Finance and Economics Discussion Series
Divisions of Research & Statistics and Monetary Affairs
Federal Reserve Board, Washington, D.C.

The Effect of Self-Reported Transitory Income Shocks on Household Spending

John Sabelhaus and Samuel Ackerman

2012-64

The Effect of Self-Reported

Transitory Income Shocks

On Household Spending

Samuel Ackerman
John Sabelhaus*

August, 2012

We use repeated cross-sections of the Survey of Consumer Finances (SCF) to study the effect of self-reported transitory income shocks on household food spending. The self-reported shocks in the SCF are derived from survey questions about the gap between actual and "normal" income. This approach stands in contrast to existing income shock measures in the literature, which are generally derived from the residuals of estimated earnings or income equations. Although the self-reported transitory shocks could potentially give very different answers, the overall variance and asymmetry of shocks over the business cycle are similar to those of existing residual-based estimates. Engel Curve analysis shows a significant relationship between self-reported income shocks and household food spending, though the estimated spending responses are only a small part of the substantial slowdown in the growth rate of food consumption observed during the recent economic downturn.

JEL Codes: D12, E21

*Board of Governors of the Federal Reserve System, Washington, DC. Contact author: john.sabelhaus@frb.gov. The analysis and conclusions set forth are those of the authors and does not indicate concurrence by other members of the research staff or the Board of Governors.

1. Introduction

One of the continuing legacies of the Great Recession is a dramatic slowdown in the growth rate of aggregate consumer spending. This sharp break in trend growth has led to renewed interest in some very old questions in macroeconomics.[1] Do consumers react to transitory income shocks by reducing spending, or do they smooth consumption over those shocks? If consumers reduce their spending when their income falls, is it because they are liquidity constrained? Do only those consumers actually affected by income shocks reduce their spending, or do unaffected consumers also lower their consumption for precautionary reasons?

In this paper we use repeated cross-sections from the triennial Survey of Consumer Finances (SCF) to study the effect of self-reported income shocks on household food spending.[2] Food spending includes both food at home and purchased meals and beverages. Together, those account for just over ten percent of total personal consumption expenditures (PCE) in the National Income and Product Accounts (NIPA). Although food spending is more of a necessity than most consumption items, the overall PCE pattern of rapid spending growth between the mid 1990s and 2006 and failure of the growth rate to recover after the Great Recession is evident in the aggregate NIPA food consumption data (Figure 1). Between the two food consumption categories, it is not surprising that purchased meals and beverages show both higher trend growth before the Great Recession and a larger reversal of trend growth after 2006, because purchased meals and beverages are generally more income elastic and discretionary in nature.

The self-reported income shocks analyzed in this paper are derived from survey questions about the gap between actual and "normal" income in the SCF.[3] Towards the end of the SCF

[1] See, for example, De Nardi, French, and Benson (2012) and Petev, Pistaferri, and Eksten (2011).
[2] For an overview of the SCF and latest results see Bricker, Kennickell, Moore, and Sabelhaus (2012).
[3] The SCF has maintained a consistent methodological design since the 1989 survey, though the question on "normal" income was not added until the 1995 survey.

survey, after detailed income components have been summed to arrive at a total, respondents are asked if that total income is higher than, lower than, or about the same as their income in a "normal" year. Most respondents say their reported total income is in fact about normal—the median gap between actual and normal income is zero in every survey year. However, sizable minorities of respondents indicate that their income is either unusually high or unusually low, and those fractions vary predictably and systematically with business cycle conditions.

The self-reported income deviations in the SCF are intended to capture the principle of a transitory income shock, but the gaps between actual and normal income in the SCF could in practice be very different from the estimated transitory income shocks that are generally used to study consumption behavior. The canonical approach when studying household-level consumption behavior has been to derive transitory income shocks from the residuals of earnings or income equations estimated using panel data. Transitory shocks are solved for as one component of the overall income change: the unexplained change in income that does not appear (to the econometrician) to be permanent.

Although the transitory income shocks in the SCF are estimated using a very different approach, the high-level statistical properties of the self-reported gaps between actual and normal income seem generally consistent with the properties of transitory income shocks derived from the residuals of estimated equations. In particular, the variances of the percentage gap between actual and normal income are of the same general magnitudes as the variances of residual-based annual transitory shocks, and the shape of the distribution of the gaps changes asymmetrically over the course of the business cycle in ways that are consistent with residual-based estimates. Thus, there is reason to believe that the households who self-report experiencing a transitory

shock are the same households that the econometrician would identify as having experienced a transitory shock simply by looking at changes in their income over time.

Given these reassuring findings about the statistical properties of the self-reported income shocks in the SCF, the next step involves investigating whether those shocks have explanatory power with respect to household food spending. The SCF has been collecting data on food spending (both food at home and food away from home) since the 2004 survey, and thus there are now three sets of cross-sections to work with (2004, 2007, and 2010). The SCF estimates of food at home match the NIPA values quite well, but the estimated SCF aggregates of food away from home fall short in levels. For our purposes, what matters is that the SCF finds slowly growing inflation-adjusted total food spending over the six year period 2004 through 2010, and a shift from spending on food away from home towards food at home.

Engel Curve analysis shows a clear relationship between self-reported income shocks and household food spending, though the estimated spending responses are not large enough to explain the dramatic slowdown in the growth of food spending observed during the recent economic downturn. The relationship between both types of food spending and normal income is highly non-linear, so we use a linear-spline across vingtiles of normal income as the basic model for analyzing self-reported income shocks. A more parsimonious functional form might dictate the magnitude of income effects at various points in the normal income distribution, and the linear-spline allows us to capture the non-linear relationship between food spending and normal income while preserving flexibility in propensities to consume out of normal income across normal income groups.

