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Are People Ashamed of Paying with Food Stamps?

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We evaluate the claim that marginal 'welfare stigma' causes a dollar of food to provide less utility if bought with food stamps rather than cash, and that this explains why, in the United States, the marginal propensity to consume food out of food stamps is larger than that out of income. This hypothesis has been advanced to explain the so-called 'cash-out puzzle': the empirical observation that the marginal propensity to consume food out of food stamps is much higher than that out of income, even for households who spend some cash income on food. We develop a theoretical model to identify the restrictions imposed by the hypothesis that the puzzle is indeed caused by such stigma. Using data from San Diego County, we find that two of the three predictions of the marginal stigma model are violated. These results cast serious doubt on the marginal stigma hypothesis.

1. Introduction

This paper investigates the hypothesis that an additional dollar's worth of food bought with food stamps provides less utility than one bought with cash due to welfare stigma. It has been suggested (Levedahl, 1995) that this hypothesis explains the so-called 'cash-out puzzle', i.e., the tendency of the marginal propensity to consume food out of food stamps to be much larger than that out of cash income, noted in studies of the Food Stamp Programme[2] (FSP) in the United States. We formulate a theoretical model to further develop and examine this claim and to identify the major restrictions imposed on consumption behaviour of agents by this hypothesis. Using experimental data that have been used to advance the stigma hypothesis, we investigate whether these empirical restrictions indeed hold. Our

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[2] The Food Stamp Programme provides food coupons (or electronic debit cards) to low-income households in the United States. These coupons may only be used to purchase food for preparation and eating at home. They cannot be used to purchase tobacco, alcohol, or take-out food. Participants must fall below a certain income level and have sufficiently small assets to qualify for the programme. The programme is administered by the United States Department of Agriculture (USDA). Over 17 million individuals in nearly 7.5 million households participated in the programme in 2001. The current cost of the programme is over 15 billion dollars, making it one of the largest government support programmes for low-income families. The best source of information on the Food Stamp Programme is the web page of the USDA: http://www.fns.usda.gov/fsp/.

empirical results cast doubt on the (marginal) stigma hypothesis, and thus bring into question its usefulness as an explanation of the 'cash-out puzzle'. They also bring into question the very relevance of this puzzle for policy debates regarding FSP.

A better understanding of welfare stigma is crucial for policy formulation. If stigma causes programme participants to treat food stamp income and cash income differently, this has implications for programme cost and the well-being of programme participants. It is widely believed that the social stigma associated with receiving welfare benefits imposes significant non-pecuniary costs on recipients.[3] Because using food stamps necessarily involves revealing one's status as a welfare recipient, it seems eminently plausible that such non-pecuniary costs can be significantly reduced if food stamp benefits are paid in cash instead of in coupons. The United States Department of Agriculture has begun to move away from the traditional food coupons to schemes such as electronic benefit transfers (EBT) (see Beecroft *et al.*, 1994) and this has been partly justified by arguments about welfare stigma. Switching to EBT or cash transfers may generate administrative savings and reduce monitoring costs. Conversely, if these changes induce more people to enter the programme, costs may in fact rise.

Strong political support for FSP is predicated largely on the belief that food stamps generate greater amounts of food expenditure than cash transfers. Improving the nutritional levels of the poor, and particularly of children in poor families, is widely perceived to be a major goal of public policy. The coupon-based system may in fact be justified in terms of its impact on food consumption if welfare stigma has the consequence of increasing food expenditure. Moves away from the food stamp system towards cash support or EBT may therefore lead to a reduction in food expenditure, potentially to the detriment of children. Clearly, a deeper understanding of the role stigma might play in generating this observed difference in expenditure out of food stamps and cash is crucial to an informed debate.

In providing grounds for questioning the usefulness of the marginal stigma hypothesis as an explanation for the 'cash-out puzzle', the present paper contributes to this debate. Our aim in this paper is to contest the adequacy of the stigma-based explanation and to establish the case for seeking an alternative explanation. We begin by discussing some of the theoretical issues involved in the puzzle and the marginal stigma hypothesis. We also provide a review of the relevant literature in this section. We introduce our theoretical model in Section 3 and provide sufficient and necessary conditions for stigma to generate differences in demand behaviour from coupon income and cash income. In Section 4, we discuss our strategy for testing the marginal stigma hypothesis. In Section 5, we briefly discuss the data and the econometric model. Section 6 contains the main results from the estimation and the evidence against marginal welfare stigma as an explanation of the 'cash-out puzzle'. Our empirical results also bring into question the common belief that a move from the present FSP to a system based on cash welfare payments (or EBT)

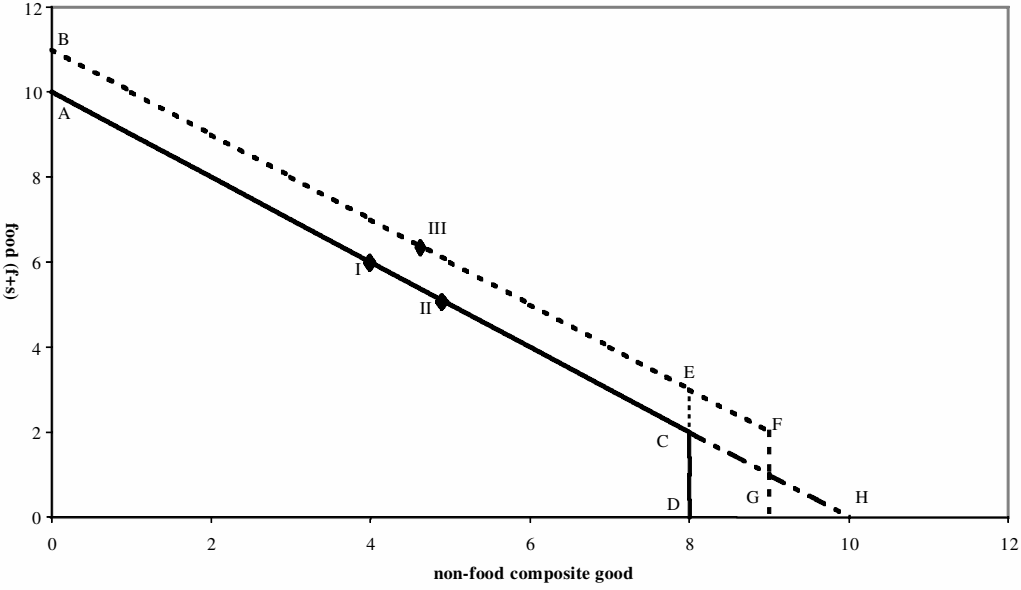
[3] The existence of a lump sum cost of participation due to such stigma has been advanced as an explanation of why many eligible households choose not to participate in welfare programmes such as AFDC (renamed Temporary Assistance for Needy Families, TANF) and the Food Stamp programme. A large literature exists on this issue. See, for example, Moffitt (1981, 1983), Ranney and Kushman (1987), Besley and Coate (1992), Blank and Ruggles (1996) and Gundersen and Andrews (1999).

