a)		(b)	(c)
	(1)	(2)	(3)	(4)
Cash and benefit income per household member	0.091**	0.056**	0.369**	0.228**
	(0.014)	(0.014)	(0.042)	(0.045)
Household size		-1.631**		-.342**
		(.272)		(.049)
Constant	14.704**	23.298**	1.403**	2.409**
	(1.022)	(1.740)	(.175)	(.220)
Adjusted R^2	.0804	.1421	.1335	.2118

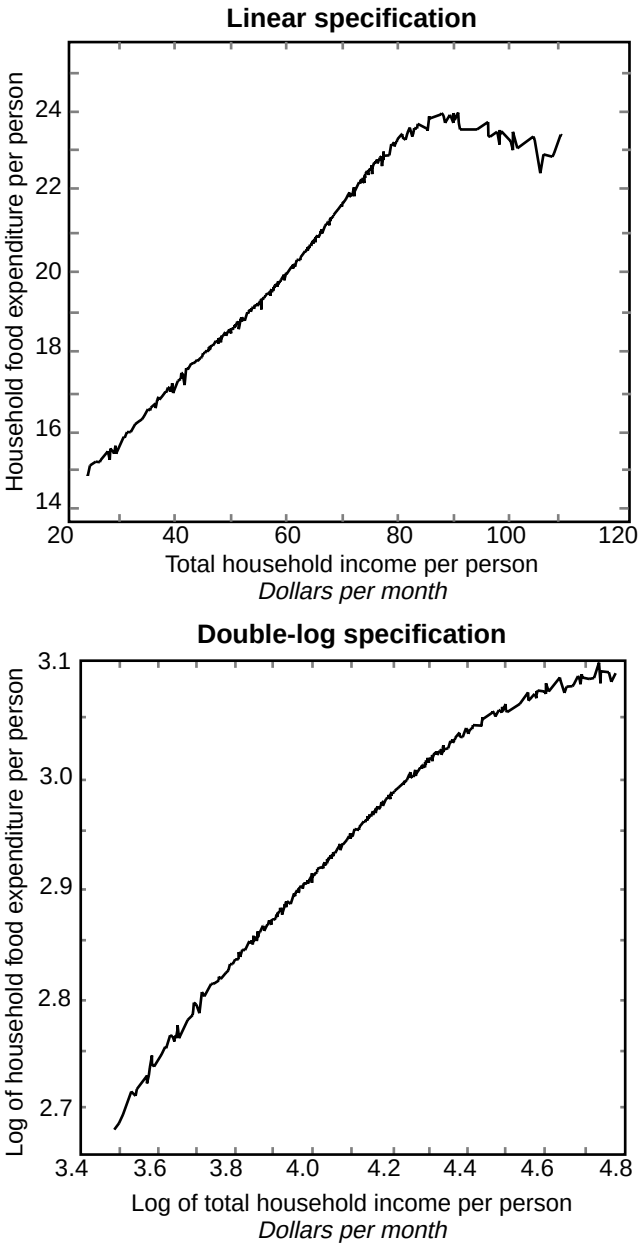
Notes: These are the coefficient estimates from models (a), (b), and (c). The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

seems linear for the bulk of the data. In analyzing our estimates, we shall keep figure 3 in mind. Neither nonparametric regression accounts for the full set of explanatory variables considered later in this report.

We now estimate all three models, using a full range of explanatory variables to control for receipt of other food subsidies, household composition, and household characteristics. In the appendix, we discuss some sensitivity analyses that we conducted. Regardless of the choice of model, the cash-out puzzle remains clearly visible in the data. A significant difference exists between the marginal propensities to consume out of cash income and food coupons, even for those households unconstrained in their food-purchasing behavior. Table 3 presents the results from the regression, using a complete matrix of explanatory variables for the linear model. We also show the results imposing the constraint that the effect of cash income and stamp benefits be equal. This is clearly rejected by an F-test of equality of the coefficients on cash income and stamp benefits.

Figure 3.
San Diego cash-out: Unconstrained stamp households' nonparametric regression



We scale the food expenditure and income quantities by household size rather than by using an equivalence scale. We then include variables to control for the percentage of household members in different age groups, who, presumably, have different nutritional needs.[25]

Table 4 presents results from regressions, using the double-log models (b) and (c). Again, the marginal propensities to consume out of stamps and income are found to be significantly different. The results from the two models are quite similar.

Levedahl (1995) estimates model (c) with a slightly different specification and a slightly different sample of the same data set. Qualitatively, his results are similar to those shown here, though our results show slightly larger marginal propensities to consume from both coupons and cash income.

In summary, in line with other studies, marginal propensities to consume out of cash income and food stamps are significantly different for unconstrained households in our data set. Thus, the cash-out puzzle seems to be robustly present in the data. Furthermore, the results are robust to choice of functional form and the nonparametric regressions seem to lend support to either the linear or double-log relationship for the bulk of the data.

[25]The primary reason we choose to follow this approach is that it is not at all clear what type of equivalent scale should be used for total household food expenditure. In much of the food stamp literature, the adult male equivalent for calories is used to weight total food expenditure. We feel that this is inappropriate, since providing for energy needs is only one small part of overall food expenditure and allowing age proportions to directly affect total food expenditure is a more reasonable modeling assumption.