Using the linear-spline as our basic model, we evaluate changes in both types of food spending across the surveys using two additional sets of independent variables.[4] The first set of variables is dummies for 2007 and 2010. The coefficients on these dummies reflect any changes in average food spending after 2004 not captured by the non-linear Engel Curves. If food spending only depends on normal income, and that relationship is stable over time, then the changes in food spending over time should be fully explained by the Engel Curves and the year dummies will be insignificant. For spending on food at home in 2010, that is close to being the case. However, for food away from home, the 2010 dummy is highly significant, and indicates a large drop (about 13 percent) in spending relative to 2004.

One possible reason for the unexplained decline in food away from home is that families self-reporting transitory income shocks cut back on their spending because of liquidity constraints or other reasons. Thus, the second set of regressions includes the gaps between actual and normal income, where positive and negative shocks are introduced separately so they can have different effects. The effects of the two types of shocks are largely the same order of magnitude, and the effects are highly significant for food away from home, but not for food at home. Thus, families self-reporting negative shocks have lower average spending on food away (relative to the Engel Curve prediction) than families not reporting shocks. However, the size of these estimated effects is very small, and they account for only a small fraction of the overall unexplained drop in spending.

These estimates of unexplained residual declines in food spending and the effects of transitory income shocks on food spending both pertain to average spending across all families. In any cross-section analysis, but especially with the SCF where the top end of the wealth

[4] We also estimate the Engel Curves using a number of additional demographic controls, which, as expected, are very significant. Adding those controls does not change the estimates for the coefficients of interest.

distribution is well-represented because of the oversampling strategy, it is useful to investigate differences across households. In the final set of regressions we interact the year dummies and the self-reported income shock terms with dummies for quintile of normal income. It is not surprising that both the unexplained residual decline and the estimated impact of self-reported transitory income shocks are both much smaller at the very top of the normal income distribution. The primary impact in the next highest quintile seems to be a shift towards food at home. Both the unexplained residual and the estimated impact of income shocks are largest for the bottom three quintiles by normal income.

2. Self-Reported Transitory Income Shocks

Macroeconomists who study consumer spending behavior recognize the need to distinguish between transitory and permanent income shocks. Although the concepts of permanent and transitory shocks are clear in principle, and expectations about consumption responses given the two types of shocks (with and without liquidity constraints) are also generally straight-forward, the measurement and analysis of income shocks remains fertile ground for empirical research.[5] Most of the research on income shocks is based on estimating income or earnings equations using panel data, then manipulating the residuals of those equations in order to separate the unexplained income changes into permanent and transitory components. The SCF measure of transitory income shocks is potentially very different from the typical residual measure, because the SCF measure is based on households' own assessment of how much their actual income deviated from "normal" during the previous year.

[5] Some subtleties in predicted outcomes across various types of lifecycle models remain, of course. For example, Carroll (2009) notes that in a buffer-stock model permanent shocks may have transitory effects as consumers adjust to their new target wealth level.

Respondents in the SCF are asked to report amounts for individual components of their previous year's income, including income from wages, businesses, capital gains, and transfers; several of these components may have negative amounts. For most income components, the respondent is given the corresponding location on the IRS 1040 form for comparison. The respondent is then asked to confirm whether their previous year's income matches the total of these components. If it is incorrect, the respondent is asked to provide a corrected total. This respondent-approved total income is referred to throughout this paper as "actual" income.

The respondent is then asked, "Is this income unusually high or low compared to what you would expect in a "normal" year, or is it normal?" The three possible answers are unusually high, unusually low, and the same as what they would expect in a normal year. If the respondent reports their income was unusually high or low, they are asked "About what would your total income have been if it had been a normal year?"[6] Most respondents never hear the second question about the level of normal income, because the majority of respondents in any given SCF indicate their actual income is not in fact different from "normal."

There are, however, sizable minorities of respondents in every SCF survey who indicate that their income in the previous year was either unusually high or low, and the fractions of respondents with gaps between actual and normal income vary predictably and systematically with business cycle conditions. For those respondents, the interpretation of the self-reported gap between actual and normal income is essentially what economists have in mind when they

[6] Respondents with unusually low or high income are also asked to give a verbatim answer, which is then assigned a numeric code, as to the reason for the income deviation. These responses may be categorized as labor or employment shocks, such as a change in wages or hours worked; business or self-employment shocks; shocks involving investment returns that differed from the expected; external income shocks, such as retirement or support payments; and miscellaneous. Labor shocks are the most dominant reason in each year, though they tend to be more significant drivers of negative income shocks. High capital or investment returns, which are generally significant in positive shocks, fell dramatically as a share of the households reporting positive shocks between 2007 and 2010. In 2010, a significant share of those with negative shocks reported the cause as a generally bad economy (included in the "other" category).

describe a transitory income shock.[7] Although the self-reported gap is in principle a useful estimate of transitory shocks, there are a number of questions one should ask about the measure in order to understand how it relates to the more typical residual-based estimates.