will necessarily lead to a significant fall in food consumption. In doing so, they cast doubt on the relevance of the puzzle for policy debates regarding changes in FSP.

2. Theoretical Issues

The presence of food stamps, an in-kind benefit which can only be used to purchase food, creates a kink in the budget constraint. This is illustrated in Figure 1, where an individual purchases food with cash (f), food with stamps (s), and a non-food composite good (x). A typical individual participating in the food stamp programme will therefore face a budget constraint such as the solid line A-C-D. Assuming prices for food and the non-food good are both equal to one for simplicity, A-C-D represents the budget constraint of an individual who receives eight dollars of cash income and two dollars of food stamp benefit. The food stamps cannot be used to purchase the non-food composite, but may only be used to purchase food, creating the drop at point C.

Figure 1: Budget Constraint under Food Stamp Program



The basic theoretical model of the effects of government food subsidy on household expenditure, originally due to Southworth (1945), assumes that individuals who spend more on food than they receive in food stamps (who are sufficiently in the interior of the line segment A-C) take into account only their total income, not the *form* in which they receive it, when making their consumption decisions. In other words, they consider (a) a dollar of income received from own sources and that from welfare payments equivalent, and (b) a dollar of cash income received from the government and a dollar worth of food stamps equivalent. The model thus places two restrictions on demand behaviour for individuals who spend more on food than they receive in food stamps:

(R1) A reduction in food stamps associated with an identical increase in either income or cash welfare benefits, will keep food consumption invariant.

(R2) The marginal propensity to consume food out of cash income, food stamps and cash welfare payments should all be identical.

Consider these two restrictions with respect to an individual consuming at point I. The first restriction requires that if the food stamp benefit were converted to a cash welfare benefit (shifting the budget constraint from A-C-D to A-C-H), consumption should remain at I and not switch to another point such as II. This is simply what usual consumer theory would lead us to expect - if I is preferred over II at budget set A-C-D it should also be so at budget set A-C-H. The second restriction is that an individual at point I should switch to the same point (say III) irrespective of whether or not the increase in income occurs through an increase in food stamps (a shift from A-C-D to B-E-D) or from an increase in cash income (a shift from A-C-D to B-F-G). These predictions only pertain to individuals sufficiently in the interior of the line segment A-C.

Fraker (1990) reviews seventeen studies where the marginal propensity to consume food out of food stamp benefits is three to ten times larger than that out of money income, violating the second restriction. Ohls *et al.* (1992) use experimental data from the US Department of Agriculture where food stamp benefits were converted to an equal amount of cash benefit and show that the first restriction is violated. Together, these empirical regularities have been labelled the 'cash-out puzzle'.

While the discrepancy between the theory and the empirical results is of interest in its own right, studies have drawn an important policy implication from it as well. If agents do not distinguish between money income from own sources and welfare benefits paid in cash, then the empirical puzzle would imply that replacement of FSP by a system of cash welfare benefits (or EBT) would reduce food consumption significantly. Such a possible policy implication in turn provides an important motivation for developing a proper analysis and explanation of the 'cash-out puzzle'.

Of course, there is no puzzle for those households receiving an amount of food stamps greater than their desired level of food expenditure, given their total income level. If the government benefit were given in cash, these individuals would consume at a point on the segment C-H. The in-kind nature of the benefit, relative to the situation where the benefit is given in cash, constrains these individuals to consume at the 'kink', C. Converting the benefit from coupons to cash may result in a decrease in food expenditure and an increase in non-food expenditure for this group. Likewise, marginal increases in food stamp benefits and cash income may be treated quite differently by those at the budget constraint kink[4].

[4] Most studies show this group to be on the order of ten per cent. In the experimental data from San Diego used below, this group is only about five per cent. Thus, studies which find a large estimated marginal propensity to consume food out of food stamps at the aggregate level, relative to money income, would seem to contradict conventional economic theory.

The 'cash-out puzzle' only exists for 'unconstrained' households (those on the interior of the line segment A-C who spend some of their cash on food in addition to all of their food stamp income) and we will therefore restrict our theoretical and empirical focus to these households. The theory below is not intended to capture the more general case of all individuals including those at the kinked constraint.

Levedahl (1995) has suggested an interesting explanation for the puzzle. He considers a standard utility maximisation model where the agent consumes two goods: food and a composite of all other goods. The model is extended by allowing food bought with food stamps and that bought with income to be less than perfect substitutes. He defines stigma as the condition that the marginal utility of food bought with food stamps is less than that of food purchased with cash and conjectures that such marginal stigma generates the 'cash-out puzzle' in this model.

Levedahl's argument, however, suffers from two limitations. First, this theoretical condition is neither necessary nor sufficient to generate the observed anomaly in food consumption, as shown by Breunig and Dasgupta (2002). If it is neither necessary nor sufficient, then, even if it is the case that food purchases made with food stamps do impose non-pecuniary costs, the policy conclusion that implementation of EBT will cause food expenditure to fall does not necessarily hold. Second, he does not provide any independent empirical evidence to justify the assumption of marginal stigma. Even if marginal stigma is sufficient to explain the puzzle, in the absence of such evidence, it does not follow that it is indeed the correct explanation (unless it is also necessary). Both issues need to be addressed before one can seek to draw policy conclusions. That is the goal of this paper.