Table 3—San Diego Cash-Out Experiment: Coefficient estimates for linear model

Model	Unconstrained stamp households (n = 487) (a) with $\gamma = \beta$	(a)
Cash and benefit income per household member	0.053** (0.014)	
Cash income per household member		0.051** (0.014)
Food stamp benefit per household member		.419** (.132)
Household size	-1.457** (.346)	-1.165** (.359)
Money value of gifts of food per household member	.718** (.232)	.705** (.231)
In-kind food commodity donations per household member	-.799** (.380)	-.741** (.378)
Breakfast subsidy per household member	.216 (.409)	.175 (.406)
Lunch subsidy per household member	.405** (.163)	.442** (.162)
Female-headed household	.525 (1.181)	.701 (1.174)
Weekly meals eaten as guest per household member	-1.196** (.191)	-1.191** (.190)
Weekly meals eaten by guests per household member	1.035** (.137)	1.039** (.136)
Proportion of households with child(ren) age 0 to 1	-1.947 (4.109)	-2.220 (4.081)
Proportion of households with child(ren) age 2 to 17	.244 (3.175)	-.319 (3.159)
Proportion of households with member(s) over age 60	-6.128 (5.373)	-3.835 (5.398)
Constant	22.880** (2.121)	19.174** (2.489)
Adjusted R^2	.2848	.2949

Notes: The dependent variable is per-person food expenditure. The standard errors are in parentheses. The first column imposes the restriction that cash income and food stamps have the same effect on food expenditure. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Table 4—San Diego Cash-Out Experiment: Coefficient estimates for double-log models

Model	Unconstrained stamp households (n = 487) (b)	(c)
Cash and benefit income per household member		0.388** (0.059)
β in model (b)	0.383** (0.059)	
γ in model (b)	7.850** (2.383)	
Proportion of food stamp benefits in total cash and benefit income		1.068** (.260)
Log of household size	-.326** (.076)	-.323** (.076)
Money value of gifts of food per household member	.030** (.010)	.030** (.010)
In-kind food commodity donations per household member	-.024 (.017)	-.024 (.017)
Breakfast subsidy per household member	.003 (.018)	.003 (.018)
Lunch subsidy per household member	.021** (.007)	.021** (.007)
Female-headed household	-.032 (.057)	-.032 (.057)
Weekly meals eaten as guest per household member	-.054** (.009)	-.054** (.009)
Weekly meals eaten by guests per household member	.037** (.006)	.036** (.006)
Proportion of households with child(ren) age 0 to 1	.165 (.195)	.231 (.193)
Proportion of households with child(ren) age 2 to 17	.328** (.161)	.375** (.158)
Proportion of households with member(s) over age 60	.023 (.242)	-.071 (.242)
Constant	1.389** (.333)	1.431** (.316)
Adjusted R^2	.3574	.3470
MPC out of income	.062** (.018)	.076** (.013)
MPC out of stamps	.487** (.142)	.395** (.078)
MPC out of stamps - MPC out of income	.425** (.137)	.319** (.074)

Notes: The standard errors are in parentheses. The standard errors for the nonlinear model (b) are calculated with bootstrap. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates the variable is statistically significant at the 95-percent confidence level. MPC denotes the marginal propensity to consume.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Stigma Reconsidered

Moffitt (1983) found that stigma was associated with enrolling in Aid to Families with Dependent Children (AFDC) but, not surprisingly (since AFDC benefits were paid in cash), stigma did not vary with benefit levels. In other words, throughout the FSP literature, the common argument is that benefits that look like cash should be treated like cash. Thus, we take steps to verify that the check-receiving households indeed treat their food benefits like cash income. If they do not, this would provide evidence against the stigma hypothesis. Table 5 presents a summary of results for this comparison.

In the sample with check- and stamp-receiving households, we include a dummy variable for stamp-receiving households and interact this dummy variable with the income, stamp benefit, and household size variables. We fail to reject the hypothesis that the marginal propensities to consume between the stamp and check groups are different. The intercept dummy is significant and positive (consistent with table 1). Full regression results are presented in appendix tables 7 and 8.

Check households treat their check benefits like stamps in a significantly different way than they treat cash income. This finding contradicts the stigma hypothesis, or at a minimum, indicates that the stigma hypothesis by itself is insufficient to explain the puzzle. Now we turn to an explanation that we find more compelling, that the puzzle is driven by intra-household dynamics.

Table 5—Is stigma the explanation? Unconstrained stamp households and all check households

Model	Pooled sample (n = 953)	Unconstrained stamp households (n = 487)	All check households (n = 466)
Linear model:			
MPC(Y)	0.046**	0.051**	0.037**
	(0.010)	(0.014)	(0.014)
MPC(FSB)	.318**	.416**	.221*
	(.089)	(.132)	(.122)
MPC(FSB) - MPC(Y)	.272**	.365**	.184
	(.089)	(.132)	(.122)
Double-log model:			
MPC(Y)	.307**	.393**	.235**
	(.057)	(.078)	(.084)
MPC(FSB)	.069**	.075**	.063**
	(.010)	(.013)	(.014)
MPC(FSB) - MPC(Y)	.238**	.318**	.172**
	(.053)	(.074)	(.078)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Intra-Household Resource Allocations

The major prediction of the model developed previously is that multi-adult and single-adult unconstrained households may have different consumption patterns. Multi-adult households may exhibit larger marginal propensity to consume food out of coupons than out of cash. However, single-adult households should not exhibit the cash-out puzzle. The marginal stigma-based explanation formalized in the Theoretical Framework section, however, predicts that if nonfood items taken together constitute a normal good, then single-adult households should exhibit the cash-out puzzle. This difference then provides a way of empirically evaluating the two competing hypotheses. We, therefore, estimate both pooled and separate Engel curves for multi- and single-adult households, using models (a) and (c) and the specification developed earlier in this section of the report. The results are presented in table 6. We include a dummy variable for single-adult households and interact it with the income and food benefit variables. Using an F-test, we reject the poolability of these two samples. In other words, the relationship between cash income, benefit income, and food expenditure is significantly different for the single- and multiple-adult households.

