Do Food Stamp Recipients Anticipate Future Earnings?:
A Test of the Permanent Income Hypothesis

Ziv Tepman*
Department of Economics
Stanford University
June 1, 2006
Advisor: Thomas MaCurdy

The permanent income hypothesis (PIH) states that consumers decide how much money
to spend in a given period based on a rational assessment of future income. They react to
unusual events by borrowing or saving as necessary in order to “smooth” their consumption
across time. The question I address is, can low-income households on welfare also smooth their
consumption, even though borrowing and saving could be quite difficult? I use a survey of food
stamp recipients conducted in San Diego County in 1990 to explore the relationship between a
household’s expected future income and its spending behavior in the present. Based on
information about the educational attainment, age and other attributes of household heads, I
compute marginal propensities to consume (MPC) out of permanent and transitory income across
three categories of consumption: food, clothing, and total expenditures. As the PIH predicts, I
find that the MPC for food out of permanent income exceeds the MPC out of transitory income,
by up to 20%. A similar result emerges for total expenditures, while clothing does not display
such a difference. The semi-durable nature of clothing may explain this difference.

Keywords: permanent income hypothesis, food stamps, food consumption

*I am very grateful for Tom MaCurdy’s generous feedback and advice throughout this process.
Sri Nagavarapu was also a tremendous source of guidance throughout the year.
I. INTRODUCTION

How far ahead do people plan when deciding how much of their income to spend today? If an individual is earning very little at the present time but expects a large bonus in two years, will she still spend a lot of her money now? People make consumption decisions based not only on how much money they receive at the current time, but on how much they plan to make in the future. This rather simple notion is the essence of the permanent income hypothesis (PIH). Many studies of household consumption behavior model expenditures as a function of current income only, ignoring the implications of the PIH. This is especially true with regard to analyses of food stamp recipients. Because of their markedly low levels of income, these households are generally assumed to spend the entirety of what they receive in any given period just to survive.

As a consequence, very few studies have tested the PIH among this group. However, there is good reason to believe that these families anticipate future receipts in their spending decisions. Savings may occur in the form of durable purchases, for example. A food stamp household that is having an unusually high-income month may take such an opportunity to replace its deteriorating supply of durables such as the television, household equipment, or clothing. In this way no money is left unspent but a future payoff of services from these durables is obtained.

We can even relax the assumption that all of these households spend all of their income in each period. There is no grounds to definitively conclude that they are all making just enough money to achieve minimal subsistence month by month. If their expected future wealth is high enough, food stamp households may have good reason to believe that they are only experiencing a temporary negative income shock in any given period. We can think of the case of two households who receive the same level of income in a particular month. They are identical in
every way except one: the head of the first household has two years of postsecondary education,  
while the head of the second has not completed high school. Will the first household spend more 
of its income than the second this month?

My analysis addresses these questions using a unique set of data. In conjunction with the 
US Department of Agriculture, officials in San Diego County carried out a study in 1990 in 
which food stamp-receiving households were randomly selected as subjects. Although the main 
purpose of this exercise was to determine how converting food stamps into check payments of 
equal value would affect food expenditures, I use this data as a great way to test the PIH among 
food stamp households because of the thoroughness with which food data was gathered.

I complement these measurements of consumption with an imputation of each 
household’s “permanent income,” a proxy for lifetime wealth, which I explain below. The goal 
is to determine whether cross-sectional differences in permanent income have a greater effect on 
food consumption than do cross-sectional differences in “transitory,” or unexpected income. If 
the PIH is entirely wrong, then there should be no detectable differences in the marginal 
propensity to consume food out of these two components of income. I also run Engel curves on 
clothing consumption to see what effect durability has on the results. My final consumption 
regressions pertain to total expenditures, which is the metric most often used in studies of the 
PIH.

This analysis will reveal to what extent liquidity constraints hamper food stamp 
households’ ability to smooth consumption across periods. I end this section with a rough sketch 
of the PIH and a note on existing literature on the topic. Section II lays out previous findings on 
the food spending behavior of stamp recipients. It informs my regression analysis and reveals to 
what extent income in the form of stamps differs in its effect from non-stamp income. Section
III provides a deeper exposition of the intuition behind the PIH as well as what this model predicts for our data set. In Section IV I elaborate on the methodology I use to run Engel curves, and Section V describes the data set in greater detail. I discuss and analyze my results in Section VI and conclude with Section VII.

A BRIEF INTRODUCTION TO THE PERMANENT INCOME HYPOTHESIS

It has been nearly fifty years since Milton Friedman published his *Theory of the Consumption Function*, the formalization of the PIH that broke with the traditional Keynesian definition of income. Put formally, Friedman’s theory holds that consumers spend their current income based on a rational assessment of expected future receipts rather than on what they happen to receive in the current period.

The PIH’s definition of income takes the view that consumers have an optimal *planned* level of income in each period. This notion has intuitive appeal when one thinks of the effects of a predicted end-of-year bonus on a person’s spending. The Keynesian view would hold that consumption should rise measurably in the few months following the bonus and then quickly return to a more normal level (Friedman 1957, p. 3). More likely, households will smooth their consumption to achieve a more consistent level of spending so as to maintain a fairly constant state of affairs both before and after the one-time income boost.

Countless studies have tested this theory by measuring average propensities to consume in terms of total expenditures as a fraction of total income\(^1\). This usually takes the form of aggregate-level data which abstracts from modeling the consumption decisions of individual households. Few have examined how the model applies to separate categories of consumption at the household level. Friedman himself mentions that the PIH “clearly has implications” for

\(^1\) See, for example, Gerrard (1980), Park and Rodriguez (2000), Christiano et al. (1991)
subcomponents of consumption, but he leaves such work open for others to attempt (p. 206). In my analysis I will take two of the most universal household commodities—food and clothing—as indicators of the extent to which food stamp recipients factor permanent income into their spending decisions.

A WORD ON EXISTING PIH LITERATURE

An enormous literature exists on assessing the validity of the PIH. Authors have tested Friedman’s model by examining borrowing rates, variances of income, unexpected windfalls, revisions in consumption, and Euler relations, to name just a few. My analysis differs from theirs in two ways. First, I focus exclusively on a random sample of food stamp recipients to shed light on what role the PIH plays specifically for this group of Americans. Secondly, rather than using aggregate demand data to gain a rough estimate of the consumption behavior of consumers as a whole, I use precise household-level data which permits detection of small differences in spending on specific commodities with variation in permanent income.

II. REVIEW OF THE LITERATURE:
FOOD STAMP HOUSEHOLDS AND ENGEL CURVES

Since food spending is the main behavior I am analyzing to test the PIH, I now briefly examine previous studies that have tried to model food consumption among stamp recipients. A multitude of modeling decisions have to be made to do so in a reliable way. These include choosing which dependent and independent variables to use, the functional form, and which observations to include or exclude. The short history of the literature on this topic will guide these decisions when I run my own Engel curves.
EARLY ATTEMPTS AT MODELING HOUSEHOLD FOOD CONSUMPTION

The first empirical analysis of household consumption that was firmly rooted in statistical techniques was conducted by Ernest Engel in the mid-nineteenth century (Fraker 1990, p. A-1). His examination of the relationship between income and expenditures formed the basis of “Engel functions” as they are known today. When studying food consumption in particular, Engel found that households spend a diminishing fraction of their income on food as their earnings increase (Fraker 1990, p. A-1). Such an explanation is consistent with the Keynesian view of consumption discussed earlier, in which the share of expenditures that is spent rather than saved is predicted to systematically fall with higher income levels.

THE SOUTHWORTH HYPOTHESIS: DEALING WITH THE UNUSUAL BUDGET CONSTRAINTS OF FOOD STAMP RECIPIENTS

The first formalized analysis of the effects of food subsidies on household consumption using the neoclassical model was conducted by Southworth (1945). Only by taking into account these effects can we properly measure the marginal propensity to consume (MPC) food in our sample. In his paper, Southworth focuses on various ways to increase nationwide food consumption in the United States after World War II. This is what motivates his special examination of in-kind benefits. His basic model compares cash subsidies with coupon subsidies that can only be used for food. In the case of cash grants, Southworth notes that based on empirical evidence, only about 40% of the transfer would be spent on food in a low-income household regardless of whether it is in the form of stamps or cash because the receipt of additional income increases the consumption of all normal goods (p. 50). Even with coupons, there is no one-to-one correspondence between each dollar of subsidy and the amount of additional food purchased. The only case in which an in-kind transfer would be more effective
than cash at increasing food consumption is if its level reaches a high enough point. Southworth cites studies predicting that such transfers would need to exceed 150% of the household’s original food consumption level before the stamp allocation would drive food consumption up higher than with an equivalent cash grant. If this figure applied to our group of households, then a family of four that is earning its maximum allowed income level of $1059 and who spends 30% of it on food would need a $477 food stamp benefit before the in-kind form of the benefits made a difference. It would thus appear that the use of stamps should have no special effect on food purchases beyond the case of a cash grant unless a household’s original income is very low compared to the benefit amount.

This is depicted graphically in Figure 1. In the case that a household’s optimal consumption bundle with cash transfers is to the right of A—that is, the household spends a value greater than its transfer amount on food—there should be no effect if the benefit is converted to a cash transfer instead. The budget constraint segment AF will simply change to AB while the point of tangency with the agent’s utility curve will not change. Only when desired food spending with cash grants is on line segment AB will food stamps force a family to spend more than its preferred amount. Such households will subsequently be referred to as “constrained” by food stamps, the other households being “unconstrained.”

Southworth’s model thus allows for stamps to increase food consumption relative to the case of an equal cash transfer only in the case of constrained households. This leads to the hypothesis that for a household currently receiving stamps and spending more on food than its benefit amount—i.e., an unconstrained household—the MPC of food from cash should be equal to that from food stamps. For a consumer initially at point D in Figure 1 under a stamp benefit, an additional dollar of food stamps will extend budget constraint FA out horizontally by the
amount of food that can be purchased for one dollar. If instead the consumer were at point D under a cash benefit, another dollar of benefits would push the entire budget constraint BE upward by one dollar. In the relevant region—on segment AE—there is no difference from the increased stamp case and the utility optimizing point will be the same under both scenarios of receiving an extra dollar.

For a consumer initially at the kink A, one more dollar of food stamps will also extend budget constraint FA out horizontally by a dollar’s worth of food, but this time the agent will re-optimize at the new kink because her preferred amount lies above the kink and is thus unattainable. In this case Southworth’s model predicts an MPC for food of 1. Also implicit in the model is that the MPC from cash food assistance is no different than that from ordinary cash income. The neoclassical framework has no means to differentiate the various manners in which cash income is received. Thus, if we assume the Southworth hypothesis to be true, we would expect to find no differential effect of food stamps versus cash transfers or cash income among unconstrained households in our data set. The combined stamp and non-stamp income amount should be the only relevant metric for income in predicting food consumption. I now evaluate this claim further.

EARLY EMPIRICAL APPROACHES TO MODELING FOOD CONSUMPTION AMONG STAMP RECIPIENTS

The Southworth hypothesis was essentially assumed to be correct without question in subsequent studies that focused on the purchasing behavior of food stamp recipients. It could not be tested easily because Southworth’s analysis does not suggest a way to account empirically for the kinked budget constraint, which would require distinguishing between constrained and unconstrained households in observed data. His model also provides no insight on how the MPC
of food should vary with income. This leaves open the question of what functional forms and specifications should be used in estimating Engel curves to test his predictions.

In one of the early attempts to shed light on the topic, Salathe (1980), while making no mention of the Southworth model, finds theoretically that the distinction between constrained and unconstrained households is indeed necessary for a proper Engel curve specification. He concludes that a discontinuity exists in the relationship between bonus food stamps and household food purchases, which can only be accounted for by identifying constrained households. Because his data, taken from the 1972-74 Consumer Expenditure Diary Survey, cannot identify these households due to a lack of information on food stamp amounts, Salathe’s alternative is to run a simple linear regression model among food stamp-eligible non-participants. He uses the results from this regression to estimate predicted levels of food consumption for stamp recipients possessing the same characteristics as non-recipients. The difference between actual expenditures and these predicted values measures the added effect of food stamps on food consumption. Salathe uses per-capita weekly food consumption as the dependent variable and the following independent variables: per capita weekly (non-food stamp) income before tax, region, urbanization, race, and household size and age characteristics. Measuring food in per-capita terms allows for economies of scale in food purchasing. If these economies exist, then a rise in household size should reduce per-capita food consumption. Salathe goes on to divide the average measured net effect of stamps by the average per-capita food stamp bonus amount among participants to determine the differences in consumption per

---

2 Until 1979, the food stamp program featured a purchase requirement that obligated recipients to pay cash in exchange for an equivalent amount of stamps plus an extra “bonus,” also in the form of stamps. This is the relevant amount used to measure food stamp benefits in studies before the elimination of the purchase requirement (EPR). (Southworth 1945)
He finds a statistically significant differential effect of stamps on food purchases as compared to cash income—an MPC of 0.22 from stamps versus 0.08 from cash.

While it provides some reason to suspect that Engel curves should treat food stamps differently from cash income, Salathe’s methodology suffers from several significant flaws. Most troubling is the inherent endogeneity between food stamp participation and food expenditures. Rather than spending more on food because of the stamps, it is equally plausible that households with a greater taste for food are the ones that obtain food stamps in the first place. Similarly, recipients may be the ones with a better knowledge of nutritional requirements (Fraker 1990, p. 55). Another unobserved variable that may affect both the participation and food expenditure decisions is stigma. Food stamp recipients may feel less embarrassed about receiving stamps so that they spend these benefits more freely than non-participants would have done even if they were issued stamps exogenously. Such a phenomenon could lead Salathe to overstate the added effect of stamps. These and other unobservable factors cannot be ignored, especially because Salathe’s variables for region, income, and various demographic factors explain so little of the variation in total food consumption—the R-squared value is only 0.12.