We start with a model of consumer behaviour where the agent consumes food and a composite non-food consumption good. Marginal stigma is incorporated by imposing a lower marginal utility for food purchased with food stamps compared to food purchased with cash income. This model allows us to identify empirically verifiable conditions under which marginal stigma is equivalent to behaviour in accordance with the 'cash-out puzzle'. The issue is of interest because, *a priori*, it seems perfectly possible that such conditions may turn out to be excessively restrictive, and hence, unlikely to be satisfied in practice. However, if one can show that the conditions, in fact, turn out to be empirically plausible, one would then have strong grounds for taking the stigma conjecture seriously as an explanation of the 'cash-out puzzle', and therefore, for subjecting its implications to empirical scrutiny. We show that the marginal stigma hypothesis generates the 'cash-out puzzle' under (and only under) the restriction that the non-food item be a strongly normal good.

Our approach to testing the marginal stigma hypothesis will be to assume that marginal stigma exists, to verify that the non-food good is indeed normal, and then to check for the presence of the 'cash-out puzzle' in a form that is consistent with the marginal stigma hypothesis. Finding that the 'cash-out puzzle' fails to hold in the form predicted by the marginal stigma model, despite finding that the non-food good is normal, casts doubt upon the marginal stigma hypothesis. This is discussed in more detail below.

We use data generated by an experiment carried out in San Diego county to undertake this test. In this experiment, described further in Section 5 below, some families received their food stamp benefits in the form of a check instead of as food stamp coupons. We find that reduction of welfare stigma through a conversion of food stamp benefits into cash does not appear to reduce food consumption. Therefore marginal welfare stigma seems misleading as an explanation for the difference in marginal propensities to consume food out of welfare and non-welfare income.

Evaluating the marginal stigma hypothesis by means of estimates derived from all households is, however, somewhat misleading. Such a procedure actually implies testing the stigma hypothesis jointly with the auxiliary hypothesis that multi-person *households* behave as if they are individual decision-makers. In the food stamp literature this assumption is ubiquitous. However, as the recent literature on intra-household decision-making shows, it is actually quite questionable.[5] 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 exhibiting consumption behaviour that cannot be explained in terms of the household maximising as an individual.[6] Thus, one may interpret the estimates derived from all households as implying a rejection of the unitary model of household decision-making, rather than that of the stigma hypothesis itself.

In order to conduct a more 'pure' test of the stigma hypothesis, we separately consider the group of single-adult headed households. We find no evidence of any difference between the marginal propensities to consume food out of cash income and food stamps for stamp-receiving unconstrained individuals, even though the marginal propensity to consume food is less than one. The 'cash-out puzzle' is, in fact, not present.

Taken together, these results therefore cast doubt on the assumption of marginal stigma and question its appropriateness as an explanation of the cash-out puzzle.

3. The Model

Consider an individual who consumes two goods: food and a composite non-food item. Food is available from two different sources: cash purchases and purchases through food stamps. Purely for notational simplicity, we shall assume that all prices are equal to one. Let the agent's preferences be given by the utility function:

$$u = u(x, f, s) \tag{1}$$

[5] See, for example, Alderman *et al*. (1995) and Haddad *et al*. (1997).

[6] Elsewhere (Breunig and Dasgupta, 1999) we develop and test a model where the cash-out puzzle is in fact generated by changes in intra-household distribution of resources occurring as a result of changes in the composition of total household income.

where x is the amount of the non-food good, f is the amount of food purchased with cash and s is both the amount of food purchased with coupons and the amount of food coupons received. The utility function is assumed to be increasing and differentiable up to the second degree in its arguments and strictly quasi-concave in (x, f).

We will assume that agents suffer marginal welfare stigma, captured by the following assumption on the utility function

A1. $u_s / u_f < 1$.

This differs from the standard framework where agents consider food purchased with cash income and that purchased with coupons identical, so that the marginal rate of substitution between these two items is unity.

The agent has cash income I, which consists of non-welfare income and cash welfare payments (if any). $Y = I + s$ is the total income of the agent from all sources, cash and coupons. Let $F = f + s$ be the total amount of food purchased with cash and coupons.

The agent's optimisation problem can be written as:

$$\underset{x,F}{Max}\ u(x, F - s, s) \tag{2}$$

subject to:

$$x + F = Y, \tag{3}$$

and

$$F \geq s. \tag{4}$$

Constraint (4) above holds with strict inequality if an agent is unconstrained. As explained above, the 'cash-out puzzle' only refers to the behaviour of unconstrained individuals. Hence, throughout the rest of this section, we shall assume that the agent is unconstrained. (This also lets us represent by s both the amount of food purchased with coupons and the amount of food coupons received.) The solution to the agent's optimisation problem subject to the budget constraint (3) yields, in the standard way, demand functions:

$$x = x(Y, s) \tag{5}$$

and

$$F = F(Y, s). \tag{6}$$

We shall assume that both demand functions are differentiable in their arguments.

The marginal propensity to consume food out of non-welfare income is the same as that out of cash welfare income, both being given by

$$\frac{\partial F(Y,s)}{\partial I} = \frac{\partial F(Y,s)}{\partial Y} \cdot \frac{\partial Y}{\partial I} = F_Y \cdot 1 = F_Y . \tag{7}$$

Given cash income, a change in the amount of stamps changes total food consumption both directly and indirectly, through its impact on total income from all sources, Y . The marginal propensity to consume food out of an additional dollar worth of stamps is thus given by

$$\frac{\partial F(Y,s)}{\partial s} = F_Y + F_s . \tag{8}$$

When the marginal propensity to consume food out of food stamps and cash income is identical, $F_s = 0$, and there is no puzzle. An agent's behaviour exhibits the 'cash-out puzzle' if the marginal propensity to consume food out of cash income is less than that out of stamps, i.e., if $F_Y < F_Y + F_s$. In that case, $F_s > 0$ and a conversion of part or all of food stamp income to cash income which leaves his total income from all sources, Y, constant, also leads to a fall in his total purchase of food. The 'cash-out puzzle' may therefore be interpreted equivalently as the following restriction on the agent's demand behaviour.