Full regression results are provided in appendix tables 4 and 5. These results come from estimating separate regressions for the two subsets of data. Using interactive dummy variables, imposing identical response coefficients for the household characteristic variables,

Table 6—San Diego Cash-Out Experiment: Single and multi-adult headed households compared

Model	All stamp households	Multi-adult households	Single-adult households
Linear model:			
MPC(Y)	0.051**	0.071**	0.017
	(0.014)	(0.018)	(0.021)
MPC(FSB)	.419**	.687**	.030
	(.132)	(.224)	(.180)
MPC(FSB) - MPC(Y)	.367**	.616**	.013
	(.131)	(.224)	(.180)
Double-log model:			
MPC(Y)	.076**	.108**	.009
	(.013)	(.018)	(.020)
MPC(FSB)	.395**	.526**	.073
	(.078)	(.107)	(.114)
MPC(FSB) - MPC(Y)	.319**	.418**	.064
	(.074)	(.103)	(.107)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

and using sparser specifications lead to quantitatively similar results. (These results are also included in the appendix.) Appendix tables 5 and 6 provide results for only those families with children. Since these make up the bulk of our sample, the results are essentially unchanged. The substantive conclusions are the same.

The low marginal propensities to consume for single-adult headed households are surprising. Within our model, we control for many differences between single- and multi-adult households. Appendix table 9 provides a comparison of the single- and multi-adult households. As seen in this table, in comparison with multi-adult households, single-adult households have lower average incomes and lower monthly food expenditures; are more likely to eat as a guest in someone else's household and less likely to have guests; have higher education levels; lower household size; and fewer people over the age of 51. While we control for many of these differences in our model, differences over unobserved variables may lead to the low marginal propensities to consume. As an example, in addition to lower average incomes, single-adult households are more likely to have longer spells of poverty (Rodgers and Rodgers, 1992). These longer poverty spells may lead to different budgeting rules that underlie the low marginal propensities to consume. As another example, Gleason, Schochet, and Moffitt (1998) showed that single-adult households have substantially longer food stamp participation spells than other households. Longer food stamp participation spells may lead to households setting their food expenditures more closely to the food stamp allotment and using any deviation from this amount for nonfood expenditures, resulting in low marginal propensities to consume.

Regardless of the specification used, the regression results unambiguously confirm the main prediction of the model presented above and run counter to the prediction generated from the stigma-based explanation. Though all nonfood items taken together constitute a normal good, there is no evidence of a cash-out puzzle for single-adult headed households. The difference in expenditure patterns in the aggregate is completely explained by the consumption behavior of multi-adult households. Clearly, further empirical exploration of this difference between multi- and single-adult headed households is needed. The results here provide strong encouragement to explore this explanation of the cash-out puzzle.

Conclusion

As previous analysts have demonstrated, there appears to be a large discrepancy between the marginal propensity to purchase food out of cash income and that out of food stamps. In this report, we have advanced the hypothesis that the cash-out puzzle can be explained in terms of the differential effect of food stamp and cash income on intra-household distribution of resources within multi-adult households. We have developed this hypothesis formally through a Cournot model of the intra-household resource allocation mechanism in which total household food availability has the formal characteristic of a domestic public good. In this model, even if the household is unconstrained in its food expenditure, a replacement of food stamps by an equivalent increase in the cash income of the household may reduce total household expenditure on food. This occurs because when an individual member is constrained, increase in household cash income provides more cash to the constrained member. The model predicts that only multi-adult unconstrained households may exhibit larger marginal propensity to consume food out of coupons as compared with cash.

Our empirical results, using data from cash-out experiments conducted in San Diego County, are consistent with the theoretical predictions of our model. There seems to be no evidence of a cash-out puzzle for single-adult headed households, and the difference in expenditure patterns is completely explained by the multi-adult households. Our empirical results thus cast doubt on the appropriateness of the marginal stigma hypothesis as an explanation for the cash-out puzzle. An important extension of this research is to verify that this difference in marginal propensities between single- and multi-adult households is observed in other data sets. It would be of particular interest to examine this issue using data from after the passage of the 1996 Personal Responsibility and Work Opportunity Reconciliation Act.

The basic issue we raised in this report is whether the cash-out puzzle is largely a phenomenon confined to households with multiple decisionmakers. We provided some grounds, theoretical as well as empirical, as to why this may indeed be the case. We agree with others about the need for more systematic empirical exploration of this question.[26] The initial results indicate that exploring the relationship between the composition of household income and intra-household distribution of access to resources may explain the cash-out puzzle. This explanation has implications for policymakers. If the cash-out puzzle is primarily manifest in multi-adult households, any switch to cash away from food stamps (or in-kind programs more generally) may result in reduced food intakes by a readily identifiable group of households. This provides a justification for the use of in-kind benefits. If intra-household dynamics lead to children's receiving more food when the benefit is in the form of food stamps than in the form of cash, this provides a compelling reason for the use of in-kind benefits.

In this report, we have considered only the effect of stigma on total food expenditure. There may be other marginal stigma effects that do not cause changes in food expenditure. Wilde and Ranney (2000) and Beecroft et al. (1994) suggest that benefit recipients make more trips to the store when they receive checks or electronic debit cards instead of food stamps. This may, perhaps, be interpreted as evidence of stigma. Alternately, it may be that people do not like to hold food coupons, a highly liquid asset, because of the risk of theft, or more frequent trips to the store may mean that recipients are buying more perishable food such as fruits and vegetables that may provide better nutritive value. One interesting extension of this report would be to consider differences in nutrition elasticities for cash and benefit income.

[26] Wilde and Ranney (1996) also urge further exploration of this issue. Montalto (1992) considers the issue in a cooperative bargaining framework.

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Appendix

We shall establish proposition 1 with the following two lemmas.