Transitory income shocks have been estimated using various data sets, different income and earnings concepts, individual and household-level units of observation, and alternative parameterizations of the stochastic process for the shocks themselves. Following Sabelhaus and Song (2010), the simplest specification involves decomposing log earnings or income (y_{it}) into a deterministic component that evolves with observable characteristics (x_{it}), a permanent component that involves slowly over time (μ_{it}), and a transitory component (ε_{it}). That is,

$$(1) \quad y_{it} = \beta x_{it} + \mu_{it} + \varepsilon_{it}$$

The permanent component changes when the individual receives a permanent shock (η_{it}),

$$(2) \quad \mu_{it} = \mu_{it-1} + \eta_{it}$$

Given simplifying iid assumptions on ε_{it} and $\eta_{it,}$ it is straight-forward to recover estimates of the variances for the two shocks (σ^2_{ε} and σ^2_{η}, respectively) using panel data.[8,9] Although there is a great deal of heterogeneity in underlying income concepts, unit of observation, data sources, and

[7] In a small number of cases, a respondent will say that their current income is unusually high (low), and then give a figure for normal income that is higher (lower). These appear to generally be cases where the frame of reference for "normal" income has changed, such as transitions from being a student to working or from working to retirement.

[8] The essence of the method for separating permanent and transitory shocks, described succinctly in Carroll (1992), is to measure the variance of income changes at multiple frequencies, then acknowledge that every one of those variances has two transitory shocks (for each of the two years at the endpoints) and a number of permanent shocks equal to the frequency over which the change is being measured. Thus, the variance of one year income changes has two σ^2_{ε} terms and one σ^2_{η}, the variance of two year income changes has two of each, the variance of income changes over three years has two σ^2_{ε} and three σ^2_{η} terms, etc. Given panel data with more than two years of data, one measures the variance of income change at every frequency then solves the (generally over-identified) system of equations for σ^2_{ε} and σ^2_{η}. Although studies of income volatility often use more complex stochastic processes that allow transitory shocks to have effects that last more than a year, all of the estimation methods begin with this principle of using panel data to measure income changes across multiple frequencies to sort out the shocks.

[9] One interesting exception to the usual panel data approach is in Blundell, Low, and Preston (2011), who identify income shock variances in cross-section data using a combination of income and consumption data.

methods, there is a fair amount of uniformity in the literature in estimates for the percentage variance of transitory shocks, with values generally below but near ten percent.[10]

The first question one might ask when comparing the SCF normal income measure to estimates from the literature is whether respondents do in fact seem to have a comparable notion of permanent income in mind when they answer the normal income question. Some evidence for a comparable notion is found by comparing various percentiles of actual and normal income across survey years (Table 1). Although it will be shown below that there is significant variation in the distribution of the household-level gaps between actual and normal income, the univariate distributions of the two income measures exhibit a great deal of relative stability over time. In every survey year, actual income is always well below normal income at lower percentile points, while the opposite is true at the very top of the income distributions. However, the relative percentile points in the middle of the distributions are very similar. This relative stability is exactly what one would expect to see when households experience both positive and negative transitory shocks, but on average, their permanent (or normal) income is not systematically different from actual income. The exception that proves the rule occurred in the most recent survey year, 2010, when the ratio of actual to normal income collapsed at every percentile point, indicating widespread negative transitory income shocks associated with the Great Recession.

The second question about self-reported transitory income shocks involves two high-level statistical properties of the gaps between actual and normal income: means and variances. The average gaps tend to be relatively small, though cyclical (Table 2). Variances of the self-reported gaps can be computed in a number of ways, but in order to have measures that are

[10] There is a long-standing debate about whether estimated transitory variances are dominated by measurement error, which by construction will end up in the transitory shock terms. However, methodologically comparable estimates based on high-quality administrative data, such as in Sabelhaus and Song (2010), DeBacker, Heim, Panousi, and Vidangos (2011), and Guvenen, Ozkan, and Song (2012), are to a first approximation consistent with estimates from survey data, such as in Gottschalk and Moffitt (2009) and Dynan, Elmendorf, and Sichel (2007).

directly comparable to the residual-based estimates in the literature we compute the variance of the percentage gap using var(ln(actual income) – ln(normal income)). Percentage gaps cannot be computed on zero or negative incomes, so we present two sets of estimates: the first has both actual and normal income restricted to be positive, and the second has both restricted to be greater than $5,000.[11] Imposing the (modest) $5,000 threshold has a large impact on estimated variances; in 2010, the estimated variance falls from 14.5 percent to 10.9 percent.[12] Although the 2010 value for the self-reported transitory income variance in the SCF is at the high end of the range of estimates found in the literature, 2010 is of course an exceptionally bad year. The variances of the self-reported gaps in other years are very much in line with residual-based estimates.[13]

A third set of questions about self-reported transitory income shocks involve the shape of the shock distribution. Most of the literature on estimating permanent and transitory shocks using panel data has effectively ignored the issue of asymmetry, but Guvenen, Ozkan, and Song (2012) show that in recessions the distribution of transitory shocks (and possibly even permanent shocks) becomes highly asymmetric, in the sense that negative shocks are much more likely than positive shocks. This pattern of increasing asymmetry over the business cycle is also evident in the self-reported transitory shocks in the SCF (Table 3), though to some extent the self-reported shocks in the SCF are somewhat asymmetric in every year.

[11] In the 2010 SCF, only 0.5 percent of families failed to meet the actual and normal income both greater than zero condition, and only 1.5 percent failed to meet the $5,000 threshold.

[12] The same order of magnitude effect from imposing a lower bound on income has been observed in estimates of variances constructed using the residual method. See, for example, Sabelhaus and Song (2009, 2010). Variance estimates in percent terms are particularly sensitive to low initial values—an increase of income from $1,000 to $2,000 affects the estimated variance as much as a change from $100,000 to $200,000, though the two changes are obviously very different. Thus, one qualification for the assertion in the text that transitory variance estimates in the literature are roughly similar is that very small income values are effectively treated as zeroes.