C1: $F(Y,s)$ is increasing in s .

We now provide the necessary and sufficient conditions for A1 to generate the 'cash-out puzzle'. Somewhat reassuringly, this restriction is the empirically-likely requirement that the marginal propensity to consume food out of cash income be less than one, i.e., the non-food item be a strongly normal good.

Proposition 1.

(a) A1 implies C1 if and only if x is increasing in Y .
(b) C1 implies A1 if and only if x is increasing in Y .

Proof of Proposition 1:

Given any consumption bundle (x, f, s), let t be given as the solution to:

$$u(x, f+t, 0) = u(x, f, s). \tag{9}$$

Then, from (9), we get:

$$t = t(x, f, s). \tag{10}$$

Because the marginal utility of food, whether bought with coupon or cash, is positive,

$$t_s > 0, \quad 1 + t_f > 0.$$

Equations (9) and (10) imply that the agent's preferences can be represented by:

$$u = u\big(x, f + t\big(x, f, s\big), 0\big) = V\big(x, f + t\big(x, f, s\big)\big). \tag{11}$$

It follows from (11) that the marginal rate of substitution between food bought with stamps and that bought with cash is given by:

$$\frac{V_s}{V_f} = \frac{t_s}{1 + t_f}. \tag{12}$$

From (12) we get:
A1 is equivalent to

$$\left[t_s - t_f - 1 < 0\right]. \tag{13}$$

Now note that, from (11), the agent's maximisation problem can be written as:

$$\underset{x,F}{Max} \;\; V\big(x, F + t\big(x, F - s, s\big) - s\big) \tag{P2}$$

subject to (3) and (4).

Under a conversion of food stamp benefits to cash welfare, the agent's overall budget constraint, (3), remains unchanged, while (4) is non-binding, because the agent is unconstrained by assumption. Let the marginal rate of substitution between the non-food item and total food purchased be given by:

$$V_x \Big/ V_F = g\big(x, F + t\big(x, F - s, s\big) - s\big) = G\big(x, F, s\big). \tag{14}$$

The agent's total income from all sources, Y, remains constant under a conversion from food stamps to cash, thus C1 is equivalent to the requirement that the agent's consumption of the non-food item increases under such a conversion of benefits. It is obvious from P2 that the agent's consumption of the non-food item will increase under a benefit conversion if and only if the marginal rate of substitution between the non-food item and total food purchased increases as the coupon component of his income is reduced.

More formally, we have:
C1 is satisfied if and only if

$$G_s < 0 . \tag{15}$$

Using (14) we have:

$$G_s = \frac{\partial g}{\partial\left(F + t\left(x, F - s, s\right) - s\right)}\left[t_s - t_f - 1\right],$$

using (13) and (15) we get:
A1 implies C1 if and only if

$$\left[\frac{\partial g}{\partial\left(F + t\left(x, F - s, s\right) - s\right)} > 0\right], \tag{16}$$

and C1 implies A1 if and only if

$$\left[\frac{\partial g}{\partial\left(F + t\left(x, F - s, s\right) - s\right)} > 0\right]. \tag{17}$$

Now note that (14) implies

$$\left[\frac{\partial g}{\partial\left(F + t\left(x, F - s, s\right) - s\right)}\left(1 + t_f\right) = G_F\right].$$

Because $1 + t_f > 0$, we have:

$$\left[\frac{\partial g}{\partial\left(F + t\left(x, F - s, s\right) - s\right)} > 0\right] \text{ if and only if } \left[G_F > 0\right]. \tag{18}$$

It is easy to see that $\left[G_F > 0\right]$ if and only if the demand function for the composite non-food item, $x\left(Y, s\right)$, is increasing in Y. Proposition 1 follows immediately from (16), (17) and (18).

Discussion of Proposition 1
Proposition 1 demonstrates that a necessary and sufficient condition for the cash-out puzzle is that the aggregate non-food good is increasing in total income. The proposition links the marginal stigma hypothesis to the empirical 'cash-out puzzle' through the condition that the non-food composite good is normal. The presence of marginal stigma implies that purchase of food through coupons is an inefficient way

of acquiring food. Conversion of coupons to cash is therefore intuitively similar to an increase in the agent's income in terms of its effect on consumption.[7]

Assuming that marginal stigma is present, we can verify that the non-food composite good is normal. If so, part (a) of the proposition tells us that the 'cash-out puzzle' should therefore exist. We now proceed to the details of how we test for the presence of the 'cash-out puzzle' and the marginal stigma hypothesis.

4. Testing the Marginal Stigma Hypothesis

Assuming marginal stigma and a non-food composite good that is normal, we should observe the following:

(P1) Consumption behaviour should exhibit the 'cash-out puzzle' in its standard form: the marginal propensity to consume food out of food stamps should be greater than that out of non-welfare income.

(P2) The marginal propensity to consume food out of cash non-welfare income should be the same as that out of cash welfare payments.

(P3) The marginal propensity to consume food out of food stamps should be greater than that out of cash welfare benefits.

The first prediction may seem odd. In a standard model, one would expect agents to purchase less of the good that they do not like. The fact that all food stamp income must be spent on food changes the intuition. What is happening? First consider an additional dollar of cash income. This dollar will be allocated between the non-food good and food purchased with cash to keep the ratio of marginal utilities of these two goods equal to the price ratio. Provided that the non-food good is a normal good, at least some of this income will be allocated to the non-food good. Now consider, in two steps, an additional dollar of food stamp income. This additional dollar is spent entirely on food (as food stamp income must be), but this frees up one dollar of cash income that was formerly spent on food. Less food is being purchased with cash, so the marginal utility of food bought with cash is now higher. The household will allocate the 'freed up' dollar of income to equate the marginal rate of substitution with the price ratio. In order to do this, however, the household will have to allocate a greater fraction of the 'freed up' dollar of income to food purchased with cash than they did in the case where cash income increased by one dollar. The marginal utility of food purchased with cash is beginning at a relatively higher point in the latter case.