Lemma N1

(A1) and (A2) together imply that for every $k \in \{M, F\}$ and for every $J > 0$, there exists a unique $S^k(J)$, such that $[g^k(r^k(J - S^k(J)) + S^k(J)) = S^k(J)]$. Furthermore,

(a) $S^k(J) \in (0, J)$,

(b) $[g^k(r^k(J - s) + s) > s]$ for all $s \in (0, S^k(J))$,

and

(c) $[g^k(r^k(J - s) + s) < s]$ for all $s \in (S^k, J]$.

Proof of Lemma N1

Consider any $J > 0$ and any $k \in \{M, F\}$. First note that since the private good is normal by (A1) and $[r^k(0) = 0]$, it must be the case that for $s = J$ we have:

$[g^k(J) < J]$.

For $s = 0$, since $r^k(J) > 0$ by (A2), it follows from (A1) that:

$[g^k(r^k(J)) > 0]$.

(A2) implies that $[r^k(J - s) + s]$ is continuous and increasing in s. Then, noting that, by (A1), g^k is continuous and increasing in its argument, Lemma N1 is immediate.

◊

Lemma N2

Given any $J > 0$, consider any $s^*, \hat{s} \in [0, J]$. Suppose $[y(J, s^*) > s^*]$ and for some $k \in \{M, F\}$, $[y(J, s^*) > g^k(r^k(J - s^*) + y(J, s^*))]$. Then, given (A1) and (A2), if $[s^* < \hat{s}]$, then $[y(J, \hat{s}) > y(J, s^*)]$.

Proof of Lemma N2

Denote all Nash equilibrium variables under s^* and $\hat{s}$ by the corresponding superscripts * and ^, respectively. Suppose $[y^* > s^*]$ and for some $k \in \{M, F\}$, $[y^* > g^k(r^k(J - s^*) + y^*)]$. Then, in light of (5) and (6), it is clear that $[y^*_{-k} > 0]$ and $[y^*_k = 0]$. Suppose $[s^* < \hat{s}]$ but

(X1) $\hat{y} \leq y^*$.

Since, by assumption $[y^*_{-k} > 0]$, using (5), we have:

(X2) $y^* = g^{-k}(r^{-k}(J - s^*) + s^* + y^*_k)$.

From (5) we also get,

(X3) $g^{-k}(r^{-k}(J - \hat{s}) + \hat{s} + \hat{y}_k) \leq \hat{y}$.

Then, since g^{-k} is increasing in its argument, (X1), (X2), and (X3) together imply:

(X4) $[r^{-k}(J - s^*) + s^* + y^*_k] \geq [r^{-k}(J - \hat{s}) + \hat{s} + \hat{y}_k]$.

Now since r^k is increasing in its argument by (A2), (X4) implies:

(X5) $y^*_k > \hat{y}_k$.

Since by assumption $y^*_k = 0$, (X5) involves a contradiction, which establishes Lemma N2.

◊

Proof of Proposition 1

Let $J > 0$ be some arbitrary amount of total household income. By Lemma N1(a), there exists for all $k \in \{M, F\}$, $S^k(J) \in (0, J)$ such that:

(X6) $[S^k(J) = g^k(r^k(J - S^k(J)) + S^k(J))]$.

Let:

(X7) $\bar{S}(J) = \max\{S^k(J), S^{-k}(J)\}$.

In light of (X6), to establish part (i) of Proposition 1, it is sufficient to show that:

(X8) $[y(J, s) > s]$ for all $s \in [0, \bar{S}(J))$,

and

(X9) $[y(J, s) = s]$ for all $s \in [\bar{S}(J), J]$.

Lemma N1(b) immediately implies (X8). Now, by Lemma N1(c),

for all $k \in \{M, F\}$, $[s > g^k(r^k(J - s) + s)]$, for all $s \in (\bar{S}(J), J]$.

Since the private good is a normal good, it follows that:

(X10) for all $k \in \{M, F\}$, $[y > g^k(r^k(J - s) + s + y_{-k})]$, for all $s \in \bar{S}(J), J]$.

Noting that, by construction, $[y(J, \bar{S}(J)) = \bar{S}(J)]$, (X10) yields (X9). This establishes part (i) of Proposition 1.

Let $\underline{S}(J) = \min\{\bar{S}^k(J), \bar{S}^{-k}(J)\}$. By (X6) and (A3), we have:

$\underline{S}(J) \in [0, \bar{S}(J))$,

where $\bar{S}(J)$ is defined by (X7) above.

Hence, to establish part (ii) of Proposition 1, it suffices to show that:

(X11) $y(J, s)$ is an increasing function of s in the interval $(\underline{S}(J), \bar{S}(J))$.

From (X8) above, we have:

(X12) $[y(J, s) > s]$ for all $s \in (\underline{S}(J), \bar{S}(J))$.

By Lemma N1(c), we have:

for some $k \in \{M, F\}$, $[[s > g^k(r^k(J - s) + s)]$ for all $s \in (\underline{S}(J), J]$.

Since the private good is normal by (A1), it follows immediately that:

(X13) for some $k \in \{M, F\}$, $[[y(J, s) > g^k(r^k(J - s) + y(J, s))]$ for all $s \in (\underline{S}(J), \bar{S}(J))]$.

In light of Lemma N2, (X12) and (X13) together imply (X11). This completes the proof of part (ii) of Proposition 1.
◊

Illustration of Proposition 1

Consider two agents, *M* and *F* with utility functions:

$U_M(x^M, y) = \ln(y) + x^M$ and

$U_F(x^F, y) = (x^F y)^{0.5}$,

with household resources $I_M = 10$, $I_F = 10$, $T = 0$, and $S = 4$. Let prices for both goods equal 1, and let the consumption of the other agent not enter the utility function of each agent for simplicity. Treating the stamp income as cash income and letting each agent have exclusive control over her/his resources, it is easy to show that agent *M* would choose (1, 13) and agent *F* would choose (7, 7), when the first number is the amount spent on food and the second is the amount spent on the private consumption good.