[13] The literature on income volatility cited here is focused on the question of whether the variances of permanent and transitory shocks have changed over time or with business cycle conditions. Variances estimated using standard techniques (especially the iid assumption on the shocks) generally do find that transitory variances increase in recessions, though see Guvenen, Ozkan, and Song (2012) for an alternative view.

The fraction of SCF families reporting a negative gap (actual income below normal income) was 25 percent in 2010, up sharply from the 14 percent in 2007 and higher than any other year since the question was first asked in the survey, which was in1995. At the same time, the fraction reporting a positive shock was only 6 percent in 2010, down from 9 percent in 2007, and lower than any other year since 1995. Given that the 2007 survey was focused on 2006 incomes, realized before the on-set of the Great Recession, and the 2010 survey focused on calendar year 2009, when the economy was still struggling, this is good timing from the perspective of confirming previous findings about asymmetric shocks over the business cycle.

In addition, the shift in the fraction of families with positive and negative shocks between 2007 and 2010 was accompanied by relatively stable mean and median shocks, conditional on having shocks in a particular direction. This also confirms findings in Guvenen, Ozkan, and Song (2012), because they find that the best way to describe the stochastic process is in terms of the entire shock distribution shifting to the left during a cyclical downturn. That is, an increasing variance of the transitory shocks may be a part of the story, as it is in the SCF, but the more dominant theme is that the modal tendency of shocks becomes more negative in a recession.

The relatively small fractions of families reporting gaps between actual and normal income, the fact that mean gaps are larger than median gaps conditional on having gaps, and the relative stability of those conditional gaps over time raises a fourth question about self-reported shocks. Are the estimates dominated by shocks experienced by families at particular normal income levels? The answer from the SCF is clearly no—self-reported gaps between actual and normal income occur across all normal income groups, and with a few exceptions, generally to the same relative degree (Table 4). That is, the ratio of average actual income to average normal

income and various percentiles of actual income relative to average normal income are largely similar across normal income groups.

In 2010 the ratio of average actual income to average normal income was 94 percent across all families in the SCF. That ratio was higher at the bottom of the normal income distribution—100 percent or more in the bottom two vingtiles of normal income, but to some extent, that may reflect errors in reporting normal income itself. For example, families who under-report normal income, say because they misunderstood the question, are more likely to be sorted into the bottom of the normal income distribution. Setting aside those families with very low normal income, the ratio of average actual income to average normal income is relatively invariant with respect to normal income.

The same stability in reported gaps by normal income holds if we consider various percentiles of the actual to normal income distribution. Table 4 shows the 5^{th}, 10^{th}, 90^{th}, and 95^{th} percentiles of actual income within each normal income vingtile, where each actual percentile is scaled by the average normal income in that normal income vingtile. Thus, for example, for all families in 2010, the 5^{th} percentile of actual income was 12 percent of the overall average for normal income, while the 95^{th} percentile of actual income was 245 percent of the average for normal income, which simply describes the extent of actual income heterogeneity in the data. The more important message of the percentile columns is that the relative distributions of actual income to normal income across normal income groups are very similar, which means the proportional gaps between actual income and self-reported normal income are very similar. The exception in this case occurs for the highest normal income vingtile, where both very low and very high realized incomes are more extreme than in the other normal income groups.

The fifth and final question about self-reported income gaps involves how the gaps compare to actual income changes over (roughly) the same time period, in this case, estimated using the 2009 re-interview of 2007 SCF respondents (Table 5).[14] Movements across income quintiles as measured by the panel re-interview in 2009 will include both permanent and transitory shocks as well as any movements associated with observables like age, and the actual income changes are measured for two years instead of the current-year self-reported gap concept in the SCF cross-sections that we are focused on here. Even so, the matrices of actual quintile-level income movements and self-reported quintile-level actual and normal income positions show remarkable similarities. The differences that do exist appropriately indicate that self-reported one-year income deviations are a subset (meaning there is less mass off the diagonals) of the income movements captured in the 2009 re-interview.

3. Engel Curve Analysis of Household Food Spending

The self-reported gap between actual and normal income in the SCF seems to be a useful indicator of transitory income shocks, and we now turn to the question of how those shocks affect household spending. The direct measures of spending collected in the SCF and considered here are for food at home and food away from home.[15] Ultimately, the questions to be posed to the data involve the extent to which self-reported income shocks affect the two types of food spending. Before turning to those questions, however, we first consider how well the SCF tracks aggregate NIPA food spending over time, and then present an estimation strategy that takes into account the non-linear Engel Curve relationship between food spending and normal income.

[14] For a discussion of the 2009 re-interview, see Bricker, Bucks, Kennickell, Mach, and Moore (2011).
[15] The focus here is on food spending because there are no adjustment costs or other confounding factors to consider. In principle, one can also use the SCF to study household spending on cars and housing, which along with food account for about one-third of total personal consumption expenditures in the NIPA.

The SCF began asking questions about food spending in the 2004 survey. Respondents are asked to report their typical outlays for food purchased for home consumption and for food purchased outside of the home (specifically, spending associated with "eating out"). Respondents are also asked about the share of food at home associated with delivered food, which we reallocate to food away from home. Respondents are asked to report the amounts for a typical week, but the questionnaire is flexible and allows them to answer using any frequency they choose. We multiply by the appropriate frequency to solve for annual spending.

A crucial question to be addressed before proceeding with the analysis is whether or not the food outlays reported in the SCF track the aggregate food spending amounts published in the NIPA. Food consumed at home in the SCF lines up with published aggregate values very well, with about $650 billion spent on food at home in 2010. There may be noise in the micro level estimates, but there does not seem to be any systematic bias associated with asking respondents about food purchased for home consumption.