The choice problem is between food purchased with cash and the non-food good. The fact that additional dollars of food stamp income are worth less than additional dollars of cash income generates the 'cash-out puzzle'.

The second and third predictions are both straightforward interpretations of the marginal stigma hypothesis and its role in generating the 'cash-out puzzle'. They are

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[7] If an agent is constrained, then, given marginal stigma, normality of the composite non-food good is sufficient, but not necessary, to generate the cash-out puzzle, i.e., C1. On the other hand, for such an agent, if the non-food good is inferior, then marginal stigma does not necessarily imply C1. In the Southworth model, however, C1 must necessarily hold for a constrained agent, regardless of the nature of the non-food item.

incorporated in our model (equation (7)). Marginal stigma is presumably due to the fact that one reveals one's status as a welfare recipient to others by paying with coupons, and such revelation causes disutility ('shame'). One does not need to reveal one's status in this sense if one is paying with cash, regardless of the source of such cash - this is (P2).

The third prediction is the most important from a policy perspective. This prediction implies that a conversion of food stamps to cash welfare benefit will necessarily lead to a fall in food consumption when the composite non-food item is a normal good. This is the policy implication routinely drawn from the empirical puzzle in its standard form. Violation of any of the three conditions specified above would cast doubt on the marginal stigma hypothesis itself. We shall test these predictions.

5. Data and Econometric Issues

The data we use are from an experiment undertaken in San Diego County where food stamp benefits were converted to a cash welfare benefit for a randomly selected sample of individuals. There is universal agreement that the 'cash-out puzzle' is present in these data and this experiment has been used by Levedahl (1995) to advance the stigma hypothesis.[8] 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 group. As noted before, the 'cash-out puzzle' only applies to households which spend some cash income, in addition to all of their food stamp income, on food. In what follows we will compare those households (unconstrained stamp households) to the ones who had their food stamp benefits converted to checks (check households.)

Fraker, Martini, and Ohls (1995) show that after conversion of food stamp benefits to checks, mean food expenditure for the unconstrained stamp-receiving group is significantly higher than for the check-receiving group, despite the fact that the two groups are randomly selected. Thus (R1) from Section 2 is violated - the 'cash-out puzzle' is present.

In order to investigate consumption behaviour, we estimate the Engel curve for food expenditure for check and unconstrained stamp-receiving households. We consider the Working-Leser specification which relates share of food expenditure, w, to total income, $I + s$, (cash income and food stamp income).

$$w = \alpha_1 + \alpha_2 \ln\{I + s\}$$

which underpins the AIDS model, has been found to fit well for food expenditure (see Chesher and Rees, 1987) and which is consistent with utility maximisation. (See Deaton and Muellbauer, 1980.)

As a check on the specification of the model, we first considered the nonparametric regression of food expenditure share on log of total income. While we found some

[8] Detailed information on the design and data collection of the San Diego cash-out experiment may be found in Ohls *et al.* (1992).

non-linearity present in the tails of the data, this specification appears better than linear or linear-in-logs specifications, which were also considered. In what follows, we therefore present the parametric results from the Working-Leser specification[9].

6. Empirical results

6.1 Testing the marginal stigma hypothesis on all households

We estimate the following variant of the Working-Leser model which allows us to test the predictions of our model:

$$w = \alpha_1 + \alpha_2 \ln\{I_i + \delta s\} + X'\beta \tag{19}$$

where w is share of food expenditure (from cash and stamps) in total expenditure, I is cash income, s is stamp (or check) benefits, and X is a vector of household characteristics. We use a full set of control variables which take into account receipt of other government subsidies, demographic characteristics, female-headedness of household, and the age composition of the household. In the Appendix, we present results using log of household size as the only household characteristic. The substantive results are the same in both cases.

Table 1 shows the results from maximum likelihood estimation of equation 19. We show three sets of estimates: separate estimates for unconstrained stamp households and check households and pooled estimates which include a dummy intercept variable (*stamp)* equal to 1 for households which receive food stamps. We have also estimated marginal propensities to consume out of food stamp benefits and non-welfare cash income. Standard errors for the marginal propensities to consume are calculated via the bootstrap.

If the first prediction of the marginal stigma model (P1) holds, then welfare benefits and cash income should be treated differently by unconstrained stamp households. This implies $\delta \neq 1$ for those households. Using just the stamp-receiving households, we estimate $\delta = -.26$. (See column 3 of Table 1.) The test of $\delta = 1$ produces a t-value of 2.36, leading us to reject the hypothesis that stamps and cash income are treated identically.

Thus the first prediction of the marginal stigma model holds - the 'cash-out puzzle' in the form of (R2) is present. Indeed, both (R1) and (R2) are violated, confirming what others have found, that the 'cash-out puzzle' is present in these data.

We also estimated the model using interactive dummies on α_2 and δ

$$w = \alpha_1 + \lambda_1 stamp + (1 + \lambda_2 stamp)\alpha_2 \ln\{I_i + (1 + \lambda_3 stamp)\delta s\} + X'\beta \tag{20}$$

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[9] Results from the linear and linear-in-logs specifications for the Engel curves are summarised in the appendix. The substantive conclusions are the same under all specifications that we considered. These results and the nonparametric regressions are available from the authors.

which allow the marginal relationships between income, food stamp benefit receipt and food expenditure to differ between the check-receiving and stamp-receiving groups. λ_2 and λ_3 are individually insignificant and the Wald test for joint significance gives a test value of 1.44, leading us to reject the hypothesis that the marginal propensities to consume out of food stamp coupons and checks are different. These results are confirmed by looking at the results from separate estimation of these two groups in columns 3 and 4 of Table 1.