Furthermore, cross-sectional variation in a non-random sample of food stamp recipients is not adequate to identify MPC values from stamps because the level of benefits is a direct function of household characteristics—mainly household size and other income—along with the unobserved factors already mentioned. Differences in spending may well be attributable to these underlying characteristics rather than the exogenous receipt of an additional dollar of stamps. A random sample among recipients only, however, is less likely to contain these biases because it achieves a more random variation in the error term. Omitted variable bias is more likely to average to zero. Finally, the Salathe paper specifies no budget constraint and makes no reference
to the neoclassical Southworth model. For all these reasons, the higher MPC out of stamps which the paper finds does not allow us to form conclusions about the appropriateness of the Southworth hypothesis.

A similar study finds higher MPC values. Chavas and Yeung (1982) also show that MPC values differ significantly for stamp and cash income. Among households with non-black, no-college heads in metropolitan areas, these numbers are 0.370 and 0.126 respectively. But because the study uses food stamp eligibility as a criterion for inclusion, its results may be biased. Also, these values once again reveal very little about the effect of stamps in the interesting case of unconstrained households. Because one can merely conclude that the measured difference in MPC’s arises from a large presence of constrained households, Chavas and Yeung’s analysis cannot verify the accuracy of Southworth’s model. The question of whether this model is appropriate to study food stamp households remained open.

Most other similar studies in the 1970s and 1980s suffer from the same two shortcomings: assuming no sample selection bias in comparing food stamp recipients to non-recipients, and failing to account for the censored dependent variable problem that arises from not being able to observe desired amount of food expenditure among constrained households. While nearly all find a differing MPC value between stamp and cash income, their shortcomings cast doubt on their results. They do not provide an adequate basis to answer a key question: does this MPC difference exist even among unconstrained households, as the Southworth model fails to predict?

MORE SUCCESSFUL ATTEMPTS AT TESTING THE SOUTHWORTH MODEL

The first authors to take explicit account of constrained versus unconstrained households in order to test the Southworth hypothesis were Senauer and Young (1986). Using the Tobit
method, they allow for separate Engel curves between the constrained and unconstrained groups. The authors use Panel Study of Income Dynamics (PSID) data on food stamp recipient households from both 1978 and 1979 to estimate separate regressions for each year. This is therefore the first study on the topic to contain some data after the elimination of the purchase requirement in 1979\(^3\). The survey provides sufficient information to compare food consumption levels to food expenditures, thus allowing for the identification of constrained households. Letting “FS” and “FEH” denote the annual allotted food stamp benefits and annual household food expenditures in each household, respectively, their model is:

\[
\begin{align*}
\ln(\text{FEH}) &= bX + e, \quad \text{if} \quad bX + e > \ln\text{FS} \quad \text{[Unconstrained Households]} \\
\ln(\text{FEH}) &= \ln\text{FS} \quad \text{if} \quad bX + e \leq \ln\text{FS} \quad \text{[Constrained Households]}.
\end{align*}
\]

Expenditure and income variables are measured on a per-household basis rather than a metric that divides these quantities by household size. The authors show that this decision should have no effect on the coefficient of the income term. The “\(X\)” in these two equations is a vector of characteristics that includes current and one-year lagged total income and their squares, the current and one-year lagged proportion of stamps in a household’s total income, log of household size in adult male equivalent units (AME)\(^4\), sex and age of household head, and race. A few items are worthy of comment here. The authors choose to use natural logarithms of the expenditure and income variables as opposed to a linear model, as a few others had done.\(^5\) Without specific justification, the authors state that they selected this double-logarithmic form because it displays a more homogeneous error structure than a linear form. The authors also choose to use proportion of stamps out of total income as an explanatory variable in order to

\(^3\) See Footnote 2.
\(^4\) AME units account for the age, sex, and pregnancy or lactation status of household members. Values are based on recommended dietary allowance (RDA) amounts as set by the Food and Nutrition Board (Fraker B-2).
\(^5\) See, for example, West and Price (1976).
allow for an easy test of the Southworth model. A concrete prediction of the model is that among unconstrained households, the proportion of income coming from food stamps should have no effect on food expenditure as long as total income is included as a regressor. Using a likelihood ratio test to evaluate the joint significance of current and lagged proportion of food stamps out of total income, the authors reject the null hypothesis of no effect at the 95% significance level. From the 1979 data, they also estimate the MPC to be 0.264 out of stamps and 0.073 out of cash. At 0.55, their R-squared value reaches a much higher level than previous studies, which do not use Tobit analysis. They also provide a table of MPC values out of cash and stamps that have been found in previous studies, which I include as Table 1.

Though taken by Fraker (1990, p. A-18) to be a rejection of the Southworth model, Senauer and Young’s findings only correct one of the two methodological errors made in previous works. While the authors account for the censored dependent variable problem involved with constrained households, their sample is essentially non-random. They only select food stamp recipients from the set of PSID households. These observations may differ systematically from non-recipients. The authors effectively treat the decision to participate in the food stamp program as independent of the food expenditure decision, a dubious assumption. They do not adequately justify their direct claim that limiting the sample to food stamp households does not introduce sample selection bias.

The only way to overcome these issues and to conduct a reliable estimation of Engel curves among stamp recipients is through an experiment. The ideal scenario is one in which we start with a population that has no access to the food stamp program. We would then randomly issue varying amounts of food stamps to the households and measure how their food purchasing behavior varies with exogenously chosen levels of benefits. While this scenario is obviously
infeasible, there have been a few food stamp policy experiments sponsored by the Food and Nutrition Service (FNS) of the Department of Agriculture. The SSI/Elderly Food Stamp Cashout Demonstration in the early 1980s consisted of four treatment counties and four control counties, all lying within New York, Oregon, or South Carolina (Fraker 1990, p. 69). The experimental groups had their food stamp benefits switched to equivalent cash benefits and the resulting differences in their purchasing behavior was analyzed. Studies found no significant difference between the food MPC values from stamps and cash transfers (Fraker 1990, p. 69). The Puerto Rico cash-out also occurred in 1982. All food stamp benefits were converted to cash benefits. Unfortunately the only data on food consumption was collected in 1977 and 1984 with an entirely different sample each time. Time effects could have had a large influence on the estimated MPC values (Fraker 1990, pp. 73-75). Studies on this experiment also failed to find a statistically significant difference in the relevant metrics. Fraker points out, however, that the results of both of these experiments may be unreliable. The most apparent concern is that both studies targeted a very specific and unique sub-sample of US households. Furthermore, the matched county design of the SSI study allowed for unobserved differences between counties (Fraker 1990, pp. 64-76). A within-county experiment would have been more fruitful. In addition to the shortcomings already mentioned, the Puerto Rico study occurred at a time when an active black market in stamps was known to exist before cash-out (Fraker 1990, p. 74). This could have caused the absence of significant changes in MPC values under the cash-out.

ANOTHER REJECTION OF THE SOUTHWORTH HYPOTHESIS: PURE CASH-OUT IN SAN DIEGO COUNTY

To gain more reliable results on the possible effects of cashing out stamps, the United States Department of Agriculture (USDA) conducted a set of four experiments in counties in
Alabama, San Diego, and Washington State. These were intended to be more representative of the US population and to obtain more rigorous data than the Puerto Rico and SSI/Elderly exercises. The San Diego experiment turns out to be the most reliable, as I explain in section IV. Since I also describe in Section IV the specifics of the San Diego cash-out in greater detail, I now focus on the findings by authors who analyzed it.

Multiple authors have found an unambiguous cash-out effect in the San Diego County experiment. MPC values for food differed significantly not only from MPC values out of cash benefits, but also from those out of ordinary (non-benefit) income. The authors of the original San Diego study find that food stamps do indeed boost food consumption more than an equivalent amount of cash (Ohls et al. 1992). By a simple comparison of means, they discover that the money value of purchased food per equivalent nutrition unit (ENU) is $2.42 higher in the stamp group than in the group of check recipients, which is significant at the 95% confidence level in a one-tailed test. Projecting this to a month leads to a figure of about $10.50 per ENU. Furthermore, the authors run a simple linear regression of the money value of food used at home on stamp income, check benefit income, ordinary income, and a vector of demographic variables. They discover a statistically significant positive difference between the MPC out of stamp coupons and that out of check benefits, as well as between the MPC from coupons and that from ordinary income. The MPC from stamps comes out to 0.277, that from checks is 0.108, and that from ordinary income is 0.063. These fall in the range of values found by previous authors as shown in Table 1.

Could the presence of constrained households explain the difference in means and in the linear regression coefficients? The answer turns out to be no. Wilde and Ranney (1996) use

---

6 This measure of household size adjusts for the nutritional energy needs of members based on age and gender composition as well as accounting for meals eaten from the household food supply and served to guests.
Tobit analysis to account for the kinked budget constraint in this same data set and thus for the presence of constrained units. Of the four functional forms the authors run—linear, semi-log, double-log, and share (see study)—they find that the linear model has the lowest estimated root mean squared residual. A semi-log model that uses the log of income but not of food expenditure ranks second. They obtain an MPC out of coupons of 0.22 versus a value of 0.10 out of checks with a linear functional form. The difference is statistically significant even in the case of accounting for the kinked budget constraint. The MPC out of ordinary income is even lower at 0.03. One can reasonably conclude that at least in the case of San Diego County, the neoclassical Southworth model is rejected. Even among unconstrained households, a significant difference in food consumption occurs with an extra dollar of stamp income as opposed to an extra dollar of cash or check income. This lends greater credibility to the results obtained in the earlier food consumption regressions of the 1970s and 1980s described earlier.

The methodologies and results described in this section provide the basis for my own approach to running Engel curve regressions, which I describe in Section V. I now move on to explain the background of the main topic of my analysis—the permanent income hypothesis.

III. THEORY AND METHODOLOGY

USING THE INTERTEMPORAL CONSUMPTION MODEL TO MOTIVATE THE PERMANENT INCOME HYPOTHESIS

To build the intuition behind the permanent income hypothesis (PIH), I start by solving an intertemporal consumer optimization problem (Friedman 1957). First I take the simple case of one good to be consumed for each of two periods.

I maximize utility in a simple two-period model allowing for borrowing and lending with interest rate r by taking first order conditions:
Max \( u = u(c_1, c_2) \) s.t. \( p_1 c_1 + \frac{p_2 c_2}{1+r} = y_1 + \frac{y_2}{1+r} \)

\[ \nabla(c_1, c_2, \lambda) = u(c_1, c_2) - \lambda (p_1 c_1 + \frac{p_2 c_2}{1+r} - y_1 - \frac{y_2}{1+r}) \]

\[ \frac{\partial \nabla}{\partial c_1} = \frac{\partial u(c_1, c_2)}{\partial c_1} - \lambda p_1 = 0 \]

\[ \frac{\partial \nabla}{\partial c_2} = \frac{\partial u(c_1, c_2)}{\partial c_2} - \lambda p_2 = 0 \]

I tentatively assume a Cobb-Douglas utility function, \( u(c_1, c_2) = c_1^\alpha c_2^\beta \), where \( \alpha, \beta \in (0,1) \).

Because these preferences are convex, second order necessary conditions for a maximum are satisfied. First order conditions yield:

\[ \frac{c_2}{c_1} = \left( \frac{\beta}{\alpha} \right) \left( \frac{p_1}{p_2} \right) (1+r) \]

Now let \( W = y_1 + \frac{y_2}{1+r} \) so that \( W \) represents the present discounted value of expected income. The new budget constraint is:

\[ p_1 c_1 + \frac{p_2 c_2}{1+r} = W \]

Solving these results in:

\[ c_1 = \left( \frac{W}{p_1} \right) \left( \frac{\alpha}{\alpha + \beta} \right) \]

and

\[ c_2 = \left( \frac{W}{p_2} \right) \left( \frac{\beta}{\alpha + \beta} \right) (1+r) \]

If prices are taken as fixed, the optimal consumption bundle \((c_1, c_2)\) depends only on two variables—\( W \) and \( r \). I do not need to know actual receipts \( y_1 \) and \( y_2 \) to solve the problem, only their expected combined present value. This is demonstrated in Figure 2. The point of tangency between the utility curves and budget constraint is not affected if \( y_1 \) and \( y_2 \) change, as long as \( W \) remains the same.