Food away from home in the SCF is somewhat more problematic, with the SCF reported aggregate of about $250 billion in 2010 that is roughly half the NIPA aggregate. To some extent this is conceptual—the NIPA measure includes all purchased food and beverages, including snacks, lunches, or other items that respondents may not consider a part of "eating out." The nature of the SCF question leads respondents to think about discrete "eating out" events, which means they will generally consider the number of times they engage in those activities per week and the average cost each time they do, and then work out a total spending estimate. Respondents are likely to omit small purchases, and they may not (for example) even consider eating lunch in the work cafeteria as part of "eating out."

For the purposes of studying whether and how income shocks are affecting household spending over time, the growth of food spending in the SCF is what really matters (Table 6). Although the slowdown in NIPA food spending after 2004 is evident in Figure 1, the SCF actually shows even less growth over this period. Aggregate food spending in real terms is basically unchanged in the SCF, while it increased by several percentage points in the NIPA (Figure 1). The growth of overall food spending in the SCF is masking two very different underlying trends, with food at home rising by 4 percent over the 2004 to 2010 period (still below the NIPA growth, but not by much) while food away from home fell by 7 percent. In the NIPA, both food at home and food away from home grew, so the divergence between SCF and NIPA growth rates is primarily in food away from home. The growth in NIPA food away from home may be in the part "missing" in the SCF, or respondents may have believed they cut back on spending for eating out more than they actually did. In either case, the SCF is generally capturing or even overstating the slowdown in food spending.

Analyzing the effects of income shocks on food spending over time requires a framework that acknowledges the highly non-linear relationship between food and normal income. That point is underscored by differential trends in the aggregate, mean, and median values of the various SCF measures we will be working with. The level of aggregate normal income in 2010 is 7 percent above the 2004 value, while the level of actual income is only 1 percent higher. Both income measures have grown much more slowly than in the decade preceding the Great Recession, and the decline in median income indicates very different growth rates across the income distribution. Consistent with expectations about income elasticities for food at home and away from home, the growth in mean and median values for the two types of spending suggest that slower income growth is associated with a shift from food away to food at home.

Formally modeling the relationship between food spending and income requires a functional form for the underlying Engel Curves. Indeed, the original motivation for Engel's analysis was to understand food spending across different income groups. His finding that food spending rises with income but declines as a share of families' budgets as income increases is clearly still the dominant impression one gets from the data (Table 7). Self-reported food at home and food away from home both increase with income, with food at home nearly tripling and food away from home rising by a factor of nearly ten as one moves from the bottom vingtile to the top vingtile of normal income. However, the differential in either type of food spending is nowhere near the differential in normal incomes across those groups, and thus the ratio of food at home to normal income falls from 38 percent to 2 percent across vingtiles, and the ratio of food away from home to normal income falls from 7 percent to 1 percent across vingtiles.

There are a number of ways to parameterize highly non-linear Engel Curves, but the focus here is on studying the effect of income shocks on food spending over time, so we adopt a very simple but flexible linear-spline in normal income to avoid constraining responses at particular income levels.[16] We solve for the maximum values for each of the j=1,…,20 vingtiles of inflation-adjusted normal income in the pooled (2004, 2007, and 2010) sample, and denote those Y_j^{max}. Denote food spending across the k=1,2 types of food for family i and normal income for family i using $food_{ik}$ and y_i^{normal}, respectively. We then run separate regressions for the k=1,2 measures of food spending on these normal income splines,

$$(3)\quad food_{ik} = \alpha_k + \sum_{j=2,20} \beta_{jk} \min(\max(0, (y_i^{normal} - Y_{j-1}^{max})), (Y_j^{max} - Y_{j-1}^{max})) + \varepsilon_{ik}$$

[16] See Deaton and Muellbauer (1980) for a discussion about strengths and weaknesses of the various Engel Curve functional forms that have been used to study consumer demand.

where the first vingtile of income is omitted, and thus the constant term is a lower bound on food spending. The β_{jk} coefficients can be interpreted as the marginal propensity to consume on food type k out of a dollar of normal income in the jth normal income vingtile.

This linear-spline Engel Curve formulation will be used in the next section as the basic framework for analyzing the effect of income shocks on food spending, and it is useful to have a visual impression of the estimated splines as we consider how income shocks might have affected spending (Figure 2). Predicted food at home and food away from home based on equation (1) are plotted at income levels from $1,000 through $250,000, and the predicted pattern of increasing spending at a decreasing rate is clear for both types of food spending. There is also a clear differential between the two in the rate of increase at various income levels, and as expected, food away from home accounts for an increasing share of total food spending as normal income increases.

4. Can Self-Reported Income Shocks Explain the Recent Decline in Food Spending?

The motivation for this paper is to address some long-standing questions about the effect of income shocks on consumer spending behavior. The dramatic slowdown in household spending on food during and subsequent to the Great Recession can in principle be explained by a number of different theoretical mechanisms that connect current spending to either current income or expected future income. One mechanism in particular to be explored is the effect of self-reported transitory shocks. We use the Engel Curve framework described in the last section to investigate whether the drop in food spending relative to normal income can be attributed to those families who experienced transitory income shocks, versus the alternative that the declines in spending between 2004 and 2010 were more widespread.