The Nash equilibrium will have:

(a) consistency of beliefs about other agent's contribution to *y*, and

(b) $y \geq S + y_{-k}$.

It is easy to see that (b) will be binding for agent *M*, and thus he will not contribute to food purchases for the household. *F* will then choose to allocate (7, 7).

This is an unconstrained household in which food expenditure is greater than stamp income ($S = 4$, $FE = 7$) with a constrained individual, *M*.

What would happen under a cash-out? Assume agents *F* and *M*, each getting half of the cash transfer. Now, *M* would choose (1, 11) and agent *F* would choose (6, 6).

The Nash equilibrium allocations would be:

M: (0, 12) and

F: (6, 6).

Thus, the household is unconstrained, but food expenditure decreases when benefits are cashed out.

Sensitivity Analysis of Regressions

To determine which variables to include in the regression and to test the sensitivity of our models, we estimated both models for: (1) the full check and stamp data set; (2) the full data set, using interactive dummies for the stamp recipients; (3) only the check households; and (4) only the unconstrained stamp households. We also conducted these four regressions, using only single-adult headed households. Any variable significant in one of these regressions was included in all the regressions for the sake of completeness and comparison. (The dummy variable for Asian head of household was included only in the check/stamp comparison since it was never significant for any of the stamp subsamples.) The point was not to necessarily come up with the best model, but to show that the results are robust to specification and variable inclusion. Furthermore, we feel that it is important to include variables for which a strong *a priori* reason exists for that variable to influence the dependent variable. We have resisted the temptation to further pare down the model or to drop variables with unexpected signs.

We report pooled and separate regressions for most regressions. There are no contradictions between the sign or approximate magnitude of any of the control variables we considered across these various regressions. Thus, our results seem quite robust to dividing the sample in various ways.

Gift income is the only variable that seems to differently affect the check and stamp households. For the stamp households, the sign is opposite of that which we would expect. When the sample is pooled, this variable is insignificant. Dropping this variable had no effect on the marginal propensity to consume out of food stamps or income or on any substantive result. Lunch subsidies were, surprisingly, positively related to food expenditure for all groups. This was consistent for every subsample of data. It could reflect an effect on preference development or taste for certain kinds of food that may increase family food expenditure. The age proportion variables was generally significant only for the double-log model. The higher the proportion in the 2- to 17-year age range, the higher the expenditure on food. This may reflect a focus on nutrition for children or the effects of advertising and peer pressure. We tested several different ways of separating the age ranges and this did not affect the main results. We also tested definition of food stamp benefit variables, income variables, and the definition of single- and multiple-adult families. Our results are robust for any reasonable definition of these variables.

We also explored the possibility of measurement error in the reported food expenditure data. It could be that there are many households considered unconstrained that are in fact constrained and clustered very close to the kink in the budget constraint. We allowed for food expenditure to be overstated by 5 and 10 percent and re-estimated the model, using that data to form the constraint. There was only 1 household within 5 percent of being constrained and less than 20 within 10 percent. We estimated the model after re-classifying these 20 households, but there was no effect on the results.

Appendix table 1—Comparison of stamp and check households

Item	Received stamps	Received checks
Sample size	510	467
Monthly cash income ($)	891	907
Monthly food stamp benefit ($)	116	117
Benefits as proportion of income (%)	13.7	13.9
Monthly food expenditure ($)	310	284
Households with WIC vouchers (%)	11.8	13.7
Average amount ($)	60	52
Households with school breakfast (%)	19.2	20.1
Average amount ($)	30	32
Households with school lunch subsidy (%)	50.0	50.5
Average amount ($)	56	58
Weekly average number of meals eaten as guest per household member	2.36	2.26
Weekly average number of meals eaten by guests per household member	3.66	2.92
Information on household head:		
Employed (%)	13.1	13.5
Hispanic (%)	32.9	32.8
Black (%)	22.4	18.2
Married (%)	22.4	24.2
Widowed (%)	2.9	3.6
Divorced (%)	19.4	19.5
Legally separated (%)	17.8	14.1
Completed high school (%)	58.8	56.5
Own home/pay mortgage (%)	1.0	1.3
Household information:		
Average size	3.9	3.6
Percentage of households with--		
Child(ren)	95.1	93.1
One adult	59.0	60.4
Female head	76.1	76.4
Single parent with child(ren)	56.3	57.0
Percentage of households with--		
Child(ren) age 0 to 11	85.7	84.4
Child(ren) age 12 to 17	30.8	30.8
Member(s) over age 51	13.1	11.6
Average number of children for households with children	2.5	2.3

Notes: WIC is the Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 2—Comparison of stamp households: Constrained and unconstrained

Item	All stamp households	Constrained	Unconstrained
Sample size	510	23	487
Monthly cash income ($)	891	700	900
Monthly food stamp benefit ($)	116	141	115
Benefits as proportion of income (%)	13.7	21.3	13.3
Monthly food expenditure ($)	310	109	320
Households with WIC vouchers (%)	11.8	17.4	11.5
Average amount ($)	60	67	60
Households with school breakfast (%)	19.2	17.4	19.3
Average amount ($)	30	44	30
Households with school lunch subsidy (%)	50.0	34.8	50.7
Average amount ($)	56	78	55
Weekly average number of meals eaten as guest per household member	2.36	3.38	2.32
Weekly average number of meals eaten by guests per household member	3.66	3.39	3.68
Information on household head:			
Employed (%)	13.1	4.3	13.6
Hispanic (%)	32.9	34.8	32.9
Black (%)	22.4	8.7	23.0
Married (%)	22.4	21.7	22.4
Widowed (%)	2.9	4.3	2.9
Divorced (%)	19.4	17.4	19.5
Legally separated (%)	17.8	30.4	17.2
Completed high school (%)	58.8	60.9	58.7
Own home/pay mortgage (%)	1.0	0	1.0
Household information:			
Average size	3.9	3.5	3.9
Percentage of households with--			
Children	95.1	78.3	95.9
One adult	59.0	69.6	58.5
Female head	76.1	78.3	76.0
Single parent with child(ren)	56.3	56.5	56.3
Percentage of households with--			
Child(ren) age 0 – 11	85.7	69.6	86.4
Child(ren) age 12 – 17	30.8	30.4	30.8
Member(s) over age 51	13.1	4.3	13.6
Average number of children for households with children	2.5	2.7	2.4