I now turn to the same simple case with two consumption goods in each period and with no specific utility function, to show that the predictions do not differ. This model will provide the most basic predictions for my regression analysis. In this case, borrowing and lending are allowed but the interest rate is set to zero for simplicity. We have goods “f” (say, food) and “c” (say, clothing). Both are non-durable so that they provide services only for one period before
being used up. I will later show what happens when clothing is assumed to have durable properties. I assume utility functions are separable and additive across periods, such that:

\[ U(f_1, c_1, f_2, c_2) = U_1(f_1, c_1) + U_2(f_2, c_2). \]

The various parameters are represented as follows:

\[ f_1 = \text{food purchased in period 1}, \quad f_2 = \text{food purchased in period 2} \]
\[ c_1 = \text{clothing purchased in period 1}, \quad c_2 = \text{clothing purchased in period 2} \]
\[ y_1 = \text{period 1 income}, \quad y_2 = \text{period 2 income} \]

Consumers derive utility depending on the quantity of food and clothing consumed.

\[
\max_{f_1, c_1, f_2, c_2} U_1(f_1, c_1) + U_2(f_2, c_2) \\
\text{s.t. } p_{1f} f_1 + p_{1c} c_1 + p_{2f} f_2 + p_{2c} c_2 = y_1 + y_2 \\
\mathcal{I}(f_1, c_1, f_2, c_2) = U_1(f_1, c_1) + U_2(f_2, c_2) - \lambda_i (f_1 + c_1 + f_2 + c_2 - y_1 - y_2)
\]

I wish to demonstrate again that the consumption of any one good is a function only of total wealth \( y_1 + y_2 \) rather than any one period’s income. Taking good \( f_1 \) as an example, I will show that if we hold \( W \) constant,

\[
\left. \frac{\partial f_1}{\partial y_1} \right|_W = \left. \frac{\partial f_1}{\partial y_2} \right|_W = 0 \quad (\text{Eq. 1})
\]

while, in general,

\[
\left. \frac{\partial f_1}{\partial W} \right| = 0 \quad (\text{Eq. 2}).
\]

I solve for the four parameters in terms of income amounts \( y_1 \) and \( y_2 \). The first order conditions are:

\[
p_{1f} f_1 + p_{1c} c_1 + p_{2f} f_2 + p_{2c} c_2 = y_1 + y_2
\]

\[
\frac{\partial \mathcal{I}}{\partial f_1} = \frac{\partial U}{\partial f_1} - \lambda p_{1f} = 0 \\
\frac{\partial \mathcal{I}}{\partial c_1} = \frac{\partial U}{\partial c_1} - \lambda p_{1c} = 0
\]
\[
\frac{\partial \mathcal{J}}{\partial f_2} = \frac{\partial U}{\partial f_2} - \lambda p_{2f} = 0
\]
\[
\frac{\partial \mathcal{J}}{\partial c_2} = \frac{\partial U}{\partial c_2} - \lambda p_{2c} = 0
\]

Equating the LaGrange multipliers:

\[
\frac{\partial U}{\partial f_1} \left( \frac{1}{p_{1f}} \right) = \frac{\partial U}{\partial c_1} \left( \frac{1}{p_{1c}} \right), \quad \frac{\partial U}{\partial f_2} \left( \frac{1}{p_{2f}} \right) = \frac{\partial U}{\partial c_1} \left( \frac{1}{p_{2f}} \right), \quad \frac{\partial U}{\partial f_2} \left( \frac{1}{p_{2f}} \right) = \frac{\partial U}{\partial c_2} \left( \frac{1}{p_{2c}} \right).
\]

I now solve for the other three endogenous variables in terms of \( f_1 \) using the three equations above:

\[
c_1 = \alpha(f_1)
\]
\[
f_2 = \beta(c_1) = \beta(\alpha(f_1)) = \chi(f_1)
\]
\[
c_2 = \delta(f_2) = \delta(\chi(f_1)) = \varepsilon(f_1)
\]

I plug these into the budget constraint and assume all functions are invertible:

\[
f_1 + \alpha(f_1) + \chi(f_1) + \varepsilon(f_1) = y_1 + y_2
\]

Let \( f_1 + \alpha(f_1) + \chi(f_1) + \varepsilon(f_1) = \theta(f_1) \), so that

\[
\theta(f_1) = y_1 + y_2
\]
\[
f_1 = \theta^{-1}(y_1 + y_2)
\]

Let \( W(y_1, y_2) = y_1 + y_2 \) so that \( dW = dy_1 + dy_2 \)
\[
f_1 = \theta^{-1}(y_1 + y_2) = \theta^{-1}(W) = \rho(W)
\]

It can be seen that \( f_1 \) is a function only of total wealth. To formally complete this derivation, I now differentiate with respect to \( y_1 \) and \( y_2 \):

\[
df_1 = \frac{\partial \rho[W(y_1, y_2)]}{\partial W} \cdot \frac{\partial W}{\partial y_1} dy_1 + \frac{\partial \rho[W(y_1, y_2)]}{\partial y_2} \cdot \frac{\partial W}{\partial y_2} dy_2
\]
\[
df_1 = \frac{\partial \rho[W(y_1, y_2)]}{\partial W} \cdot (1) dy_1 + \frac{\partial \rho[W(y_1, y_2)]}{\partial W} \cdot (1) dy_2
\]
\[
df_1 = \frac{\partial \rho[W(y_1, y_2)]}{\partial W} \cdot (dy_1 + dy_2)
\]

If we hold wealth \( W \) constant, this implies that:

\[
dy_1 + dy_2 = 0
\]  
(Eq. 3), and
\[ df_t = \frac{\partial \rho[W(y_1, y_2)]}{\partial W}(0) = 0. \]  

(Eq. 4).

It follows that a change in any one period’s income will have no effect on the consumption of non-durables holding wealth constant for a well-behaved utility function.

This provides the intuition behind the PIH. A rational consumer should plan her consumption based on the income she expects to receive in the long run rather than only on the current period’s receipts.

ASSUMPTIONS OF THE PERMANENT INCOME HYPOTHESIS

In Friedman’s model, income is defined as the amount a consumer would choose to consume in a given period in order to maintain a constant level of wealth \( W \) from period to period (Friedman 1957 p.10). This is based on the presumption that agents will smooth their consumption so as not to make themselves worse off or better off according to the receipts they happen to receive in individual periods. Friedman shows that such wealth maintenance is achieved when income is defined as the product of the interest rate \( r \) and current wealth \( W \):

\[ y_{pl} = rW \]  

(Eq. 5)

In the first example, we had \( W_1 = y_1 + \frac{y_2}{1 + r} \). In this two-period case, assume that a consumer receives her receipts at time zero so that she bears interest for the end of period 1.

After subtracting income incurred in time one, her total wealth at the end of period one is

\[ y_1(1+r) - rW_1 = y_1(1+r) - r(y_1 + \frac{y_2}{1+r}) = y_1 - \frac{ry_2}{1+r}. \]

At the beginning of period 2, the additional receipts bring wealth up to

\[ W_2 = y_1 - \frac{ry_2}{1+r} + y_2 = y_1 + \frac{y_2}{1+r} = W_1. \]  

(Friedman p. 10)
Friedman labels this special definition of income—the amount needed to maintain a constant level of wealth—as *permanent*. Intuitively, this is the *planned* level of income an agent expects to receive based on a rational assessment of her current wealth (i.e., the present discounted value of expected receipts over his lifetime) and expected rates of interest. This planned income is usually based on standard indicators of future income such as education level, age, and occupation. In one simple case in which we treat income from assets in the same way as we treat earned income, one may own a financial asset $A_o$ but have no other anticipated sources of income throughout her lifetime. Her permanent, or planned, income in any given period will then simply be the annual interest income $A_o r$. As long as the agent spends this every year her wealth $A_0$ will stay intact. If, however, she discovers that a relative has left a bequest to her of $10,000 with instructions for it to be transferred to her only in 10 years, the agent will adjust her annual permanent income to $\left[ A_o + \frac{10,000}{(1+r)^{10}} \right] r$. Likewise, an immediate income shock would be similarly smoothed over the agent’s own lifetime.

Now that I have introduced a new definition of income that takes into account an agent’s expectations about the future, I examine how consumers plan their consumption bundle in each period. It is only logical that they should base their planned consumption on their planned income. Friedman defines *permanent* consumption as the services which an agent plans to consume over the relevant period (p. 11). This includes non-durables as well as the value of services provided by durable goods. Actual consumption may differ from permanent consumption because of unanticipated levels of expenses. For example, an unexpected illness may require a costly trip to the doctor. Similarly, an unusually cool summer may negate the need to use the air conditioner.
Since consumption is a function of income, in Friedman’s model permanent consumption is a function of permanent income, which is itself a function of wealth and interest rates. Denoting $c_{pl}$ and $y_{pl}$ as the relevant permanent metrics for consumption and income\(^7\), we can express the variables as $c_{pl} = g(y_{pl}, r)$. Recall from Eq. 5 that $y_{pl} = rW_1$, so that now interest rates and wealth can be used to derive permanent income and permanent consumption for a given period.

Finally, Friedman shows that as long as we start by assuming a homothetic and symmetrical intertemporal utility function $u$, it is not unreasonable to predict that a consumer’s marginal rate of substitution in consumption between two periods depends only on the ratio of the permanent consumption in the two periods rather than their absolute levels (p 13). Put another way, doubling a person’s expected lifetime wealth should double her permanent consumption in each period. This is consistent with the usual presumption of a demand function’s homogeneity of degree one in total income. These assumptions result in the relationship

$$c_{pl} = k(r, u) * y_{pl} = k(r, u) * rW_1 \quad (Eq. 6)$$

where $k$ is a function of preferences and interest rates and $u$ denotes the agent’s utility function. If uncertainty is introduced, then $k$ will also depend on an agent’s ratio of non-human wealth to permanent income, denoted $w$ (p. 17). Friedman generalizes this result to any type of well-behaved utility function.

**PREDICTIONS OF THE PERMANENT INCOME HYPOTHESIS**

Friedman’s analysis requires that actual receipts differ from permanent income whenever there are unexpected fluctuations in income. Similarly, an agent’s actual level of expenditures

\(^7\) NOTE: I use “c” here to signify total consumption as Friedman does. Later when I analyze food and clothing expenditures, the “c” will represent clothing purchases.
should not be equal to permanent, or planned, consumption as long as unanticipated events affect desired consumption in a period. The PIH thus decomposes income and consumption into permanent and transitory components based on these discrepancies. This can be summarized as: 

\[ y = y_p + y_t \] and \[ c = c_p + c_t. \]

The terms without subscripts represent actual levels of income and spending, those with subscript ‘p’ represent permanent levels, and those with subscript ‘t’ denote transitory, or unexpected, levels. When combined with the assumption of homothetic preferences described earlier, these equations express the main elements of the PIH:

\[ c_p = k(r, w, u) y_p \]
\[ y = y_p + y_t \]
\[ c = c_p + c_t. \]

However, no testable claim can be made if there are no predictions regarding the probability distributions of \( y_t \) and \( c_t \). To complete the model, Friedman makes the following claims: the permanent component of income is uncorrelated with the transitory component of income; the permanent component of consumption is uncorrelated with its respective transitory component; and the transitory component of income is uncorrelated with the transitory component of consumption. According to the first claim, the mean value of \( y_t \) will not differ with the magnitude of \( y_p \). While higher permanent income earners may experience income fluctuations of greater absolute magnitude than their low-earning counterparts, on average positive and negative shocks will cancel each other out in both cases. A similar argument can be made for the two components of consumption.

The more interesting claim is that the average value of transitory consumption does not vary with a consumer’s level of transitory income. According to the PIH, an agent that receives a positive income shock in one period—such as an unexpected bonus at work—will be no more likely to experience a positive consumption shock in that period than she would be if she had
experienced no income shock at all. The stochastic amount by which unexpected household spending needs rise above her planned consumption level should not depend systematically on the (stochastic) value of her positive income shock. It follows that one simple prediction of the PIH with regard to our data on food stamp recipient households in San Diego is that if we can roughly identify their levels of permanent versus transitory income and consumption, we should find no correlation between the transitory components of these two measures. We will see that while I use a reasonable method to separate permanent from transitory income in the data I use, there is no useful way to do so for the components of consumption, which is the case for most PIH studies. Nonetheless, it is helpful to keep in mind that consumption is also subject to stochastic disturbances.

TESTING THE PIH WITH THE SAN DIEGO DATA SET

I will now revisit our first simple two-period consumption model in order to make concrete predictions that can be tested in the data set. Recall that when wealth \( W \) is fixed, then

\[
dy_1 + dy_2 = 0 \quad \text{and} \quad df_1 = \frac{\partial \rho[W(y_1, y_2)]}{\partial W} \cdot (0) = 0. \quad \text{(Eq. 10)}
\]

Furthermore, since all goods are assumed normal, if we take the demand function to be \( f_1 = \rho(W) \), then

\[
\frac{\partial f_1(W)}{\partial y_1} \bigg|_W = \frac{\partial f_1(W)}{\partial y_2} \bigg|_W = 0. \quad \text{(Eq. 11)}
\]
From the above analysis, the permanent income hypothesis therefore predicts that a non-durable good\(^8\) such as food should have a greater marginal propensity to consume out of permanent income \(W\) than out of transitory income \(y_1\) or \(y_2\), the latter two MPC’s being zero if the PIH is totally accurate. It is necessary to translate this result into the notation of the PIH as shown in Eqs. 7-9. I add the variables \(R_1\) and \(R_2\) to represent actual receipts in each period, replacing \(y_1\) and \(y_2\) in our most recent derivation. I can then allow \(y_1^p\) and \(y_2^p\) to represent the levels of income for which the consumer planned based on her total wealth—that is, her permanent income for each of the two periods. These are strictly functions of total wealth \(W\) and liquidity parameters, such that

\[
y_1^p = g_1(W, r) \quad \text{and} \quad y_2^p = g_2(W, r) \quad \text{(Friedman p.11)}.
\]

The consumer’s time preferences and the interest rate \(r\) will determine how she divides her wealth between the two permanent income amounts—see again Figure 2. Referring back to Eq. 7 from the PIH, the model predicts that our agent’s planned consumption amounts are \(c_1^p = ky_1^p\) and \(c_2^p = ky_2^p\), so that she consumes a fixed portion of her permanent income regardless of her actual level of receipts in each period. Recall that \(k\) depends on demographic characteristics but not on permanent income levels. It is important to keep in mind that many of the low-income households I am analyzing may receive barely enough income to meet their expenses, such that they plan to spend all of it in each period and should have a value 1 for \(k\).