The intercept dummy term is significant and positive in Table 1, consistent with the observation that the stamp group has higher mean expenditure on food. We thus report the estimates from the pooled model, with only the intercept dummy included.

In Proposition 1 above, we established that if the non-food item is a normal good, then, if it is the case that the marginal propensity to consume food out of stamps is greater than that out of non-welfare cash income, the agent's preferences must satisfy marginal welfare stigma. We find that the non-food composite good is normal (this is true by Engel Aggregation). Thus, the empirical result mentioned above, *viz* that the marginal propensity to consume food out of stamps is significantly larger than that out of non-welfare income, seems to support the marginal stigma hypothesis. However, the other two implications of the marginal stigma hypothesis are violated by the data. The marginal propensity to consume food out of cash welfare benefits is considerably higher than that out of non-welfare income. (In Table 1, δ is significantly different from 1 for the check households and the difference for check-receiving households in the marginal propensities to consume from cash income and food stamp benefits is significantly different.)

Perhaps even more important is the fact that there is no significant difference between the marginal propensities to consume out of food stamps and cash welfare benefits. Thus, the empirical evidence is strongly against the marginal stigma hypothesis. Despite the presence of the 'cash-out puzzle', neither of the other two predictions of the marginal stigma model hold.

6.2 Testing the marginal stigma hypothesis on single-adult headed households

The question arises as to whether these conclusions violate the marginal stigma model or the unitary household model. Note that we established our necessity result in Section 3 only for an individual decision-maker. For the model developed in Section 3 to be applicable to multi-adult households, one has to make the additional assumption that such households behave essentially like a single individual. As discussed in Section 2, this assumption is questionable and will affect the econometric results, because we are pooling households which may be fundamentally different. Once one moves out of the unitary model of household decision-making, it is no longer true that marginal welfare stigma is necessary for a multi-adult household's consumption behaviour to exhibit the 'cash-out puzzle', even if the composite non-food item is a normal good (see Breunig and Dasgupta, 1999).

Table 1: Regression Results for Working-Leser Model
Unconstrained stamp households and all check households[10]

	Pooled Sample (n=923)	**Unconstrained Stamp (n=470)**	**Check (n=453)**
α_2	-.16** (.01)	-.17** (.02)	-.15** (.02)
δ	.29 (.22)	-.26 (.53)	.35 (.34)
LNHHSIZE	-.098** (.016)	-.085** (.025)	-.108** (.022)
GIFT	.001 (.002)	.008** (.004)	-.002 (.002)
WIC	-.004 (.003)	-.008 (.006)	-.003 (.003)
ASIAN	.023* (.013)	.005 (.019)	.035* (.018)
BREAK	.003 (.004)	.000 (.006)	.007 (.006)
LUNCH	.005** (.002)	.006** (.002)	.004* (.002)
ASGUEST	-.013** (.002)	-.015** (.003)	-.011** (.003)
BYGUEST	.011** (.002)	.013** (.002)	.010** (.002)
FEM	-.022* (0.013)	-.002 (0.019)	-.042** (0.018)
HH0_1	.043 (.044)	.038 (.064)	.046 (.060)
HH2_17	.102** (.035)	.060 (.053)	.128** (.047)
HH61p	.019 (.051)	-.072 (.085)	.064 (.069)
STAMP	.03** (.01)		
constant	1.04** (.06)	1.07** (.10)	1.01** (.09)
log-likelihood	609.14	295.43	323.88
MPC(fsb)	.258** (.049)	.377** (.114)	.235** (.065)
MPC(inc)	.130** (.011)	.126** (.019)	.126** (.016)
MPC(fsb) - MPC(inc)	.128** (.049)	.251** (.118)	.109* (.064)

Therefore, estimates for single-adult headed households alone would seem to provide a more pure test of the marginal stigma hypothesis. We provide such

[10] Numbers in parentheses are standard errors. *significant at 90% level. **significant at 95% level
MPC(fsb): Marginal propensity to consume out of food stamp benefits (check or coupon)
MPC(inc): Marginal propensity to consume out of cash income

Table 2: Regression Results for Working-Leser Model Single-adult Households Only

	Pooled Sample (n=547)	**Unconstrained Stamp (n=272)**	**Check (n=275)**	**Pooled Sample (n=547) restricted: $\delta = 1$**
α_2	-.23** (.02)	-.26** (.03)	-.21** (.03)	-.23** (.02)
δ	1.32 (.57)	1.95 (.84)	.60 (.72)	1.00
LNHHSIZE	-.078** (.028)	-.052 (.041)	-.113** (.040)	-.077** (.027)
GIFT	-.002 (.002)	-.001 (.005)	-.004 (.003)	-.002 (.002)
WIC	-.004 (.003)	-.009 (.006)	-.002 (.003)	-.004 (.003)
ASIAN	.014 (.019)	.008 (.028)	.010 (.027)	.015 (.019)
BREAK	.003 (.005)	-.004 (.008)	.011 (.007)	.003 (.005)
LUNCH	.005** (.002)	.006** (.003)	.003 (.003)	.005** (.002)
ASGUEST	-.015** (.002)	-.018** (.003)	-.012** (.003)	-.015** (.002)
BYGUEST	.012** (.002)	.013** (.003)	.011** (.003)	.012** (.002)
FEM	-.042 (0.028)	-.033 (0.040)	-.059 (0.042)	-.039 (0.028)
HH0_1	-.048 (.063)	-.086 (.092)	-.012 (.096)	-.046 (.060)
HH2_17	.012 (.058)	-.090 (.087)	.114 (.084)	.013 (.055)
HH61p	-.042 (.083)	-.053 (.113)	-.064 (.125)	-.040 (.081)
STAMP	.034** (.011)			.034** (.011)
constant	1.43** (.12)	1.62** (.18)	1.31** (.16)	1.39** (.10)
log-likelihood	372.85	181.20	198.65	372.68
MPC(fsb)	.031 (.108)	-.121 (.193)	.146 (.146)	.096** (.018)
MPC(inc)	.099** (.019)	.093** (.026)	.064** (.026)	.096** (.018)
MPC(fsb) - MPC(inc)	-.068 (.109)	-.213 (.192)	.083 (.149)	

estimates in Table 2 for the stamp-receiving and check-receiving single-adult headed households. (See Appendix Table A.2 for comparison of these two sets of households, which are very similar.)