Notes: WIC is the Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 3—Comparing multi- and single-adult unconstrained stamp households estimates for linear model

Item	Unconstrained households (n = 487)	Single-adult households (n = 281)	Multi-adult households (n = 206)
Cash income per household member	0.070**	0.017	0.071**
	(0.018)	(0.021)	(0.018)
Cash income per household member interacted with number of adults	-.038		
	(.025)		
Food stamp benefits per household member	.675**	.030	.687**
	(.222)	(.180)	(.224)
Food stamp benefits per household member interacted with number of adults	-.474*		
	(.274)		
Household size	-.692*	-1.055	-.605
	(.402)	(.699)	(.497)
Money value of gifts of food per household member	.717**	.728**	.919**
	(.230)	(.276)	(.438)
In-kind food commodity donations per household member	-.697**	-.831*	-.511
	(.376)	(.450)	(.702)
Breakfast subsidy per household member	.200	.051	.410
	(.405)	(.562)	(.584)
Lunch subsidy per household member	.430**	.398*	.459*
	(.162)	(.214)	(.253)
Female-headed household	-.566	-2.487**	-.062
	(1.430)	(2.857)	(1.663)
Weekly meals eaten as guest per household member	-1.220**	-1.319**	-.872**
	(.189)	(.230)	(.352)
Weekly meals eaten by guests per household member	1.062**	1.139**	.941**
	(.135)	(.183)	(.206)
Proportion of households with child(ren) age 0 to 1	-6.767	-8.647	-7.778
	(4.386)	(5.748)	(7.471)
Proportion of households with child(ren) age 2 to 17	-4.887	-8.842*	-.281
	(3.560)	(5.046)	(5.199)
Proportion of households with member(s) over age 60	-2.704	-8.180	1.744
	(5.394)	(8.236)	(7.207)
Number of adults in the household	8.843**		
	(2.989)		
Constant	16.350**	33.007**	12.771**
	(2.768)	(4.746)	(3.230)
Adjusted R^2	.3036	.2830	.2624
Single-adult:			
MPC(Y)	.030	.017	
	(.019)	(.021)	
MPC(FSB)	.201	.030	
	(.166)	(.180)	
MPC(FSB) - MPC(Y)	.171	.013	
	(.167)	(.180)	
Multiple-adult:			
MPC(Y)	.070**		.071**
	(.018)		(.018)
MPC(FSB)	.675**		.687**
	(.222)		(.224)
MPC(FSB) - MPC(Y)	.607**		.616**
	(.222)		(.224)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The dependent variable is per-person food expenditure. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 4—Comparing multi- and single-adult unconstrained stamp households estimates for double logarithmic model

Item	Unconstrained households (n = 487)	Single-adult households (n = 281)	Multi-adult households (n = 206)
Log of cash and benefit income per household member	0.534**	0.058	0.536**
	(0.067)	(0.091)	(0.078)
Log of cash and benefit income per household member interacted with number of adults	-.417**		
	(.099)		
Proportion of food stamp benefits in total cash and benefit income	1.345**	.215	1.420**
	(.317)	(.356)	(.349)
Proportion of food stamp benefits in total cash and benefit income member interacted with number of adults	-.921**		
	(.452)		
Log of household size	-.356**	-.242**	-.399**
	(.092)	(.122)	(.141)
Money value of gifts of food per household member	.032	.022*	.066**
	(.010)	(.012)	(.021)
In-kind food commodity donations per household member	-.022	-.024	-.026
	(.017)	(.019)	(.033)
Breakfast subsidy per household member	.002	-.007	.008
	(.020)	(.024)	(.028)
Lunch subsidy per household member	.020**	.018**	.025**
	(.007)	(.009)	(.012)
Female-headed household	-.050	-.131	-.015
	(.063)	(.120)	(.080)
Weekly meals eaten as guest per household member	-.055**	-.059**	-.044**
	(.008)	(.010)	(.016)
Weekly meals eaten by guests per household member	.036**	.039**	.032**
	(.006)	(.008)	(.010)
Proportion of households with child(ren) age 0 to 1	.166	-.211	.302
	(.215)	(.277)	(.369)
Proportion of households with child(ren) age 2 to 17	.334*	-.141	.685**
	(.188)	(.260)	(.274)
Proportion of households with member(s) over age 60	-.013	-.165	.086
	(.240)	(.340)	(.348)
Number of adults in the household	1.845**		
	(.450)		
Constant	.896**	3.270**	.730*
	(.341)	(.492)	(.439)
Adjusted R^2	.3677	.2733	.3916
Single-adult:			
MPC(Y)	.018	.009	
	(.019)	(.020)	
MPC(FSB)	.145	.073	
	(.111)	(.114)	
MPC(FSB) - MPC(Y)	.127	.064	
	(.105)	(.107)	
Multiple-adult:			
MPC(Y)	.110**		.108**
	(.016)		(.018)
MPC(FSB)	.506**		.526**
	(.096)		(.107)
MPC(FSB) - MPC(Y)	.396**		.418**
	(.093)		(.103)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The dependent variable is log of per-person food expenditure. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 5—Households with children comparing multi- and single-adult unconstrained stamp households estimates for linear model