We can refer to the amount by which \(R_1\) exceeds (or falls short of) \(y_1^p\), quite conveniently, as \(y_1^t\), transitory income, so that \(y_1^p + y_1^t = R_1\). In the absence of transitory income,

---

\(^8\) Defined here to be a good that retains no value after the period in which it is consumed.
the agent consumes $y_1^p$ and saves $s_i = y_i^p - ky_i^p = 0$, if $k=1$. If the transitory amount is positive, then in order to “smooth” her income the agent will save

$$s_i = R_i - y_i^p = y_i^p + y_i' - y_i^p = y_i'$$

(Eq. 12)

to be left over for period 2. Notice than in this case where $k=1$, all savings will result from the quantity of transitory income received. By our assumption of constant wealth, receipts in period 2 must be $R_2 = W - R_1 = y_i^p + y_2^p - R_1$. By carrying over savings $s_1$ from the first period, the consumer has $y_i'' + y_2^p - R_1 + (R_1 - y_i'^p) = y_2^p$ to spend in the second period, so that she achieves her planned level of income despite the transitory income shock. Similarly, if $R_1$ falls short of $y_i^p$, savings $s_1$ will become negative and the agent would have to borrow against her expected second period income to achieve her planned optimal consumption.

I now apply this new notation to our results regarding the MPC to consume food, $f_1$, in our two-good, two-period model. In that case,

$$\frac{\partial f_1}{\partial y_1'}|_w = \frac{\partial f_1}{\partial y_2'}|_w = 0.$$  

(Eq. 13 ) and

$$\frac{\partial f_1}{\partial W} > 0, \frac{\partial f_1}{\partial y_1''} > 0, \frac{\partial f_1}{\partial y_2''} > 0.$$  

(Eq. 14)

SAVING VERSUS SPENDING UNDER THE PIH

I now focus on the effect of permanent versus transitory income on savings. Since savings is a crucial part of my subsequent regression analysis, I take the more general case of $k < 1$, such that not all of permanent income is consumed. Considering again the formula $s_i = R_i - ky_i^p$ and holding period 1 permanent income constant, we see immediately by differentiating that:
If permanent income is fixed, a dollar increase in transitory income is predicted to be saved entirely. If instead period 1 permanent income increases by one dollar due to a change in wealth $W$, and period 1 receipts $R_1$ are held constant, then we obtain:

$$\frac{\partial s_1}{\partial R_1} \bigg|_{r_1^p} = \frac{\partial s_1}{\partial y_1^r} \bigg|_{r_1^p} = 1. \quad \text{(Eq. 15)}$$

The above two results imply that the marginal propensity to save out of transitory income should be one while that out of permanent income should be negative $k$. Put another way, an additional dollar of transitory income should be saved entirely while an additional dollar of permanent income should be spent almost entirely.

In its strictest sense, the PIH predicts that all positive transitory income should be either saved or invested in durables. If food $f_1$ is taken to be a non-durable good, it follows that:

(Prediction 1) $\frac{\partial f_1}{\partial y_1^r} \bigg|_{r_1^p} = 0.$

The MPC of food out of transitory income should be zero according to the PIH.

In contrast, permanent income should be spent with MPC $k$, which will not generally equal one as we assumed. However, for households that receive just enough (or even too little) income to pay basic living expenses, such as those in the San Diego food stamp experiment, it is reasonable to tentatively assume that $k$ is one. Households are likely to spend the entirety of their planned income. I now abstract away from the distinction between temporary and transitory consumption, as has been done in most empirical tests examining the PIH. The basic predictions of the PIH will be largely unchanged without this distinction. If I now let $t_1$ represent
total consumption in period 1, Eq. 15 implies that \( \frac{\partial t_1}{\partial y^p_1} = k = 1 \), since consumption is the negative of savings in this case. An increase by one dollar of permanent income in period 1—which could arise only from a change in the consumer’s total expected wealth, as expressed in Eq. 5—will result in a \( k \) dollar increase in her total consumption in this period. If a household spends a fraction \( \alpha \) of its marginal income on food, then the MPC of food out of a dollar of permanent income will simply be \( k\alpha \).

(Prediction 2) \( \frac{\partial f_1}{\partial y^p_1} = k\alpha > 0 \).

THE DECISION OF WHETHER TO SAVE OR PURCHASE DURABLES

While this analysis is instructive, it ignores an alternative method households use to carry over wealth from period to period—durable goods. In his explanation of the plausibility of the PIH, Friedman notes that a consumer receiving an unexpected windfall may indeed increase her expenditures but will do so by purchasing durable goods with her positive transitory income (p. 28). Friedman does not consider these purchases to be entirely a form of consumption since agents only consume the services provided by a durable rather than the durable itself. The portion of a durable’s price that corresponds to the services provided by the good, however, should be considered a part of household consumption in Friedman’s view (p. 28).

I showed in Eq. 15 that households should save all transitory income under the PIH. I now turn to the decision of whether to save in the form of financial assets or durable goods. If durables could be sold and rented with insignificant transaction costs, then households should be indifferent to which form of savings they choose. A consumer can generate future income either by lending out her savings or renting out her durable good to others (or to herself, thus foregoing
rental income in exchange for the services provided by the good). Either way her assets can be liquidated at the end of the relevant period, although durables will incur a loss equivalent to the depreciation rate each year\(^9\). With costless transactions, the no-arbitrage condition of basic finance theory will require that the returns to the two options be equalized.

I now consider a more realistic scenario for low-income, food-stamp recipient households. In many cases the fixed transaction costs involved in renting out a good are too high relative to the rental income generated by the good. Secondly, in practice very few such goods are sold on the secondary market by owners, again due to the high ratio of transaction costs to value. Automobiles are an exception precisely because of their high value relative to transaction costs. In the analysis that follows, I therefore disallow non-automobile durables to be sold or rented out by households in our sample.

An additional imperfection of capital markets among low-income households is the transaction costs of saving in a bank account relative to its returns. During May through July of 1990 when the survey for our data set was conducted, the federal fund rate was 8.25\% (Washingtonpost.com), while CPI-based inflation was approximately 6\% (FFC). A household that could afford to save part of its income even up to an unusually high level such as $500 would earn $40 per year or $3.33 per month in interest. This is likely to be exceeded by the extra transportation costs involved in depositing and withdrawing cash at least monthly. Another complication in applying the PIH to these households is the high likelihood of borrowing constraints. Financial institutions typically do not make loans to individuals with so few assets, and credit card companies are reluctant to take on such a risk. Surprisingly, however, the survey conducted by Mathematica revealed that approximately one fourth of these households borrowed

\[^9\] We assume no inflation. If inflation is significant and nominal rates of return do not adjust, then durables will keep up with price levels while financial assets will not.
money in order to pay for food. As I will discuss later, most likely these loans came from higher-income relatives or friends. We could reasonably conclude that such lenders would charge little or no interest in consideration of their borrowers’ poor financial state. While survey participants were not asked if they borrowed money to purchase items other than food, there is a high likelihood that many households did given the high rate observed in the food question.

With these considerations, the decision of whether to save in the form of financial assets or durables in our sample comes down to the tradeoff between the services provided by a durable over its lifetime versus the liquidity and interest borne by a savings account. To model this, I assume that households have an optimal level of consumption of services provided by durables in each period. To ensure a reasonably steady flow of such services, households must maintain a stock of each durable. These goods are assumed to lose value at the rate of depreciation $\delta$, such that households will have to devote at least some non-zero portion $\theta$ of their savings to increasing their stock of durables in order to prevent the loss of services from each durable. The amount of savings $s_1$ in our model therefore will be split between financial holdings and durable purchases. The only semi-durable good for which we have expenditure amounts in our dataset is clothing, which unlike many durables, will be present in every household. Recalling that $c_1$ represents clothing purchases in period 1 and that durables can be a form of savings, this leads to our third prediction of consumption behavior for our sample:

(Prediction 3) $\frac{\partial c_1}{\partial y'_1} > 0$.

At the same time, households’ optimal consumption bundle always contains some demand for the services provided by clothing. Since such services are normal goods, clothing purchases should increase with permanent income just as food does:
(Prediction 4) \[
\frac{\partial c_l}{\partial y_t^p} > 0.
\]

But since clothing has durable properties, households will on average only spend a small fraction (theoretically, that fraction which corresponds to the added services provided by the good) of additional permanent income on clothing. Most of the spending on clothing goes toward investment in its durable properties, which serves the same purpose as savings. This is why the MPC for this good out of transitory income should on average be higher than that out of permanent income:

(Prediction 5) \[
\frac{\partial c_l}{\partial y_t^p} > \frac{\partial c_l}{\partial y_t^p}. 
\]

III. METHODOLOGY

CONSIDERATIONS IN RUNNING ENGEL CURVES FOR FOOD CONSUMPTION

An Engel curve by definition has some form of consumption as the dependent variable and some measure of income as a regressor. My period of measurement is one month since income and non-food expenditure data is reported on this basis in the San Diego study. Food consumption was measured for one week so I scaled it appropriately. Several choices exist in capturing household consumption—food eaten, food bought, and food both purchased and eaten. The latter category makes the most sense. Food purchased but not eaten is a sort of capital expenditure, and food eaten but not bought only reflects a previous period’s capital expenditures.

Income presents no ambiguity in measurement, but household size has been treated a variety of ways in the literature. Adult Male Equivalent (AME) units, as described in Footnote 5, provide a rough measure of the energy needs of the household based on converting each member into an appropriate fraction of an average adult male. These values are based on the
age, sex, and pregnancy or lactation status of each household member, as prescribed by the Food and Nutrition Board (Fraker B-2). Wilde and Ranney (1996) and Senauer and Young (1986) choose this metric, while Breunig and Dasgupta (2005) and Levedahl (1995) use number of household members, specifically number of members in the food consumption unit (FCU). FCU counts only those individuals that eat from the household food supply. I chose this latter figure because we would like our analysis to shed light on what difference an additional household member makes both on per person food consumption and total food consumption. AME units have no such intuitive interpretation. It is also unclear whether caloric energy needs are the key metric that influences food consumption (Breunig and Dasgupta 2005). To take some account of the ages of members, I included variables for the percentage of the household members belonging to each age category, as is done in Levedahl (1995).

Some studies have used consumption and income for the entire household as variables while others presented per-capita amounts. I chose the per-member figure. By including household size as a separate variable, this allows us to account for household economies of scale in food production. Such a phenomenon would suggest a negative coefficient on household size. However, for my regressions on clothing and total expenditures I used per-household amounts because there is little reason to believe there would be a similar effect; preliminary analysis attested to the absence of economies of size in these cases. Such a per-household regression allows for an easier direct interpretation of coefficients.

I included only the most relevant independent variables to avoid introducing too much statistical “noise.” Household size, non-food stamp income, food stamp benefits, and the proportion of household members belonging to a particular category were chosen regardless of statistical significance because of their economic importance. Variables such as race and sex of
household head were insignificant. Two variables that did have a lot of explanatory power are
\textit{ASGSTH} and \textit{BYGSTH}, the number of meals per household member either eaten as a guest in
someone else’s home or by a guest in one’s own home, respectively. Few other regressors had
enough substantive or statistical importance to include. I also found that \textit{STAMP}, a dummy
variable for being in the control group of receiving food stamp coupons rather than cash-
equivalent checks, was almost always significant in the food regressions. This is the notorious
“cash-out effect” found in the literature, so I included it. In addition, for consistency with
Breunig and Dasgupta (2005) and Levedahl (1995) in analyzing this data set, I excluded
“constrained” households who spend an amount less than or equal to their food stamp benefits
and “overflow” households who appear to spend more on monthly food than their entire monthly
income. In linear regressions, results varied only a trivial amount when these observations were
included. Noticeable differences were found in logarithmic regressions when overflow
households were included, as explained in Section V.

Another important consideration for the food regressions is the functional form of Engel
curves. No consensus exists in the literature but the most common method is the basic linear
form as used by the authors of the study itself (Ohls et al. 1992). Several studies provide insights
on this question as well as on which variables to include. Salathe (1980) assumes a linear model
by default. An example of an alternative form comes from the Chavas and Yeung (1982) paper
which explores the effects of variable interactions. The key regressors in this study are once
again income, bonus stamp value, and family composition by age. The authors attempt to
control for the possibility of non-constant MPC values by interacting income with the food stamp
bonus amount as well as including the square of income. Of the fifteen regressions they run on
fifteen food commodities, only three show statistical significance in the squared income term and
five reveal significance in the interaction between food stamp bonus and other income. Their findings do not constitute a compelling enough reason to abandon the traditional linear model.

Wilde and Ranney (1996) find little difference in the results under various functional forms, but that the linear and semi-logarithmic\textsuperscript{10} models have the lowest mean squared error. Senauer and Young (1986), Levedahl (1995), and Breunig and Dasgupta (2005) all use double-logarithms. For this reason I start with the linear form and use logarithms as a second pass. As will be discussed later, the logarithmic form displayed high sensitivity to the exclusion of only a few households. The linear form appears to be more robust in explaining expenditure behavior in our sample.