We first estimated (20) for single-adult households. As in the case of all households, we fail to reject that the marginal propensities to consume out of food stamp benefits or income are different across stamp-receiving and check-receiving households. (λ_2 and λ_3 are again individually and jointly insignificant, though the intercept dummy, λ_1, is significant.) For the stamp receiving households, we find that we cannot reject the hypothesis that $\delta = 1$, either when we consider those households alone or when we pool them with the check-receiving households. For the single-adult households, the 'cash-out puzzle' is not present. The last column in Table 2 provides estimates of the model with $\delta = 1$ imposed. (This is our preferred model, as a likelihood ratio test of this model against the separate regressions of columns 3 and 4 of Table 2 leads to rejection of the separate specifications.)

Non-food items together constitute a normal good. Yet, there is no evidence of any significant difference between marginal propensities to consume food out of cash income and food stamps. The main prediction (P1) of the marginal stigma model, fails to hold.

We cannot reject (P2), the second prediction of the model, that cash welfare benefits and cash income should be treated identically by the check-receiving group. This can be seen by looking at the last row of Column 4 in Table 2 where we find the marginal propensities to consume food from these two groups to be not significantly different.

Lastly, consider the prediction that is most important for policy purposes. We find that the non-food item is indeed a normal good. The primary restriction generated by the marginal stigma hypothesis then was that the marginal propensity to consume food out of stamps should be significantly higher than that out of checks. Yet we do not find any significant difference in the marginal propensities to consume food from welfare benefits across the stamp and check groups when we look at single-adult headed households. The marginal propensity to consume food out of check benefits actually appears to be somewhat larger than that out of stamps (Table 2), although the difference is not significant. In either case, the implication is that food consumption will not fall when benefits are converted from stamp to check, contrary to the most important prediction of the marginal stigma model.

When estimating the model for single-adult headed households only, the sample size is reduced to 547 observations. When we further separate by check- or stamp-receiving status, the samples are less than 300. The actual values estimated from such small samples are perhaps not particularly reliable - we find insignificant marginal propensities to consume from the food stamp benefit income, though not from cash (both are significant when their equality is imposed). Nonetheless, the important result that the 'cash-out puzzle' is not present in the data for single-adult households is not simply a function of sample size. If one considers multiple-adult

households only, the sample size is even smaller - 380 - but the 'cash-out puzzle' is clearly present. The overall puzzle in the data seems to be generated by the consumption behaviour of multi-adult households, and does not appear to be due to marginal welfare stigma.

In sum, we find that the 'cash-out puzzle' is present for all households, but the two other predications of the marginal stigma hypothesis fail to hold. When we restrict our analysis exclusively to single-adult households, the puzzle disappears. Whether we consider all households or only single-adult households, we fail to find any evidence that the marginal propensity to consume from food stamps is higher than from cash welfare income.

These results, therefore, put a question mark on the validity of the stigma-based explanation. There does seem to be a puzzle in the data, in that the marginal propensity to consume food out of stamps is significantly higher than that out of non-welfare income. Our empirical results thus question the policy inference usually drawn from the observed difference in marginal propensities to consume out of food stamps and non-welfare income.

7. Conclusion

As is amply documented, 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 paper, we have examined both the formal and the empirical bases of the argument that marginal welfare stigma explains this puzzling empirical regularity. We have built on Levedahl's formulation to show that it is formally valid for an individual decision-maker when (but *only* when) all non-food items taken together constitute a *strongly normal* good. Our theoretical exercise allowed us to rigorously derive testable predictions from the marginal stigma hypothesis. We have tested these predictions with data from an experiment in San Diego where food stamp benefits were converted to cash for a small sample of the food stamp receiving population. The results presented here cast serious doubt on the appropriateness of stigma as an explanation for the 'cash-out puzzle'.

Because the 'cash-out puzzle' is present in the data for all households, but there is no puzzle for the single-adult households, it appears that the puzzle is being generated by the behaviour of multiple-adult households. Our analysis thus points to the need for considering other factors, such as the dynamics of intra-household decision-making, as possible explanations for this surprising empirical regularity.

Furthermore, we do not find empirical support for the common belief that conversion of food stamps to cash welfare benefits (or EBT) will lead to a significant fall in food consumption. Thus, our empirical results also bring into question the policy implication that is commonly drawn from the observed discrepancy between the marginal propensity to consume food out of cash income and that out of food stamps. In doing so, they cast doubt on the very relevance of the 'cash-out puzzle' for debates regarding the consequences of a move from the present coupon-based programme to one based on some form of cash transfer.

In this paper we have only considered the effect of stigma on total food expenditure. There may be other marginal stigma effects which do not cause any changes in such expenditure. There is some evidence (Beecroft *et al*., 1994) 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. More frequent trips to the store may mean that recipients are buying more perishable food such as fruits and vegetables which may provide better nutritive value. It is not clear, however, what effect this should be expected to have on food expenditure. One interesting extension of this paper would be to consider differences in nutrition elasticities for cash and benefit income.