Item	Unconstrained households (n = 465)	Single-adult households (n = 270)	Multi-adult households (n = 195)
Cash income per household member	0.062**	0.023	0.069**
	(0.019)	(0.023)	(0.019)
Cash income per household member interacted with number of adults	-.020		
	(.027)		
Food stamp benefits per household member	.622**	-.126	.661**
	(.228)	(.208)	(.221)
Food stamp benefits per household member interacted with number of adults	-.650*		
	(.293)		
Household size	-.935**	-1.325*	-.704
	(.414)	(.777)	(.476)
Money value of gifts of food per household member	.772**	.861**	.992**
	(.232)	(.289)	(.419)
In-kind food commodity donations per household member	-.706*	-.853*	-.506
	(.371)	(.452)	(.666)
Breakfast subsidy per household member	.239	.094	.480
	(.399)	(.564)	(.554)
Lunch subsidy per household member	.377**	.374*	.417*
	(.161)	(.217)	(.242)
Female-headed household	-.269	-1.870**	-.024
	(1.486)	(3.267)	(1.623)
Weekly meals eaten as guest per household member	-1.179**	-1.332**	-.842**
	(.188)	(.233)	(.345)
Weekly meals eaten by guests per household member	1.023**	1.177**	.764**
	(.137)	(.187)	(.203)
Proportion of households with child(ren) age 0 to 1	-.801	-3.827	-.750
	(5.127)	(7.275)	(8.363)
Proportion of households with child(ren) age 2 to 17	.827	-4.126	5.757
	(4.364)	(6.764)	(6.055)
Proportion of households with member(s) over age 60	-1.312	-23.563	7.193
	(7.292)	(15.547)	(8.045)
Number of adults in the household	7.827**		
	(3.123)		
Constant	15.224**	31.103**	10.174**
	(3.012)	(5.534)	(3.625)
Adjusted R^2	.2695	.2488	.2392
Single-adult:			
MPC(Y)	.042**	.023	
	(.021)	(.023)	
MPC(FSB)	-.028	-.126	
	(.194)	(.208)	
MPC(FSB) - MPC(Y)	-.070	-.148	
	(.195)	(.208)	
Multiple-adult:			
MPC(Y)	.062**		.069**
	(.019)		(.019)
MPC(FSB)	.622**		.661**
	(.228)		(.221)
MPC(FSB) - MPC(Y)	.560**		.591**
	(.227)		(.220)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The dependent variable is per-person food expenditure. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 6—For households with children, comparing multi- and single-adult unconstrained households estimates for double logarithmic model

Item	Unconstrained households (n = 465)	Single-adult households (n = 270)	Multi-adult households (n = 195)
Log of cash and benefit income per household member	0.561**	0.050	0.562**
	(0.070)	(0.095)	(0.079)
Log of cash and benefit income per household member interacted with number of adults	-.470**		
	(.104)		
Proportion of food stamp benefits in total cash and benefit income	2.446**	.194	2.432**
	(.465)	(.378)	(.483)
Proportion of food stamp benefits in total cash and benefit income member interacted with number of adults	-2.159**		
	(.582)		
Log of household size	-.326**	-.223*	-.336**
	(.092)	(.128)	(.137)
Money value of gifts of food per household member	.032	.026**	.067**
	(.010)	(.012)	(.020)
In-kind food commodity donations per household member	-.022	-.024	-.021
	(.017)	(.019)	(.032)
Breakfast subsidy per household member	.003	-.007	.014
	(.018)	(.024)	(.027)
Lunch subsidy per household member	.019**	.019**	.021*
	(.007)	(.009)	(.012)
Female-headed household	-.021	-.129	-.004
	(.066)	(.139)	(.079)
Weekly meals eaten as guest per household member	-.054**	-.060**	-.040**
	(.008)	(.010)	(.017)
Weekly meals eaten by guests per household member	.037**	.041**	.030**
	(.006)	(.008)	(.010)
Proportion of households with child(ren) age 0 to 1	.180	-.214	.237
	(.240)	(.327)	(.401)
Proportion of households with child(ren) age 2 to 17	.347	-.150	.639**
	(.212)	(.313)	(.299)
Proportion of households member(s) over age 60	.059	-.821	.358
	(.326)	(.665)	(.386)
Number of adults in the household	2.193**		
	(.480)		
Constant	.594**	3.288*	.413
	(.362)	(.529)	(.455)
Adjusted R^2	.3468	.230	.3948
Single-adult:			
MPC(Y)	.016	.007	
	(.020)	(.020)	
MPC(FSB)	.101	.065	
	(.117)	(.120)	
MPC(FSB) - MPC(Y)	.085	.058	
	(.111)	(.113)	
Multiple-adult:			
MPC(Y)	.079**		.080**
	(.018)		(.020)
MPC(FSB)	.799**		.795**
	(.133)		(.140)
MPC(FSB) - MPC(Y)	.720**		.715**
	(.137)		(.142)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The dependent variable is log of per-person food expenditure. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 7—Stamp and check households: Linear model (a)