A further consideration is how to account for various forms of income. For decomposing the effects of receipts into their components, a linear form lends itself most easily. Simply including different regressors additively for non-benefit income and food stamp income, and eventually separating total income into permanent and transitory income, captures their effects rather cleanly and allows for easy interpretation and hypothesis testing of equality. Recent studies that use a logarithmic model (Senauer and Young (1986), Breunig and Dasgupta (2005)) implement a “share” approach only to test the Southworth hypothesis. They include natural log of total income including stamps as well as the share of total income coming from stamps. Statistical significance on the share term would imply a rejection of the Southworth hypothesis. Since my focus is to gain a broader understanding of the specific effects of various types of receipts, I rely primarily on the linear approach instead and use the logarithmic model as a secondary check on my results. My linear regressions for food consumption take the following form:

\textsuperscript{10} In this model, only the logarithm of income is used while the absolute amount of food consumption is the dependent variable.
\[ \exp_{p_i} = a + b*(\text{perm}_{p_i}) + c*(\text{trans}_{p_i}) + d*(\text{stamp\_dummy}_i) + e*(X_i) + u_i \]

The logarithmic regressions I use for food are:

\[ \ln(\exp_i) = a + b*\ln(\text{perm}_i) + c*(\text{trans}_i) + d*(\text{stamp\_dummy}_i) + e*(X_i) + u_i \]

where:

- \( \exp_{p_i} \) = monthly food expenditures for household \( i \), divided by household size
- \( \exp_i \) = monthly food expenditures for household \( i \)
- \( \text{inc}_{p_i} \) = total monthly non-food stamp income, divided by household size
- \( \text{inc}_i \) = total monthly non-food stamp income
- \( \text{stamp\_dummy}_i \) = indicator that household \( i \) received its food benefits in the form of coupons rather than checks
- \( X_i \) = vector of household characteristics and information on guest meals
- \( u_i \) = error term

I use similar regressions to these on clothing and total expenditures.

**TESTING THE PIH: IMPUTATION OF PERMANENT INCOME USING CPS DATA**

Our predictions from Section II state that the marginal propensity to consume food should be positive out of permanent income and much closer to zero out of transitory income.

Permanent income is the amount a consumer expects to treat as her income for a given period, or essentially her planned income. While there is no way to guess the actual expectations of future income among our sample households, patterns can be deduced from known relationships between various characteristics and average income levels. For this reason I use the Current Population Survey (CPS) from the time to determine systematic patterns in how income earners fare in relation to several key variables. The most important instruments I use are education and age, but there are several others.

The CPS is a survey of 50,000 or more households carried out each month by the Bureau of the Census (Herz). Its main purpose is to provide a wide range of information about the labor
force for the Bureau of Labor Statistics, focusing on workers of age 15 or higher. The survey uses a multistage stratified sample (CPS Design, p. 3-2). The United States is first divided into primary sampling units (PSU’s)—often large counties—and these are grouped into strata based on previously obtained demographic information. One PSU is sampled in each strata, where its probability of selection is proportional to its population. A sample of households is then selected from each of these PSU’s. Households are surveyed for 4 consecutive months, excluded for the next 8 months, and then interviewed again for 4 months.

The March Supplement of the CPS collects extra information and has a larger sample size than the regular CPS. I extracted the data for March 1990 from a “CPS Utilities” CD-ROM made by Unicon Research, which included 158,079 individuals, and obtained a final sample of 59,804 heads of separate households. Survey units which had no designated head were excluded. Household income included all annual monetary receipts and the value of any food stamps received, scaled to a one-month period for comparability with our main data set. The March Supplement allowed me to examine more comprehensive data than the usual survey on household composition, marital status, income from all sources, occupation group, and several other attributes. I ran a linear regression of household income, including food stamps, on the independent variables listed in Table 2: highest educational attainment (for head of household), sex, age, marital status, race, and household size. All coefficients were significant at the 99% level or better. I used these coefficients to instrument for the permanent income levels among the San Diego set of households, by plugging in their sample values for all variables in Table 2. The difference between total current income and permanent income as imputed with the CPS coefficients was designated as transitory income, as in Eq. 7. My imputation for households was for total income only, as there is no reason to distinguish between food stamps and other income
when looking at long-term, permanent income that is to be expected in a typical month. I double-checked the harmlessness of abstracting away from the effect of stamps by running some of my regressions among check-receiving households only, whose food stamp income comes in the same form as regular income. Results are discussed in section V.

I chose the CPS imputation because a rational agent in the San Diego sample would presumably have some sense of what a “typical” worker similar to her receives in the long run based on observations of others. While omitted variables reflecting “ability” or “diligence” may be observable only to the agent, to the extent that such factors are correlated with education, we can still get quite a reasonable estimation. Furthermore, while our data set pertains to food stamp households in particular, which is contrary to the CPS’s general sample, there is little reason to suspect that this group differs fundamentally in its members’ long-term income outlook. The great majority of these households consist of single mothers with children. One may speculate about why two single women with identical current income and household size—the two main determinants of food stamp eligibility—might make differing decisions on whether to apply for stamps. Reasons might include distance to the nearest food stamp office, knowledge of the program, preference for food, or level of stigma associated with receiving these benefits. While some of these factors may affect food consumption, as mentioned earlier, none of these are likely to influence a person’s perception of her earning ability in the long run. The risk of sample selection bias is small.

IV. DESCRIPTION OF DATA

BACKGROUND ON THE FOUR CASH-OUT EXPERIMENTS

In July of 1989, 20% of food stamp recipient households in San Diego County were randomly selected by county administrators to receive their benefits in the form of checks rather
than stamps. The decision to “cash out” only a portion of households rather than the entire
caseload was made at the request of the USDA, who wanted to use the opportunity to explore the
differential effects of cash versus stamps on household consumption. Over a fifteen-week period
starting in May 1990, Mathematica Policy Research (MPR) conducted a survey for this purpose
based on a stratified random sample of 1226 food stamp households. Approximately half were
receiving their benefits in the form of cash (the experimental group) and half were receiving
stamps (the control group) (Ohls et al. 1992). A summary of characteristics of the entire sample
is shown in Table 3. Figure 3 displays the average income levels across the sample from various
sources as a fraction of average total income.

This study comprised one of four “cash-out” demonstrations that occurred in the United
States around the same time, in which subsections of the food stamp caseload received their
benefits in the form of a check rather than a stamp coupon. County food stamp administrators
worked in conjunction with the Department of Agriculture to implement these experiments in all
four cases. Two occurred in Alabama, one in Washington State, and one in San Diego County.
Only two of the experiments—the one in San Diego County and one of the Alabama
demonstrations—were “pure” cash-outs in the sense that no other welfare policy changes
occurred in those regions at the same time (Fraker et al. 1995). The other two, known as the
Washington Family Independence Program (FIP) and the Alabama Avenues to Self-Sufficiency
through Employment and Training (ASSETS), both entailed other reforms including changes in
job training, medical benefits, and Aid for Families with Dependent Children (AFDC) (Fraker et
al. 1995). I therefore chose not to use the latter two “non-pure” studies because food stamp
household consumption behavior during a period of multiple policy reforms is likely to be non-
representative of typical behavior.
Of the two pure cash-out locations, I chose to focus on San Diego for several reasons. In Alabama, cash-out had only occurred a short time before surveys were conducted (Fraker et al. 1992). The experiment started in May of 1990 and surveys began in August of the same year. In contrast, the San Diego cash-out households had almost a year to adjust their behavior before interviews began. Because my focus is on the sustained consumption behavior of food stamp households, the San Diego demonstration fits the objectives of this study better than the Alabama cash-out. In addition, the San Diego sample has been studied by more authors than its Alabama counterpart. This provided better guidance for me in running my analysis as well as a larger basis for comparison.

THE ADVANTAGES OF THIS DATA SET IN TESTING THE PIH

This data set is ideal for testing the PIH among food stamp households for several reasons. Unlike the Consumer Expenditure Survey (CEX), this study went to great lengths to obtain relatively precise data on the consumption of one commodity in particular—food. Interviewers visited sample households before a seven-day measurement period to provide instructions on how to track their food purchases. An initial screener interview collected information on a household’s demographics, food shopping habits, and food stamp status. Participants were asked to save the labels of food items they used during the week as well as to retain receipts, shopping lists, and records of prices of the foods they bought. After this period, the same interviewers met with the sampled individuals again to conduct the main survey instrument. They asked them specifically to recount the types, quantities, prices, and characteristics of the relevant food items by referring to the records they had maintained (Ohls et al 1992 p.11). This provides a much higher level of detail on food consumption that the CEX.
Another advantage of Mathematica’s survey was that reported food stamp income amounts and AFDC amounts were matched with program records. There was a high matching rate, but for uniformity the data reports amounts from program records in both cases. On the other hand there were no records with which to verify the survey respondent’s reports of other income earned by herself or by various members of the household, allowing for measurement error. This is a problem encountered in most similar surveys. However, another advantage here was the careful breakdown of income from every possible source. These included earned income, stamps, AFDC, supplemental security income (SSI), alimony, and others.

In addition to its precise accounting of food consumed and reasonable measurement of income, the Mathematica survey prompted participants to report the amounts they had spent on various expenditure categories in the previous month. These included utilities, rent, medical expenditures, transportation, recreation, travel, food eaten away from the home, and others. Equipped with this thorough set of data, I found this to be a unique chance to test the predictions of the PIH, especially with regard to food consumption. Figure 4 shows how much an average family from our sample spends on various consumption categories.

The final advantage in using this data set relates to sample selection bias. Our objective is to study the consumption behavior of individuals on food stamps in particular. Had I used data from the CEX, which is conducted on a random sample of all households, I would have been forced to drop non-recipients from the data set, thus making the remaining observations a non-random sample. The San Diego County study selected sample households from the entire caseload of housed food stamp recipients. Therefore, no sample selection bias occurs and we obtain a cross-section that is representative of food stamp recipients in the county as a whole.
V. Results

I now begin my analysis of the effects of permanent and transitory income on consumption. In the SD sample, transitory income is negative in 81% of households. This reveals that the combination of food stamps and AFDC, which together constitute about 80% of income on average in the sample (see Figure 3) fail to bring households even close to the permanent income levels a household head would expect based on her education and demographic characteristics. This is not surprising since households at or above their permanent income levels are less likely to qualify for food stamps.

Nevertheless, the PIH predicts that the permanent and transitory components of income should be uncorrelated even among a sub-group of the population with low total income such as our sample. This means that an individual with ten extra dollars of permanent income due to her higher educational attainment, for example, is no more likely to be experiencing a positive income shock than her counterpart with ten fewer dollars of permanent income. We can test this easily by examining the correlation coefficient between permanent and transitory income components, which equals –0.87. Under the strict version of the PIH, this correlation should equal 0. This is the first of several results I found that fail to support a strict version of the PIH as it applies to food stamp recipients.

RESULTS FOR FOOD CONSUMPTION

In the food consumption regressions, all coefficients have the expected sign. The results are shown in Table 4. Column 1 (immediately to the right of the column containing the independent variables) reflects the general trends that have been observed in the food consumption literature. The MPC of 0.04 falls into the range found by many authors (see Table 1). When income is decomposed into its permanent and transitory components, both measures of
income are statistically significant at the 99% level, as shown in Column 2. An extra dollar of
permanent income per FCU member results in a 4.5 cent increase in food consumption per
capita; an analogous increase in transitory income per FCU member leads to a 3.7 increase.
Surprisingly, this small difference is statistically significant as revealed by a t-test.

The results also show that every additional member of the FCU drives down food
expenditures by $4.80 per person, again with a 99% significance level. This offers strong
support for the presence of economies of scale in food at the household level, as is found in
nearly all studies of stamp recipients. A higher presence of infants drives down food
consumption. A family of three with one infant, for example, spends $10.36 per person less on
food relative to the case of all non-elderly adults. Guest meals per person are also highly
statistically significant. Every meal eaten as a guest per person reduces household food
expenditures by $3.47 per capita. Meals eaten by guests push up food spending by $4.03 per
FCU member. Finally, as was found by all studies that have analyzed the San Diego experiment,
a household’s receiving food benefits in the form of stamps leads to a statistically significant
amount, in this case $7.81, of additional food expenditures per FCU member compared to the
case of receiving these benefits as checks. We find additional evidence for rejecting equality
between the coefficients on permanent and transitory income by examining the check-only
group. Even when all income comes in the form of cash, we still find a statistically significant
difference between our two parameters of interest as shown in Column 4 of Table 4, although
with slightly lower statistical significance.

We recall that the PIH predicts that the MPC’s for permanent and transitory income on
any nondurable good should be positive and zero, respectively (See Predictions 1 and 2). As our
t-test confirms, permanent income has a higher MPC than transitory income in terms of food
consumption. Since the overall average propensity to consume food at home is approximately 30 cents per dollar of income (see Figure 4), the 0.8 cent per person difference we found is small, but it represents a level that is 20% higher than the MPC out of transitory income. Nevertheless, a statistically significant portion of transitory income does get spent on food at the margin, violating the zero-MPC prediction of the PIH. When I ran the same regression using per-household rather than per person-measures for consumption and income, the corresponding MPC’s were 5.8 and 4.6. A similarly small but statistically significant difference occurred when I included only stamp households, as shown in Columns 3 of Table 4.

As an alternative functional form, I used a double-log specification in which I took the natural logarithm of food expenditures and regressed it on the natural log of total income including stamps. In this case, to avoid negative values, it was necessary to use the logarithmic version of the PIH, which posits that: \( \log(y) = \log(y^p) + \log(y^t) \), where \( y \) is income (Friedman p. 30). This is just another variation of the model, in which total income is taken to be the product rather than the sum of the permanent and transitory income amounts. Friedman states that the two forms yield the same results in many cases. This is hence a reasonable adjustment to allow us to run logarithmic regressions.