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APPENDIX

Table A.1:Variable definitions

Variable	Definition
INC	Cash income per household member
FSB	Food stamp benefit (check or stamp) per household member
LNHHSIZE	Natural log of household size
GIFT	Gift food received per household member
WIC	In-kind food commodity donations per household member
ASIAN	=1 if household head is Asian
BREAK	Breakfast subsidy per child
LUNCH	Lunch subsidy per child
ASGUEST	Weekly meals eaten as guest per household member
BYGUEST	Weekly meals eaten by guests in household per household member
FEM	=1 if female head
HH0_1	Fraction of household between 0 and 1 year old
HH2_17	Fraction of household between 2 and 17 years old
HH61p	Fraction of household over 60 years old
STAMP	=1 if household received food stamps

Table A.2: San Diego Experiment: Unconstrained Single-adult headed Households

	Stamp	**Check**
Monthly cash income per person	$271	$281
Monthly food stamp benefit per person	$36	$37
Monthly food expenditure per person	$98	$94
Weekly average number of meals eaten as guest per household member	2.45	2.36
Weekly average number of meals eaten by guest per household member	3.22	3.15
Household size	3.1	2.9
Percentage of households with:		
one member	3.9%	5.3%
two members	34.4%	35.5%
three members	30.5%	34.4%
four members	19.3%	15.6%
Percentage of households with:		
child from age 0 – 11	84.9%	85.1%
child from age 12 – 17	30.5%	27.9%
member over 51	5.3%	3.4%
Average number of children	2.1	2.0

Table A.3: Regression Results for Working-Leser Model
Unconstrained stamp households and all check households
Reduced model using only household size

	Pooled Sample (n=923)	**Unconstrained Stamp (n=470)**	**Check (n=453)**
α_2	-.16** (.01)	-.16** (.02)	-.14** (.02)
δ	.20 (.16)	-.25 (.56)	.16 (.18)
LNHHSIZE	-.07** (.01)	-.08** (.02)	-.06** (.01)
STAMP	.03** (.01)		
constant	1.01** (.06)	1.06** (.10)	.94** (.08)
log-likelihood	554.69	262.39	295.51
MPC(fsb)	.276** (.042)	.374** (.121)	.268** (.043)
MPC(inc)	.136** (.013)	.134** (.019)	.134** (.022)
MPC(fsb) - MPC(inc)	.140** (.043)	.240* (.130)	.134** (.047)

*significant at 90% level
**significant at 95% level

Table A.4: Regression Results for Working-Leser Model (3)
Single-adult Households Only
Reduced model using only household size

	Pooled Sample (n=547)	**Unconstrained Stamp (n=272)**	**Check (n=275)**	**Pooled Sample (n=547) restricted: $\delta = 1$**
α_2	-.23** (.02)	-.25** (.04)	-.21** (.03)	-.22** (.02)
δ	1.23 (.60)	1.70* (.91)	.81 (.79)	
LNHHSIZE	-.10** (.02)	-.10** (.03)	-.09** (.02)	-.09** (.02)
STAMP	.03** (.01)			.03** (.01)
constant	1.37** (.12)	1.51** (.18)	1.27** (.16)	1.34** (.10)
log-likelihood	331.81	157.00	175.76	331.73
MPC(fsb)	.037 (.14)	-.056 (.214)	.101 (.181)	.086** (.02)
MPC(inc)	.088** (.02)	.094** (.031)	.077** (.027)	.086** (.02)
MPC(fsb) - MPC(inc)	-.51 (.14)	-.149 (.216)	.024 (.183)	

*significant at 90% level
**significant at 95% level

Notes on Regression Estimates

We included all control variables that were used by Levedahl (1995) and by Ohls *et al.* (1992) as well as the proportion of individuals in the household in different age ranges to control for household composition. Tables 1 and 2 report all of these coefficient estimates. We have not engaged in any model reduction by eliminating insignificant coefficients, as the focus of our paper is simply on the estimated marginal propensities to consume.

As a check that the inclusion of the many insignificant results are not influencing our results, we also estimated very simple models using household size as the only control variable. These results are shown as Tables A.3 and A.4. The main point to take from these tables is that the significance patterns, signs, and general magnitudes of the marginal propensities to consume out of stamps and cash are the same as in Tables 1 and 2. We also re-estimated Tables 1 and 2, eliminating only insignificant coefficients - none of the reported marginal propensities to consume changed by more than .002 and the patterns of significance were identical to those reported in Tables 1 and 2. The conclusions in Table 1 and Table 2 regarding marginal propensities to consume out of stamps, cash income, and checks are thus robust to which individual characteristics are included in the regressions.

Gift income seems to affect the check and stamp households quite differently. For the stamp households the sign is opposite of what we would expect. When the sample is pooled, this variable is insignificant. Lunch subsidies were, surprisingly, positively related to food expenditure. This was consistent for every sub-sample of data. It could reflect an effect on preference development or taste for certain kinds of food which may increase family food expenditure. The age proportion data were significant for some models. The higher the proportion in the 2-17 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 breaking up the age ranges and this did not affect the main results.

Further sensitivity analysis was conducted regarding our definition of single-adult headed household, the definition of income and the definition of household size (the number of people in the household and the number of people eating out of the same food supply were both considered as candidates). 101 observations had household size data which conflicted with the information from the roster of individuals in the household. As this makes calculating the age proportion variables impossible, we present results for our models without these households. We also estimated the models with these households, assuming that the list of household members on the roster is correct and reported household size is incorrect. The results were the same, but as the assumption seems dubious, we prefer the reduced sample.

We explored the possibility that there are many households considered ‘unconstrained' which are in fact constrained and clustered very close to the ‘kink' in the budget constraint. We allowed for food expenditure to be overstated by five per cent and ten per cent and re-estimated the model using that data to form the constraint, but there was no impact on the results.

We also considered three other functional form specifications:

(a) $$F_i = \alpha + \beta I_i + \gamma s_i + X'\delta$$

(b) $$\ln(F_i) = \alpha + \beta \ln(Y_i) + \gamma \frac{s_i}{Y_i} + X'\delta$$

(c) $$\ln(F_i) = \alpha + \beta \ln\{I_i + \delta s\} + X'\delta$$

For all three models, the results (available from the authors) are substantively the same as those reported in the paper. We found evidence of the 'cash-out puzzle', but the two other predictions of the marginal stigma model (P2) and (P3) failed to hold. For single-adult households, we found that all three predictions failed to hold: (P1), (P2), and (P3). The key finding, that the 'cash-out puzzle' does not hold for single-adult households, is identical to that for the Working-Leser specification.