The strategy used to identify the effects of transitory income shocks on food spending takes into account the highly non-linear relationship between food spending and normal income, but is otherwise extremely naïve. The identifying assumption is that the Engel Curves for food at home and for food away from home with respect to normal income are both stable across the three survey years, 2004, 2007, and 2010. Given that assumption, dummy variables for the years 2007 and 2010 capture any residual differences in average food spending not explained by the Engel Curves.

Self-reported transitory income shocks are entered into the food spending equations in order to isolate the component of the spending relative to normal income shift that can be explained by income shortfalls or income windfalls. Positive and negative shocks are entered separately in order to allow the effect of transitory income fluctuations to be asymmetric, and the estimated coefficients are generally of the correct sign and statistically significant. Including both the self-reported income gaps and the year dummies refines the interpretation of the dummies described above. Positive and negative transitory income shocks occur in every year, so the year dummies in an equation that also has the income shock terms is interpreted as the residual change in average food spending not explained by either shifts in normal income or a change in the distribution of transitory income shocks.

The simple linear-spline Engel Curve described in the previous section is the starting point for the analysis of changes in food spending over time. Food spending is modeled in total and separately for food away from home and for food at home (Table 8). Models for each type of food spending are estimated using three variants: the first regression is a fitted linear-spline Engel Curve with just year dummies, the second regression includes additional demographic

controls, and the third includes both the positive and negative income shock terms and the additional demographic controls.[17]

The first set of observations from the estimated Engel Curves involves the year dummies. SCF food spending data indicate anemic growth or even a decrease in food spending after 2004, depending on which measure of food one looks at and for which survey year.[18] Simply looking at aggregate normal income growth (Table 6) might lead one to conjecture that food consumption fell relative to normal income, because total food spending was basically flat while normal income increased between 2004 and 2010 by 7 percent in total. However, this is where the non-linearity of the Engel Curves becomes potentially important: median normal income in the SCF fell more than average income between 2004 and 2010, and lower-income households have a higher propensity to spend on food out of normal income.

The estimated year dummies for 2010 indicate that the non-linearity of the Engel Curves does not capture the entire shift in spending behavior over time, however. For total food, the 2010 dummies across the three specifications center around $325 and are highly significant.[19] The estimated value for the 2010 dummies corresponds to roughly 5 percent of total food spending in a given year. Thus, even after controlling for changes in the distribution of normal income over time, there is an overall unexplained drop in total food spending of about 5 percent between 2004 and 2010.

[17] The additional demographic controls are highly significant and they do affect the shape of the Engel Curve, especially at lower income levels, but they generally have only a small effect on the coefficients of interest. The additional controls are dummies for couples versus single persons, number of children, and dummies for six age groups, whether the family lives within an MSA, and region of the country.

[18] Although the 2007 SCF was conducted before the official start of the Great Recession, several areas of the country had already begun to experience/expect the decline in house prices and accompanying economic hardship that would characterize the next few years. Thus, most of the focus here is on the difference between 2004 and 2010.

[19] The regressions results reported in Tables 8a-8c are based on using only the first of five implicate values in the SCF data sets. The approach of using only one implicate is a rough approximation to the more theoretically appropriate estimates of statistical confidence one achieves when using a replicate weight method.

The separate regressions for food away from home and food at home make it possible to further sort out the changes in behavior underlying the unexplained drop in food spending. The 2010 dummies for food away from home are all highly significant and in the vicinity of $250, while the 2010 dummies for food at home are generally in the neighborhood around $75 and are either insignificant or only marginally significant. The difference in estimated 2010 residuals is underscored by the fact that average food spending away from home is less than a third of total food spending. That is, the $250 residuals in 2010 represent about 13 percent of average food away from home, while the $75 residuals for food at home represent something less than 2 percent of food at home. Thus, another conclusion from the Engel Curve analysis is that the unexplained drop in food spending is concentrated in food away from home.[20]

How much of this residual drop in food spending relative to normal income can be explained by transitory income shocks? The fact that the estimated year dummies for 2010 do not change much when the positive and negative income shock terms are included when moving from the Model 2 to the Model 3 regressions is one clue that the answer will be small. Starting with total food, it is clear that self-reported transitory income shocks have an effect on food spending, and that effect is both statistically significant and in the correct direction. Not unexpectedly, negative income shocks have a larger absolute effect than positive shocks. However, the effects are very small in magnitude. For example, the average negative income shock in 2010 was about -$9,000 (25 percent of families had negative shocks, and the average shock conditional on having experienced a negative shocks is -$35,995; Table 3). The

[20] Mian, Rao, and Sufi (2011) focus on spending at food away from home in their "balance sheet channel" analysis of the consumption slowdown. Their argument, which is confirmed by the SCF, is that the decrease in spending on food away from home played a significant role in the overall drop in aggregate demand that occurred during the Great Recession. Also, Aguiar and Hurst (2005) point out that food spending and food consumption may be very different across households because of home production. Given the counter-cyclical nature of home production, food consumption did not fall by as much as food expenditures over this period.

coefficient on negative transitory shocks is -.0014, which implies the overall average effect of negative shocks on total food spending was only about -$13 in 2010. However, there were also negative shocks in 2004, so the net effect in 2010 is even less than -$13. Again, this "small but statistically significant" finding on transitory income shocks is consistent with the lack of substantial change in estimated year dummies when the income shocks are added.

There is a substantial difference in the estimated effect of transitory income shocks across the two components of total food spending, and those differences are also consistent with the results on year dummies discussed above. Focusing just on negative shocks, the entire average effect of shocks on food spending is concentrated in food away from home, as the coefficient on negative shocks in the food at home equation is effectively zero. Even though the effect of negative transitory income shocks is highly significant for food away from home, the self-reported shocks in 2010 only explain a small part of the overall decline in that category of spending. That is, the estimated average net effect of something like $5 (the difference between the 2010 and 2004 gross effects of negative shocks) may all be concentrated in food away from home, but that is still only a fraction of the $250 unexplained residual decline.