The results are shown in Table 5. I chose not to normalize by household size because economies of scale in food production are already captured by the logarithm of the size of FCU. Qualitatively, the only relationship that changes from the linear model in the case where we do not account for permanent and transitory income (Column 1), is that the coefficient on the proportion of household members over age 60 becomes statistically significant. A 50 percentage-point increase in this metric causes food expenditure to rise by about 10%, which amounts to $30 per month. In Column 1 of Table 4 this same proportion would raise
expenditures by less than $2 per person and the coefficient itself is not statistically different from zero, casting doubt on Table 5’s result. This finding also went away in Column 2 of Table 5 when I regressed the dependent variable on the two separate components of income. The most interesting coefficient to examine in Column 1 is that of income, 0.05. A 10% rise in total income increases food expenditures by 0.5%. At the mean values of income and expenditures this implies an MPC of 0.015, noticeably lower than the 0.04 figure obtained in the linear case. Furthermore, in conducting sensitivity analysis I ran the same regression but excluded the 32 households thrown out by Breunig and Dasgupta (2005) for having a higher total food expenditure amount than their total income, which I call “overflow.” As shown in Column 2, this raised the coefficient on log of total income to 0.16, implying an MPC of 0.05 at the sample means. This is much closer to the typical figure found in previous studies, but its marked difference from Column 1 shows that the logarithmic functional form is highly sensitive to exclusion of specific observations. The summaries of MPC results in Fraker (1990) and in Senauer and Young (1986, see Table 1) reveal that MPC values have mainly ranged from 0.05 to 0.10. Our linear model’s MPC fits well with this consideration even if we exclude the “overflow” households, while only the restricted, non-overflow sample yields a reasonable MPC in the logarithmic regression.

As shown in Column 3, permanent income again has a higher coefficient than transitory income like in the linear case, but this time the difference is not statistically significant. The values imply an MPC of 0.02 out of permanent income at the mean total income level and 0.01 out of transitory income. In Column 4 where overflow households are excluded, the MPC values for permanent and transitory income are 0.05 and 0.04, respectively. Again we find that the logarithmic regression is very sensitive to excluding the set of 32 households who spend more on
food than their monthly income, and only when we do so do we obtain more reasonable MPC values for food. This high sensitivity to minor changes casts doubt on the accuracy of the logarithmic form. The more reliable linear regression is the one that identifies a statistically significant difference in the MPC’s from stamps and cash.

From the two sets of food regressions, we have some reason to believe that households in our sample tend to spend slightly more of each additional permanent dollar on food than they do of each additional transitory dollar. Our linear regression in Table 4 indicates that the permanent MPC is 20% higher than the transitory at a high level of statistical significance, while the logarithmic model in Columns 3 and 4 of Table 5 shows a noticeable difference but cannot reject the hypothesis of equality between the two. With these mixed findings we now turn to clothing consumption.

RESULTS FOR CLOTHING PURCHASES

From our theoretic analysis we would expect that spending behavior on clothing should differ from that of food because clothing is longer-lasting. A purchase of clothing can be viewed as mostly a capital expenditure, only a small portion of which pays for the services it provides in the present period. Spending on clothing should therefore rise noticeably with positive transitory income shocks and rise by a relatively smaller amount with increases in permanent income. That is, if we assume a $k$ value of 1 (see Section II), a rise in permanent income is spent entirely, only a small portion of which can be considered as going toward the service provided by clothes. The greater portion of clothing can be considered a durable good. According to the PIH, households will tend to wait for periods of high transitory income to add to their clothing stock, so we should expect a higher MPC out of transitory than out of permanent income.
To test these predictions, I retained all the same independent variables in my regressions as those in the food model except for guest meals: the two income components, household size, and measures for the proportion of members in the household belonging to a particular age group. Age proportions remain relevant as children may require less clothing than adults. For consistency with the food regressions, I also left in the dummy variable for being a food stamp rather than a check recipient, but this had no significant effect. I used absolute levels of income and consumption rather than normalizing by some measure of household size because such regressions were found to reveal no economies of size. Actual household size was used in contrast to food consumption unit (FCU) size because the latter measure was designed specifically to reflect the number of people consuming food in the household. It is therefore only relevant for Engel curve estimations of food consumption. In many cases in our data set, the FCU amount is lower than the household size. This indicates that members who sleep at home may consume their meals at other locations such as school or work and so would not contribute to at-home food consumption. In contrast, our measure for clothing places no restrictions on where or how the clothing was purchased. I did not run logarithmic Engel curves because over 40% of the sample spent no money on clothing.

Surprisingly, there is no detectable difference between the MPC of clothing out of permanent versus transitory income, as shown in Table 6, Column 2. Each value is approximately $0.02 and is statistically different from 0 at the 99% level. Household size is also statistically significant. At the margin, one additional member raises clothing expenditures by $7.21 per month. This amounts to nearly $90 per year, a quantity that is quite reasonable for maintaining an adequate stock of clothing among poor households. Age distribution within a
household has no effect on our dependent variable. All age ranges tend to demand a similar amount of clothing.

RESULTS FOR TOTAL EXPENDITURES

My analysis for total expenditures provides more support for a loose version of the PIH. This is not surprising since the PIH makes most of its predictions on total consumption rather than on any one commodity, though as we have shown the model still has clear implications for single items. Table 7 shows the results of linear regressions of total expenditure at the household level on income as well as its permanent and transitory components, while Table 8 shows logarithmic regressions. Column 1 of Table 7 reveals an MPC of 0.31. This value is well below those found in the studies that Friedman cites (p. 41). His Table 1 shows that among various subsections of households, the MPC out of total income generally ranges from 0.65 to 0.90. A possible reason for this discrepancy is that all of Friedman’s reported values included durables in their measurement of consumption, while our data set did not. Another explanation may be that the spending behavior of food stamp recipients differs from that of the general population by a significant amount.

Column 2 of Table 7 reveals a statistically significant difference between the MPC’s out of permanent and transitory income under a linear model, 0.343 versus 0.296. The difference is approximately 5 cents per dollar of income, such that the permanent income coefficient is over 15% higher than that of transitory income. In percentage terms this figure is fairly close to the 20% premium we found in the food Engel curve estimation in Table 4. This suggests that there is likely to be some regularity in this result if we were to decompose consumption into its other components. This also lends support for the claim that there is something fundamentally
different about clothing which fails to conform to the pattern of food and total expenditures in terms of the two forms of income. Its durable properties may constitute this difference.

Using a logarithmic regression instead, I found a statistically significant difference once again. Evaluating at the mean of total income, Column 1 in Table 8 implies an MPC of 0.16, while Column 2, which excludes households I have deemed “overflow,” reveals an MPC of 0.27. The first value is remarkably small. The second value is still quite below the generally expected MPC’s found in historical data, but it is fairly close to the linear estimate. Moving to Column 3, the MPC’s out of permanent and transitory income come out to be 0.33 and 0.25, respectively. Excluding overflows yields values of 0.45 and 0.39 in Column 4. Equality between the permanent and transitory values is rejected at more than 99% significance in both cases. Again the results were very responsive to excluding some households, unlike the linear regression. Nonetheless, we recall that in our logarithmic food results in Table 5 only the version excluding overflow households gave reasonable MPC’s. Similarly, the regression in Column 4 of Table 8 gives the most credible MPC values, at least in comparison with previous findings.

We have good reason to be skeptical of the logarithmic specifications because of their high sensitivity. Another concern is the exclusion of 50 households whose predicted permanent income levels are negative, which cannot be handled in the logarithmic form. While I find the linear models to be more reliable, the logarithmic form still confirms a statistically significant difference between the MPC’s from our two forms of income. It would appear that households do indeed tend to spend slightly more out of permanent income than out of transitory income when it comes to total expenditures.

A MORE GENERAL TEST OF THE PIH USING INSTRUMENTS
The possibility remains that the instruments I used to instrument for permanent income amounts—namely education, sex, marital status, age, race, and household size—give a misleading level of precision with regard to a household head’s planned future income. A more general method is used by Mayer (1966) in one of the early examinations of the PIH. His methodology is simple but effective in testing Friedman’s model. He puts forth two versions of the theory—a strict version that predicts that the MPC of total consumption should be independent of the level of permanent income, and a “looser” version which states that the MPC should be higher from permanent than from measured income. The latter version is the one that our regressions support so far to some extent.

Though Mayer uses occupational groupings to separate income recipients into varying levels of permanent income, we have no such option with our data set. At least 80% of our sample does not work during the current period. Fortunately we have solid data on the educational attainment of the household head. If the strict PIH is correct, then at each level of permanent income the average propensity to consume (APC) out of measured income should be roughly the same. This follows from Eq. 7 in Section III, which posits that the ratio of consumption to permanent income should be consistent throughout all levels of income. Table 9 shows mean income levels and APC values for each educational group. Figure 5 displays the distribution of educational attainment across the sample.

A surprising result emerges. All APC values exceed 1. In fact, the mean value of APC across all households in our sample is 1.18. The median is 0.94. If we are to accept them as correct, then the APC’s in Table 9 appear to be uncorrelated with education level. These differ from Mayer’s results in that they do not show a systematic decrease with rising permanent income. Mayer’s trends support the absolute income hypothesis as posited by Keynes, which
states that households have a decreasing APC with increasing income. My results, as shown in Table 8, find some support for the PIH. Interestingly, the highest APC values in the three consumption categories examined all occur for the lowest-educated group, whose mean measured income is actually the highest. This can be explained by the significantly higher household size of 4.7 in this category than in any other, the overall average for the other groups being around 3.5. This is one limitation of focusing on just one predictor of permanent income—we fail to control for important other factors which only our regressions are able to capture. Nevertheless, if we examine the top four educational groups there is a remarkably small amount of variation in APC as the PIH predicts.

EXPLAINING THE ABOVE-ONE AVERAGE PROPENSITY TO CONSUME (APC)

The finding that the households in our sample are spending 118% of their monthly income on average raises concerns about measurement error. Reported amounts of total consumption exceed total income for over 40% of households in our sample. For these households the median excess spending is $179 per month. There are several possible explanations:

1. Interviewed participants are overstating their consumption of major non-food items such as rent, utilities, and transportation.

2. They are underreporting non-food stamp income amounts for themselves and other income earners in their food consumption unit.

3. They have a stock of savings at the beginning of the measurement period.

4. They are borrowing from friends or relatives.

The first explanation turns out to be unlikely. Overstating of consumption can be tested fairly easily. This problem is possible in all expenditure categories except food. We recall that interviewees were given specific instructions about maintaining all records of food purchases
over a seven-day period. We thus have reliable data on the money value of all purchased food items used over the week. The USDA’s Thrifty Food Plan, which is the basis for determining food stamp benefits, assumes that households spend 30% of their income on food (FRAC). At the low level of income experienced by food stamp households, total income approximately equals total expenditures, so that food should constitute about 30% of all consumption. A more direct measure comes from Fraker (1990), who reports findings that food stamp recipients spend 23.3% of their expenditures on food at home (p. 31). Total food, including that eaten away from home, constitutes 28.7%. In our sample, expenditures on food bought and used average approximately $300 per month. If the 30% figure is accurate this implies total expenditures of $1000 per month, and if Fraker’s markedly lower 23.3% is correct then this value exceeds $1300. The measured mean of total consumption in our sample is about $960. Judging by these figures, total consumption might even be understated as opposed to overstated in our sample. Perhaps this is because expenditures on durables were not asked for in the survey. Measurement error in consumption therefore cannot explain the above-one APC values.

The savings explanation has some merit. The PIH predicts that households will save either when there is a period of higher-than-expected income or lower-than-expected expenses. A portion of the 40% of households with higher-than-one APC values must have had an unusually low-consumption or high-income period the month before to allow for positive savings. However, only 8% of households report taking money out of savings because there was no food at home. Furthermore, the median value of a $179 excess among over-spenders is too high to be entirely explained by income or consumption shocks, given that average income is about $1000 per month. Variation in work hours or unexpected expenses is unlikely to be higher than $30 to $40 per month.
Explanation 3 is also plausible but its effects are limited. An assessment of earnings reporting error in the Survey of Income and Program Participation (SIPP) finds that persons earning less than $5000 per year over-report their earned income by a median of $271, while persons with earned income between $5000 and $1,000 have only a $30 error (Pedace and Bates 2000). Of the approximately 20% of our sample households that receive non-zero amounts of wage or salary, the average earned income projected to a full year is $7128, with about half making less than $5000. For at least the lower part of this sample, over-reporting of income rather than under-reporting is likely to be an issue. However, this is only 10% of households. The great majority of income throughout the sample (60% overall) comes from AFDC (see Figure 3). Like food stamp amounts, AFDC benefits were taken from program records and thus are unlikely to contain significant measurement error. The most likely component of under-reporting is from income received from sources other than stamps or AFDC. Stigma may be a factor discouraging reporting of income from charitable sources. Survey respondents may also forget to report or may be unaware of money earned by other household members. Unreported income probably explains at least some of the excess of expenditures over income. Considering that over-reporting of earned income will balance out non-reporting in some cases, I estimate that only $25 to $30 of the $179 median excess that occurs for over 40% of households can be explained in this way.

With regard to Explanation 4, borrowing probably plays the largest role in generating the above-one APC values. Bank loans are out of the question at such low levels of assets, and only 2% of participants report buying food on credit. However, one of the survey questions reveals that many households borrow through other means. One fourth of respondents answered ‘yes’ to the question of whether they borrowed money in the last month because there was not food at
home. These loans must have been provided by other family members or friends. Had the question asked about borrowing for any purpose, the 25% figure would have been even higher. For these reasons, I conclude that borrowing explains the majority of expenditures which exceed income. Savings comprise the next largest portion, and income non-reporting likely explains the rest.