Item	Pooled sample (n = 953)	Unconstrained stamp (n = 487)	Check (n = 466)
Food stamp benefit per household member	0.318**	0.416**	0.221*
	(0.089)	(0.132)	(0.122)
Income per household member	.046**	.051**	.037**
	(.010)	(.014)	(.014)
Household size	-1.362**	-1.183**	-1.488**
	(.258)	(.362)	(.371)
Money value of gifts of food per household member	.217	.704**	-.015
	(.136)	(.231)	(.173)
In-kind food commodity donations per household member	-.270	-.742**	-.076
	(.187)	(.378)	(.215)
Household head is Asian	2.064**	.571	2.756**
	(.903)	(1.312)	(1.256)
Breakfast subsidy per household member	.340	.159	.491
	(.283)	(.408)	(.394)
Lunch subsidy per household member	.359**	.442**	.258
	(.117)	(.163)	(.171)
Female-headed household	-1.109**	-1.186**	-.968**
	(.135)	(.191)	(.193)
Weekly meals eaten as guest per household member	.978**	1.039**	.986**
	(.104)	(.136)	(.165)
Weekly meals eaten by guests per household member	-.155	.726	-1.069
	(.850)	(1.177)	(1.242)
Proportion of households with child(ren) age 0 to 1	-3.901	-2.182	-5.196
	(2.876)	(4.086)	(4.083)
Proportion of households with child(ren) age 2 to 17	1.593	-.291	3.017
	(2.198)	(3.162)	(3.070)
Proportion of households with member(s) over age 60	3.249	-3.780	7.713
	(3.562)	(5.404)	(4.785)
Household receives food stamp benefits	2.001**		
	(.577)		
Constant	18.597**	19.179**	20.238**
	(1.727)	(2.491)	(2.341)
Adjusted R2	.2571	.2937	.2172
MPC(FSB)	.318**	.416**	.221*
	(.089)	(.132)	(.122)
MPC(Y)	.046**	.051**	.037**
	(.010)	(.014)	(.014)
MPC(FSB) - MPC(Y)	.272**	.365**	.184
	(.089)	(.132)	(.122)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 8—Stamp and check households: Double-log model (c)

Item	Pooled sample (n = 953)	Unconstrained stamp (n = 487)	Check (n = 466)
Log of cash and benefit income per household member	0.338**	0.385**	0.295**
	(0.045)	(0.091)	(0.069)
Proportion of food stamp benefits in total cash and benefit income	.836**	1.065	.608**
	(.186)	(.247)	(.277)
Log of household size	-.375**	-.327**	-.420**
	(.057)	(.076)	(.084)
Money value of gifts of food per household member	-.012*	.030**	-.036**
	(.007)	(.002)	(.009)
In-kind food commodity donations per household member	-.028**	-.024	-.028**
	(.009)	(.017)	(.012)
Household head is Asian	.109**	.039	.144**
	(.045)	(.059)	(.068)
Breakfast subsidy per household member	.007	.002	.009
	(.014)	(.018)	(.021)
Lunch subsidy per household member	.021**	.021**	.019**
	(.006)	(.007)	(.009)
Female-headed household	-.053**	-.053**	-.048**
	(.007)	(.009)	(.010)
Weekly meals eaten as guest per household member	.037**	.036**	.044**
	(.005)	(.006)	(.009)
Weekly meals eaten by guests per household member	-.091**	-.030	-.165**
	(.045)	(.057)	(.069)
Proportion of households with child(ren) age 0 to 1	.184	.233	.117
	(.151)	(.193)	(.234)
Proportion of households with child(ren) age 2 to 17	.451**	.376**	.499**
	(.122)	(.158)	(.183)
Proportion of households with member(s) over age 60	.279	-.068	.445*
	(.178)	(.242)	(.259)
Household receives food stamp benefits	.110**		
	(.029)		
Constant	1.634**	1.442**	1.925**
	(.240)	(.317)	(.359)
Adjusted R^2	.2854	.3462	.2523
MPC(FSB)	.307**	.393**	.235**
	(.057)	(.078)	(.084)
MPC(Y)	.069**	.075**	.063**
	(.010)	(.013)	(.014)
MPC(FSB) - MPC(Y)	.238**	.318**	.172**
	(.053)	(.074)	(.078)

Notes: MPC(Y) is the marginal propensity to consume out of income, and MPC(FSB) is the marginal propensity to consume out of food stamp (check) benefits. The MPC's are calculated at median values. The standard errors are in parentheses. * indicates that the variable is statistically significant at the 90-percent confidence level; ** indicates that the variable is statistically significant at the 95-percent confidence level.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).

Appendix table 9—Comparison of unconstrained single- and multi-adult households

Item	Multi-adult	Single-adult
Sample size	206	281
Monthly cash income ($)	1,088.48	762.57
Monthly food stamp benefit ($)	128.02	105.14
Benefits as proportion of income (%)	13.02	13.50
Monthly food expenditure ($)	371.12	281.99
Households with WIC vouchers (%)	14.56	9.25
Average amount ($)	51.63	68.62
Households with school breakfast (%)	23.30	16.37
Average amount ($)	29.08	30.38
Households with school lunch subsidy (%)	53.88	48.40
Average amount ($)	57.21	53.23
Weekly average number of meals eaten as guest per household member	1.87	2.47
Weekly average number of meals eaten by guests per household member	4.47	3.09
Information on household head:		
Employed (%)	14	13
Hispanic (%)	37	30
Black (%)	18	27
Married (%)	42.70	7
Widowed (%)	1.94	3.57
Divorced (%)	11.65	25.27
Legally separated (%)	11	21
Completed high school (%)	52.90	62.99
Own home/pay mortgage (%)	3.40	1.07
Household information:		
Average size	4.97	3.06
Percentage of households with—		
Children	94.66	96.09
One adult	19.90	96.09
Female head	0	96.09
Single parent with child(ren)		
Percentage of households with—	87.86	85.41
Child(ren) age 0 – 11	31.10	30.60
Child(ren) age 12 – 17	24.76	5.34
Child(ren) age 12 – 17	24.76	5.34
Members over 51		
Average number of children for households with child(ren)	2.64	2.06

Notes: WIC is the Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: Data are from the San Diego Cash-Out Experiment, conducted by the U.S. Department of Agriculture, Food and Consumer Service (currently Food and Nutrition Service).