The finding that transitory income shocks have a small but statistically significant effect on total food spending (through the food away from home component) can be interpreted as evidence against the proposition that transitory income fluctuations have a quantitatively significant impact on spending. That is, families self-reporting having experienced a transitory income shock spent only marginally less on food, given their level of reported normal income. Although food is a relatively small component of household spending, this result does raise some doubts about models in which declines in household spending are driven by liquidity constraints.

One possible explanation for the failure to estimate significant effects of income shocks on spending is that responses differ across income groups. A simple extension of Model 3 in the basic regressions suggests that there are in fact differential responses across normal income groups. To test for this, we interact both the year dummy and self-reported transitory income shock terms with dummies for quintile of normal income, and we find that the unexplained residual decline in total food spending is concentrated in the lowest three normal income quintiles (Table 9). We also find that the magnitudes of the coefficients on both positive and negative income shocks generally decline with normal income, but as with the overall average, none of the coefficients are large enough to account for a substantial share of the unexplained decline in food spending within any normal income quintile. Lastly, we find evidence of substitution towards food at home within the second-highest normal income quintile, as food at home went up by roughly the same amount by which food away from home declined.

Thus, there is a statistically and economically significant decline in spending on food between 2004 and 2010 that remains unexplained by changes in normal income, demographics, or self-reported transitory income shocks. The decline holds for food generally, but is most pronounced for food away from home. Assuming that the families who self-reported income shocks are the ones who actually experienced those shocks, plausible explanations for the decline in aggregate food spending will have to account for the much more widespread decline in food spending and the shift towards food at home. One possibility is that a combination of housing price shocks and high debt levels continues to depress spending (Mian, Rao, and Sufi, 2011). Another possibility is that lower to middle income families generally cut back on food away from home after 2004 because of either precautionary reasons or because their expectations about future permanent income growth became more pessimistic.

5. Conclusions

There are a few key takeaways from this analysis of how income shocks affect food spending. First, the self-reported transitory income shocks collected in the SCF since 1995 appear to have very desirable statistical properties when compared to the more traditional estimates of shocks based on income equation residuals, which suggests that the self-reported measure is a useful independent variable for analyzing household behavior. Second, the measures of food spending collected in the SCF since 2004 show the same basic trends as NIPA aggregates during and subsequent to the Great Recession. The third key takeaway builds on the first two, because in a very simple Engel Curve model relating food spending to normal income, self-reported transitory income shocks have a statistically significant effect on food spending away from home, but the effects on food at home are mixed. However, the magnitude of the transitory income effect falls far short of explaining the decline in spending on food away from home between 2004 and 2010.

This vetting and application of the SCF self-reported income shock measure for analyzing household spending behavior sends an important message about opportunities for studying other aspects of household behavior using the SCF. The SCF is a unique data set because of the high-wealth oversample and the combination of extensive and high quality data collected for each family. Knowing that there is a useful indicator of transitory income shocks on the data set makes it possible to take advantage of the SCF for studying how income shocks affect behavior. Researchers can analyze spending and other household behavior without having to rely on data sets where earnings shocks are inferred from residuals of estimated income equations. The SCF has extensive and high-quality data on household financial outcomes along with a key independent variable many researchers want to use to study those outcomes.

6. References

Aguiar, Mark, and Erik Hurst. 2005. "Consumption versus Expenditure," *Journal of Political Economy*, 113(5):919-948.

Blundell, Richard, Hamish Low, and Ian Preston. 2011. "Decomposing Changes in Income Risk using Consumption Data," Institute for the Study of Labor (IZA) Discussion Paper No. 6125. (November)

Bricker, Jesse, Arthur B. Kennickell, Kevin B. Moore, and John Sabelhaus. 2012. "Changes in U.S. Family Finances from 2007 to 2010: Evidence from the Survey of Consumer Finances," *Federal Reserve Bulletin*, 98(2):1-80.

Bricker, Jesse, Bucks, Brian, Arthur Kennickell, Traci Mach, and Kevin Moore. 2011. "Surveying the Aftermath of the Storm: Changes in Family Finances from 2007 to 2009." Finance and Economics Discussion Series 2011-17. Federal Reserve Board of Governors.

Carroll, Christopher D. 2009. Precautionary saving and the marginal propensity to consume out of permanent income," *Journal of Monetary Economics* 56:780–790.

Carroll, Christopher D. 1992. "The Buffer-Stock Theory of Saving: Some Macroeconomic Evidence," *Brookings Papers on Economic Activity*, 1992(1): 61-156.

Deaton, Angus, and John Muellbauer. 1980. *Economics and Consumer Behavior*. New York: Cambridge University Press.

DeBacker, Jason, Bradley Heim, Vasia Panousi, and Ivan Vidangos. 2011. "Rising Inequality: Transitory or Permanent? New Evidence from a U.S. Panel of Household Income 1987-2006," Finance and Economics Discussion Series, 2011-60. Washington, DC: Federal Reserve Board. (December)

De Nardi, Mariacristina, Eric French, and David Benson. 2012. "Consumption and the Great Recession," Federal Reserve Bank of Chicago, *Economic Perspectives*, 1Q: 1-17.