Another curious finding is that households spend around one third of their income on food but the overall MPC for this commodity is found to be closer to four cents. Nearly all previous estimates predict a similarly small value (see Fraker 1990 and Table 1). We note that previous logarithmic regressions that evaluate the MPC at the mean of income and food expenditure find a similar result. The most likely explanation for the discrepancy between MPC and APC of food is that in both a linear and logarithmic model, coefficients capture the MPC evaluated at average values. In contrast, the MPC of food is likely to be extremely high at the lowest levels of income since food is the most basic necessity for survival. Our functional forms are unable to capture such a dramatic fall in MPC even though it must exist.

VI. Conclusion

Three conclusions emerge from my analysis. The first is that food stamp recipients appear to adhere to a loose version of the PIH. This version predicts that households should spend more on nondurables from each marginal dollar of permanent income as compared to each marginal dollar of transitory income. Households on welfare tend to spend slightly more on food and total purchases if their education level, sex, age, marital status, race, and family size together indicate that a higher level of lifetime income awaits them. On average, households with an additional dollar of permanent income spend 15 to 20% more of it on nondurables than households with an additional dollar of transitory income. It is difficult to say whether this gap
would be even larger if people in this income range had more access to credit. We know that at least part of the extra spending comes from informal loans. Our findings therefore suggest that people on food stamps and other welfare programs are able to circumvent liquidity constraints to a limited extent, or else higher permanent income households would not be able to spend more than their lower permanent income counterparts.

A second finding is that households overwhelmingly spend a portion of that income which would be considered “transitory” based on a long-term horizon. Friedman’s model leaves no room for non-zero MPC’s out of transitory income. We can thus reject the strict form of the PIH for these households. Keynes’s assertion that current income plays the main role in affecting expenditures finds support in our data. Coefficients on transitory income are almost invariably statistically and economically significant.

Thirdly, our results suggest that the distinction between permanent and transitory income is unimportant when it comes to durable goods. Unlike our Engel curves on food and total consumption, the clothing expenditure regression reveals no detectable effect from considerations of future income. Although one would need to test this result on a wider variety of durable goods, this preliminary finding seems to follow from the fact that these goods have two properties. On the one hand, they store wealth in the form of future services, making them attractive targets for transitory income. On the other hand, they provide services immediately in the current period, such that an increase in permanent income would cause one to demand more of these services and thus to buy more durables.

Several channels for additional analysis remain. It would be interesting to extend our method of instrumenting for permanent income to a wider range of sample households. This may answer the question of whether the difference we found between the two forms of income in
our sample extends itself to families who are less liquidity-constrained. Such work would require a fairly precise measure of one category of consumption or else of total consumption. The San Diego County data unfortunately did not track other expenditures as closely as food. Furthermore, the data set used here did not capture durable expenditures. It would have been informative to observe any differences in the basic findings if durable goods were included. This would have allowed us to deduce to what extent households treat these items differently from nondurables, and may have raised the unusually low MPC values we found for total expenditure.

Another question raised here is whether more can be learned about how low-income households are able to spend over 100% of their income in a given month. More detailed questions about the amount borrowed for any purpose are necessary. If friends and relatives are providing interest-free loans, households may be a lot less liquidity-constrained than is generally assumed. Savings behavior should also be studied more closely to answer several questions. How many of these households have a banking account? What is a typical level of their assets? Knowing this information would be helpful to policy analysts in getting a clearer picture of the level of need among welfare recipients.
Figure 1: Budget constraint faced by consumers under cash grants versus food stamp coupons.

Source: Southworth 1945, p. 49.
Figure 2: Intertemporal budget constraint and optimal consumption levels

Source: Friedman 1957, p. 8.
Figure 3: Average Income Breakdown by Source

- AFDC: 60%
- Food Stamps: 12%
- Wage and Salary: 13%
- Other: 6%
- General or Charitable Assistance: 2%
- Social Security: 2%
- Supplemental Security Income (SSI): 5%
Figure 4: Household Expenditures by Category

- Shelter: 42%
- Food at Home: 31%
- Transportation: 8%
- Utilities: 7%
- Clothes: 5%
- Recreation: 2%
- Other: 5%
Figure 5: Highest Education Level Attained by Household Head

- Eighth Grade or Less: 16%
- Beyond Eighth Grade, No High School Graduation: 27%
- High School Graduate or GED: 30%
- Some Post-Secondary or Vocational: 25%
- Four-Year College Program or Higher Degree: 2%
Table 1: Marginal Propensities to Consume Food out of Money Income and Food Stamp Bonus in Various Studies

<table>
<thead>
<tr>
<th>MPC</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money income</td>
<td>.14</td>
<td>.05</td>
<td>.03</td>
<td>.03</td>
<td>.05</td>
<td>.13</td>
<td>.06</td>
<td>.06</td>
<td>.10</td>
<td>.08</td>
</tr>
<tr>
<td>Bonus</td>
<td>.35</td>
<td>.86</td>
<td>.56</td>
<td>.31</td>
<td>.30</td>
<td>.37</td>
<td>.45</td>
<td>.17</td>
<td>.23</td>
<td>.30</td>
</tr>
</tbody>
</table>

* Sources: Study (1) Hyman and Shapiro, p. 267 (figures given are for urban, low-income households); (2) Benus, Kmenta, and Shapiro, p. 137; (3) West, p. 49 (Model 1); (4) West, Price, and Price, p. 137 (evaluated at the mean, MPC for income derived from the elasticity); (5) West and Price, pp. 728–29; (6) Chavas and Young, p. 136 (estimates are for metropolitan households with non-black, non-college-educated heads); (7) Neenan and Davis, p. 95 (for food stamp participants, evaluated at group sample means); (8) Johnson, Burt, and Morgan, pp. 62–63 [equation (3)]; (9) Smallwood and Blaylock, p. 28; (10) Allen and Gadson, p. 42.

Source: Senauer and Young (1986, p. 39).
Table 2: CPS Regression of Household Income on Characteristics Of Household Head

<table>
<thead>
<tr>
<th>HOUSEHOLD HEAD CHARACTERISTICS, MEAN VALUES AND PERCENTAGES</th>
<th>REGRESSION COEFFICIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Household Income</td>
<td>$2943.162</td>
</tr>
<tr>
<td>HIGHEST EDUCATIONAL ATTAINMENT</td>
<td></td>
</tr>
<tr>
<td>Eighth Grade or Less</td>
<td>12.4%</td>
</tr>
<tr>
<td>Beyond Eighth Grade</td>
<td>11.6%</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>35.6%</td>
</tr>
<tr>
<td>Some Post-Secondary</td>
<td>18.3%</td>
</tr>
<tr>
<td>Four or More Years of College</td>
<td>14.6%</td>
</tr>
<tr>
<td>Advanced Degree</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

| | | |
| Female | 32.2% | -418.153 |
| Married | 57.5% | 769.289 |
| Age | 48.1 | 133.702 |
| Square of Age | --- | -1.239 |
| Black | 9.6% | -513.211 |
| Hispanic | 10.3% | -362.947 |
| Household Size | 2.640 | 244.421 |
| Constant | --- | -2333.975 |

| R² | --- | 0.331 |
| Sample Size (n) | 59,804 | 59,804 |

*Standard errors appear in parentheses.*

All coefficients are significant at the 99% level in Column 2.
Table 3: Mean Values of Variables for Sample of 1076 Food Stamp Households

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Food Stamp Households(^a)</td>
<td>1076</td>
</tr>
<tr>
<td>No. of Households Receiving Food Benefits in Stamp Form</td>
<td>536</td>
</tr>
<tr>
<td>No. of Households Receiving Food Benefits in Check Form</td>
<td>540</td>
</tr>
</tbody>
</table>

### INCOME AND EXPENDITURE FIGURES

- Total Income without Food Stamps (Monthly\(^b\)) $881.46
- Total Income with Food Stamps (Monthly) $998.10
- Food Stamp Amount $117.07
- % Earning Positive Income 21.3%
- Earned Income (recipients only) $593.89
- Percent Receiving AFDC Benefits 89.0%
- AFDC Benefit Amount (recipients only) $658.90
- Food Expenditure (Monthly) $296.81
- Clothing Expenditure (Monthly) $45.20
- Clothing Expenditure (Non-zero amounts only) $77.19
- Total Expenditures\(^c\) (Monthly) $957.91

### HOUSEHOLD COMPOSITION

- Household Size 3.8
- Size of Food Consumption Unit 3.49
- % with Children Under 18 92.3%
- Number of Children (if children present) 2.3
- Average Age of Youngest Child 4.6

### CHARACTERISTICS OF HOUSEHOLD HEAD

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>80.7%</td>
</tr>
<tr>
<td>% Single</td>
<td>88.0%</td>
</tr>
<tr>
<td>% Female</td>
<td>11.9%</td>
</tr>
<tr>
<td>% Asian</td>
<td>33.0%</td>
</tr>
<tr>
<td>% Hispanic</td>
<td>20.3%</td>
</tr>
<tr>
<td>% Black</td>
<td>32.7%</td>
</tr>
</tbody>
</table>

\(^a\) Excludes non-housekeeping and homeless members of the original Mathematica sample.

\(^b\) All income amounts are monthly.

\(^c\) Survey did not solicit information on durable expenditures.
### Table 4: Expenditures on Food as a Function of Permanent and Transitory Income: Linear Model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>All Households</th>
<th>Stamp Only</th>
<th>Check Only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Income</strong></td>
<td>0.040***</td>
<td>---</td>
<td>0.033**</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Permanent Income</strong></td>
<td>---</td>
<td>0.045***</td>
<td>0.054***</td>
</tr>
<tr>
<td>per FCU member</td>
<td>(0.009)</td>
<td>(0.013)</td>
<td>(0.014)</td>
</tr>
<tr>
<td><strong>Transitory Income</strong></td>
<td>---</td>
<td>0.037***</td>
<td>0.045***</td>
</tr>
<tr>
<td>per FCU member</td>
<td>(0.009)</td>
<td>(0.012)</td>
<td>(0.014)</td>
</tr>
<tr>
<td><strong>Size of Food</strong></td>
<td>-5.155***</td>
<td>-4.799***</td>
<td>-5.177***</td>
</tr>
<tr>
<td>Consumption Unit</td>
<td>(0.847)</td>
<td>(0.856)</td>
<td>(1.214)</td>
</tr>
<tr>
<td><strong>Prop. of Household</strong></td>
<td>-41.063***</td>
<td>-31.429***</td>
<td>-25.587*</td>
</tr>
<tr>
<td>Age 0 to 1</td>
<td>(10.074)</td>
<td>(10.699)</td>
<td>(15.507)</td>
</tr>
<tr>
<td>Prop. of Household</td>
<td>-10.664</td>
<td>-4.544</td>
<td>-6.725</td>
</tr>
<tr>
<td>Age 2 to 17</td>
<td>(7.140)</td>
<td>(7.494)</td>
<td>(11.213)</td>
</tr>
<tr>
<td>Prop. of Household</td>
<td>3.529</td>
<td>-0.051</td>
<td>-21.671</td>
</tr>
<tr>
<td>Over Age 60</td>
<td>(14.523)</td>
<td>(14.545)</td>
<td>(22.014)</td>
</tr>
<tr>
<td><strong>Total Meals Eaten as</strong></td>
<td>-3.455***</td>
<td>-3.467***</td>
<td>-3.719***</td>
</tr>
<tr>
<td>Guests in Other</td>
<td>(0.472)</td>
<td>(0.471)</td>
<td>(0.672)</td>
</tr>
<tr>
<td>Locations per FCU Member</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Meals Eaten by</td>
<td>4.051***</td>
<td>4.033***</td>
<td>4.356***</td>
</tr>
<tr>
<td>Guests in the Home</td>
<td>(0.400)</td>
<td>(0.399)</td>
<td>(0.517)</td>
</tr>
<tr>
<td>per FCU Member</td>
<td>(0.517)</td>
<td>(0.627)</td>
<td>(0.682)</td>
</tr>
<tr>
<td>Stamp Household</td>
<td>7.667***</td>
<td>7.810***</td>
<td>---</td>
</tr>
<tr>
<td>(benefits in the form of stamps)</td>
<td>(2.289)</td>
<td>(2.283)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>103.153***</td>
<td>94.507***</td>
<td>101.569***</td>
</tr>
<tr>
<td></td>
<td>(5.859)</td>
<td>(6.712)</td>
<td>(9.714)</td>
</tr>
</tbody>
</table>

R² 0.251 0.256 0.304 0.207

t-test: 0.009 0.055 0.062

MPC(perm) = MPC(trans)

[Prob >F] Sample Size (n) 1019 1019 495 524

Dependent Variable: Food consumption per food consumption unit (FCU) member

*Significant at 90%  **Significant at 95%  ***Significant at 99%

---

*a “Constrained” and “overflow” households are excluded for food consumption regressions as done in previous literature on this data set. The first are households whose food stamp benefits exceed monthly food expenditures, the second are those who spend more than their monthly income amount on food.

b Households whose food benefits were maintained in the form of stamps rather than cash.

c Households whose food benefits were converted to cash.

d Imputed from CPS regression (see Table 2) of household income on various instruments.
Table 5: Expenditures on Food as a Function of Permanent and Transitory Income: Logarithmic Model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>All Households(^a)</th>
<th>“Overflow” Households Excluded</th>
<th>All Households</th>
<th>“Overflow” Households Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Total Income</td>
<td>0.051(^*)</td>
<td>0.160(^{***})</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.038)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Permanent Income(^b)</td>
<td>---</td>
<td>0.074(^{**})</td>
<td>0.171(^{***})</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td>(0.041)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Transitory Income</td>
<td>---</td>
<td>0.048(^*)</td>
<td>0.152(^{**})</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.038)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Size of Household in FCU</td>
<td>0.735(^{***})</td>
<td>0.637(^{***})</td>
<td>0.707(^{***})</td>
<td>0.616(^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.040)</td>
<td>(0.043)</td>
<td>(0.042)</td>
<td>(0.044)</td>
</tr>
<tr>
<td>Prop. of Household Age 0 to 1</td>
<td>-0.487(^{***})</td>
<td>-0.397(^{***})</td>
<td>-0.372(^{***})</td>
<td>-0.300(^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.116)</td>
<td>(0.116)</td>
<td>(0.124)</td>
<td>(0.124)</td>
</tr>
<tr>
<td>Prop. of Household Age 2 to 17</td>
<td>-0.027</td>
<td>0.012</td>
<td>-0.011</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>(0.084)</td>
<td>(0.085)</td>
<td>(0.086)</td>
<td>(0.087)</td>
</tr>
<tr>
<td>Prop. of Household Age Over 60</td>
<td>0.230(^{***})</td>
<td>0.103</td>
<td>0.204</td>
<td>0.083</td>
</tr>
<tr>
<td></td>
<td>(0.158)</td>
<td>(0.165)</td>
<td>(0.155)</td>
<td>(0.161)</td>
</tr>
<tr>
<td>Total Meals Eaten as Guests in Other Locations per FCU Member</td>
<td>-0.044(^{***})</td>
<td>-0.041(^{***})</td>
<td>-0.044(^{***})</td>
<td>-0.042(^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Total Meals Eaten by Guests at Home per FCU Member</td>
<td>0.037(^{***})</td>
<td>0.035(^{***})</td>
<td>0.036(^{***})</td>
<td>0.034(^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Stamp Household</td>
<td>0.107(^{***})</td>
<td>0.105(^{***})</td>
<td>0.101(^{***})</td>
<td>0.099(^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.026)</td>
<td>(0.026)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.422(^{***})</td>
<td>3.750(^{***})</td>
<td>4.276(^{***})</td>
<td>3.693(^{***})</td>
</tr>
<tr>
<td></td>
<td>(0.182)</td>
<td>(0.239)</td>
<td>(0.224)</td>
<td>(0.263)</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.437</td>
<td>0.429</td>
<td>0.433</td>
<td>0.424</td>
</tr>
<tr>
<td>Implied MPC (total income)</td>
<td>0.015</td>
<td>0.046</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Implied MPC (perm)</td>
<td>---</td>
<td>---</td>
<td>0.022</td>
<td>0.049</td>
</tr>
<tr>
<td>Implied MPC (trans)</td>
<td>---</td>
<td>---</td>
<td>0.014</td>
<td>0.044</td>
</tr>
<tr>
<td>MPC(perm) =</td>
<td>---</td>
<td>---</td>
<td>0.206</td>
<td>0.370</td>
</tr>
<tr>
<td>MPC(trans)</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Prob >F]

Sample Size (n) | 1050 | 1018 | 1025 | 994

Dependent Variable: Log of food consumption for entire household

\textit{Standard errors appear in parentheses. MPC values are evaluated at sample means.}

\textit{Observations with negative permanent or transitory income are excluded.}

\(^a\) “Constrained” and “overflow” households are excluded.

\(^b\) Imputed from CPS regression (see Table Y) of household income on various instruments.

---
Table 6: Expenditures on Clothing as a Function of Permanent and Transitory Income: Linear Model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>All Households(^a)</th>
<th>All Households</th>
<th>Stamp Only</th>
<th>Check Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Income</td>
<td>0.024***</td>
<td>---</td>
<td>---</td>
<td>0.015***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td></td>
<td></td>
<td>(0.007)</td>
</tr>
<tr>
<td>Permanent Income(^b)</td>
<td>---</td>
<td>0.022***</td>
<td>0.026***</td>
<td>0.015***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.005)</td>
<td>(0.008)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Transitory Income</td>
<td>---</td>
<td>0.025***</td>
<td>0.029***</td>
<td>0.018***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.005)</td>
<td>(0.007)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Size of Household</td>
<td>6.489***</td>
<td>7.211***</td>
<td>3.375</td>
<td>11.433***</td>
</tr>
<tr>
<td></td>
<td>(1.522)</td>
<td>(1.644)</td>
<td>(2.570)</td>
<td>(2.047)</td>
</tr>
<tr>
<td>Proportion of</td>
<td>8.159</td>
<td>1.717</td>
<td>5.253</td>
<td>3.780</td>
</tr>
<tr>
<td>Household Age 0 to 1</td>
<td>(18.646)</td>
<td>(19.451)</td>
<td>(31.370)</td>
<td>(23.364)</td>
</tr>
<tr>
<td>Proportion of</td>
<td>14.097</td>
<td>11.254</td>
<td>28.161</td>
<td>-0.122</td>
</tr>
<tr>
<td>Household Age 2 to 17</td>
<td>(12.392)</td>
<td>(12.630)</td>
<td>(20.811)</td>
<td>(14.888)</td>
</tr>
<tr>
<td>Proportion of</td>
<td>18.407</td>
<td>20.223</td>
<td>22.650</td>
<td>19.535</td>
</tr>
<tr>
<td>Household Over Age 60</td>
<td>(26.705)</td>
<td>(26.747)</td>
<td>(45.489)</td>
<td>(30.713)</td>
</tr>
<tr>
<td>Stamp Household</td>
<td></td>
<td>4.463</td>
<td>4.334</td>
<td>---</td>
</tr>
<tr>
<td>(benefits in the form of stamps)</td>
<td></td>
<td>(4.385)</td>
<td>(4.386)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(7.831)</td>
<td>(8.405)</td>
<td>(13.278)</td>
<td>(9.739)</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.083</td>
<td>0.084</td>
<td>0.060</td>
<td>0.135</td>
</tr>
<tr>
<td>MPC(perm) =</td>
<td>---</td>
<td>0.246</td>
<td>0.481</td>
<td>0.304</td>
</tr>
<tr>
<td>MPC(trans)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Prob &gt;F]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Size (n)</td>
<td>1076</td>
<td>1076</td>
<td>536</td>
<td>540</td>
</tr>
</tbody>
</table>

Dependent Variable: Clothing consumption for entire household

*Significant at 90%  **Significant at 95%  ***Significant at 99%

---

\(^a\) “Constrained” and “overflow” households are included. They are only excluded for food consumption regressions.

\(^b\) Imputed from CPS regression (see Table Y ) of household income on various instruments.
Table 7: Total Expenditures as a Function of Permanent and Transitory Income: Linear Model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>All Households(^a)</th>
<th>All Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Income</td>
<td>0.311***</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td></td>
</tr>
<tr>
<td>Permanent Income(^b)</td>
<td>---</td>
<td>0.343***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.024)</td>
</tr>
<tr>
<td>Transitory Income</td>
<td>---</td>
<td>0.296***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.023)</td>
</tr>
<tr>
<td>Size of Household (not FCU)</td>
<td>61.342***</td>
<td>49.346***</td>
</tr>
<tr>
<td></td>
<td>(7.167)</td>
<td>(7.730)</td>
</tr>
<tr>
<td>Proportion of Household Age 0 to 1</td>
<td>116.219***</td>
<td>219.496**</td>
</tr>
<tr>
<td></td>
<td>(87.792)</td>
<td>(90.970)</td>
</tr>
<tr>
<td>Proportion of Household Age 2 to 17</td>
<td>177.935***</td>
<td>223.268***</td>
</tr>
<tr>
<td></td>
<td>(58.346)</td>
<td>(59.055)</td>
</tr>
<tr>
<td>Proportion of Household Over Age 60</td>
<td>126.172</td>
<td>97.026</td>
</tr>
<tr>
<td></td>
<td>(125.742)</td>
<td>(125.093)</td>
</tr>
<tr>
<td>Stamp Household (benefits in the form of stamps)</td>
<td>7.455</td>
<td>9.504</td>
</tr>
<tr>
<td></td>
<td>(20.649)</td>
<td>(20.513)</td>
</tr>
<tr>
<td>Constant</td>
<td>319.821***</td>
<td>262.166***</td>
</tr>
<tr>
<td></td>
<td>(36.871)</td>
<td>(39.380)</td>
</tr>
</tbody>
</table>

\( R^2 \) 0.345 0.354

Implied MPC (all) 0.311 ---
MPC (perm) --- 0.343
MPC (trans) --- 0.296
MPC(perm) = MPC(trans) --- 0.000

[Prob >F] Sample Size (n) 1076 1076

Dependent Variable: Total (nondurable) consumption for entire household

*Standard errors appear in parentheses.

*Significant at 90% **Significant at 95% ***Significant at 99%

\(^a\) “Constrained” and “overflow” households are included. They are only excluded for food consumption regressions.

\(^b\) Imputed from CPS regression (see Table Y ) of household income on various instruments.
Table 8: Total Expenditures as a Function of Permanent and Transitory Income: Logarithmic Model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>All Households&lt;sup&gt;a&lt;/sup&gt;</th>
<th>“Overflow” households&lt;sup&gt;b&lt;/sup&gt; excluded</th>
<th>All Households</th>
<th>“Overflow” households excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Income</td>
<td>0.166***  (0.025)</td>
<td>0.290***  (0.032)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Permanent Income</td>
<td>---</td>
<td>---            0.341***  (0.027)</td>
<td>---</td>
<td>0.476***  (0.030)</td>
</tr>
<tr>
<td>Transitory Income</td>
<td>---</td>
<td>---            0.264***  (0.023)</td>
<td>---</td>
<td>0.422***  (0.028)</td>
</tr>
<tr>
<td>Log of Household Size (not FCU)</td>
<td>0.435***  (0.028)</td>
<td>0.461***  (0.028)</td>
<td>0.185***  (0.031)</td>
<td>0.133***  (0.030)</td>
</tr>
<tr>
<td>Prop. of Household Age 0 to 1</td>
<td>0.146  (0.098)</td>
<td>0.237***  (0.096)</td>
<td>0.251***  (0.102)</td>
<td>0.251***  (0.096)</td>
</tr>
<tr>
<td>Proportion of Household Age 2 to 17</td>
<td>0.323***  (0.066)</td>
<td>0.375***  (0.066)</td>
<td>0.281***  (0.067)</td>
<td>0.294***  (0.064)</td>
</tr>
<tr>
<td>Prop. of Household Over Age 60</td>
<td>0.255*  (0.137)</td>
<td>0.158  (0.141)</td>
<td>0.244*  (0.131)</td>
<td>0.066</td>
</tr>
<tr>
<td>Stamp Household</td>
<td>0.011  (0.022)</td>
<td>0.012  (0.022)</td>
<td>0.018  (0.022)</td>
<td>0.017  (0.020)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.139***  (0.156)</td>
<td>4.363***  (0.200)</td>
<td>4.036***  (0.178)</td>
<td>3.198***  (0.191)</td>
</tr>
<tr>
<td>R²</td>
<td>0.274</td>
<td>0.295</td>
<td>0.333</td>
<td>0.401</td>
</tr>
<tr>
<td>Implied MPC (all)</td>
<td>0.159</td>
<td>0.271</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Implied MPC (perm)</td>
<td>---</td>
<td>---</td>
<td>0.327</td>
<td>0.445</td>
</tr>
<tr>
<td>Implied MPC (trans)</td>
<td>---</td>
<td>---</td>
<td>0.253</td>
<td>0.394</td>
</tr>
<tr>
<td>t-test: MPC(perm) = MPC(trans) [Prob &gt;F]</td>
<td>---</td>
<td>---</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>Sample Size (n)</td>
<td>1075</td>
<td>1043</td>
<td>1025&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Dependent Variable: Log of total (nondurable) consumption for entire household

<sup>a</sup> “Constrained” and “overflow” households are included. They are only excluded for food consumption regressions.
<sup>b</sup> Households whose monthly food expenditures exceed their monthly total income.
<sup>c</sup> Imputed from CPS regression (see Table Y ) of household income on various instruments.
<sup>d</sup> Fifty households with negative predicted permanent income had to be excluded due to the logarithmic functional form. This is one drawback of the log model.

Standard errors appear in parentheses.

*Significant at 90% **Significant at 95% ***Significant at 99%
TABLE 9: Average Propensities to Consume by Education Group as a Proxy for Permanent Income, San Diego Households

<table>
<thead>
<tr>
<th>EDUCATION LEVEL OF HOUSEHOLD HEAD</th>
<th>Mean Monthly Income</th>
<th>APC\textsuperscript{a} (total expenditures)</th>
<th>APC (food)</th>
<th>APC (clothing)</th>
<th>No. of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eighth Grade or Less</td>
<td>1146</td>
<td>1.80</td>
<td>0.494</td>
<td>0.068</td>
<td>172</td>
</tr>
<tr>
<td>Beyond Eighth Grade, No HS Graduation</td>
<td>1034</td>
<td>1.29</td>
<td>0.344</td>
<td>0.045</td>
<td>291</td>
</tr>
<tr>
<td>HS Graduate or GED</td>
<td>955</td>
<td>1.40</td>
<td>0.351</td>
<td>0.039</td>
<td>324</td>
</tr>
<tr>
<td>Some Post-Secondary</td>
<td>1077</td>
<td>1.35</td>
<td>0.320</td>
<td>0.049</td>
<td>266</td>
</tr>
<tr>
<td>Four-Year College or More</td>
<td>1030</td>
<td>1.33</td>
<td>0.345</td>
<td>0.043</td>
<td>22</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Average propensity to consume is total consumption divided by total expenditures.
REFERENCES