Dynan, Karen E., Douglas W. Elmendorf, and Daniel E. Sichel. 2007. "The Evolution of Household Income Volatility," Finance and Economics Discussion Series, 2007-61. Washington, DC: Federal Reserve Board. (October)

Gottschalk, Peter, and Robert Moffitt. 2009. "The Rising Instability of U.S. Earnings," *Journal of Economic Perspectives*, 23(4): 3-24. (Fall)

Guvenen, Fatih, Serdar Ozkan, and Jae Song. 2012. "The Nature of Countercyclical Income Risk," University of Minnesota and Federal Reserve Bank of Chicago. (April)

Mian, Atif, Kamalesh Rao, and Amir Sufi. 2011. "Household Balance Sheets, Consumption, and the Economic Slump." Working Paper, University of California, Berkeley. (November)

Passero, William, Thesia I. Garner, and Clinton McCully. 2012. “Understanding the Relationship: CE Data and PCE,” Forthcoming in *Improving the Measurement of Consumer Expenditures*, NBER series on Studies in Income and Wealth, edited by Christopher Carroll, Thomas Crossley, and John Sabelhaus.

Petev, Ivaylo, Luigi Pistaferri, and Itay Saporta Eksten. 2011. “Consumption and the Great Recession: an Analysis of Trends, Perceptions, and Distributional Effects,” Working Paper, Stanford University. (August)

Sabelhaus, John, and Jae Song. 2010. “The Great Moderation in Micro Labor Earnings," *Journal of Monetary Economics*, 57(4): 391-403. (May)

Sabelhaus, John, and Jae Song. 2009. “Earnings Volatility across Groups and Time," *National Tax Journal*, 62(2): 347-64.

Figure 1. Inflation-Adjusted Aggregate Consumer Spending on Food

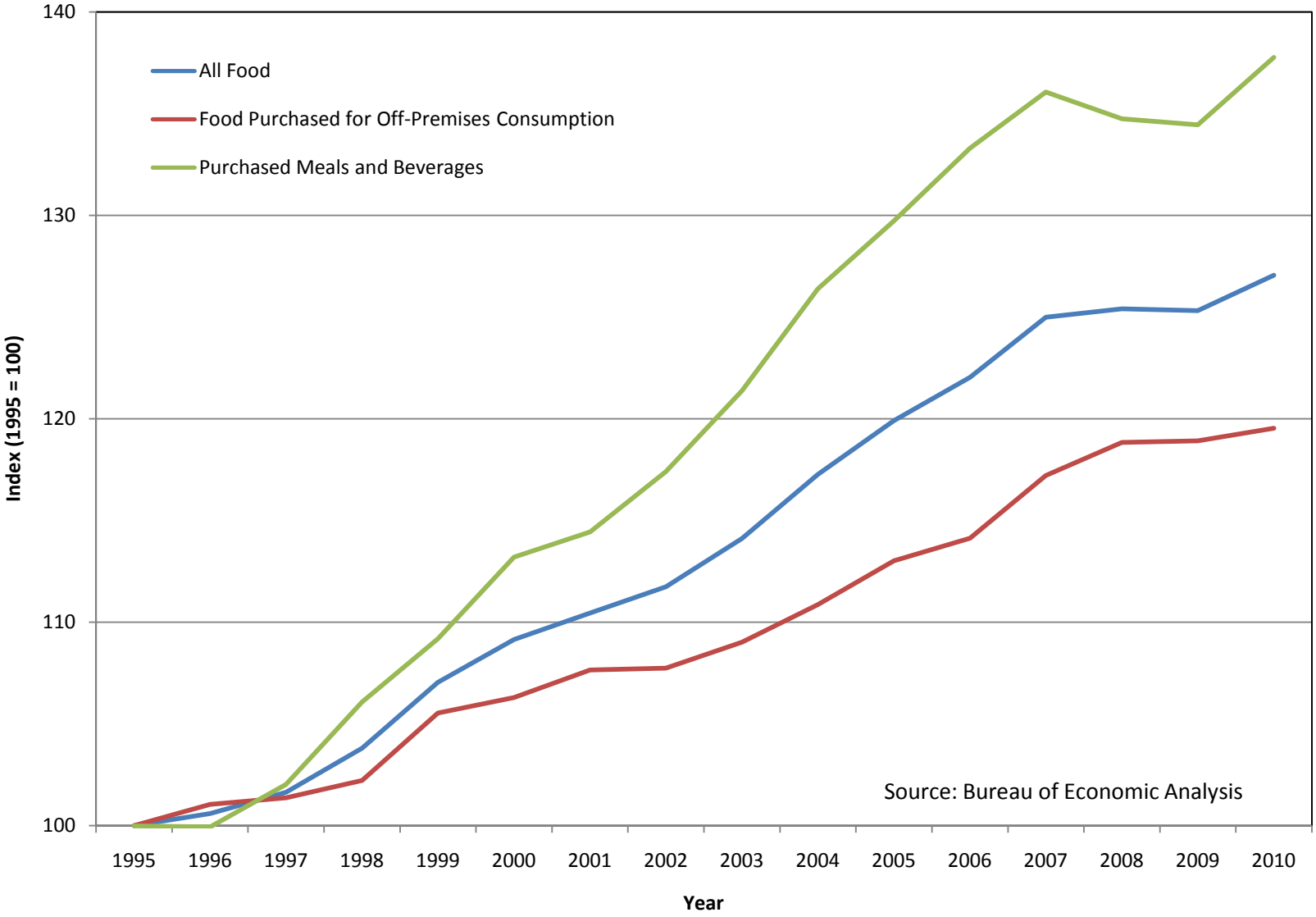

Figure 2. Fitted Engel Curves for Food Expenditures by Normal Income

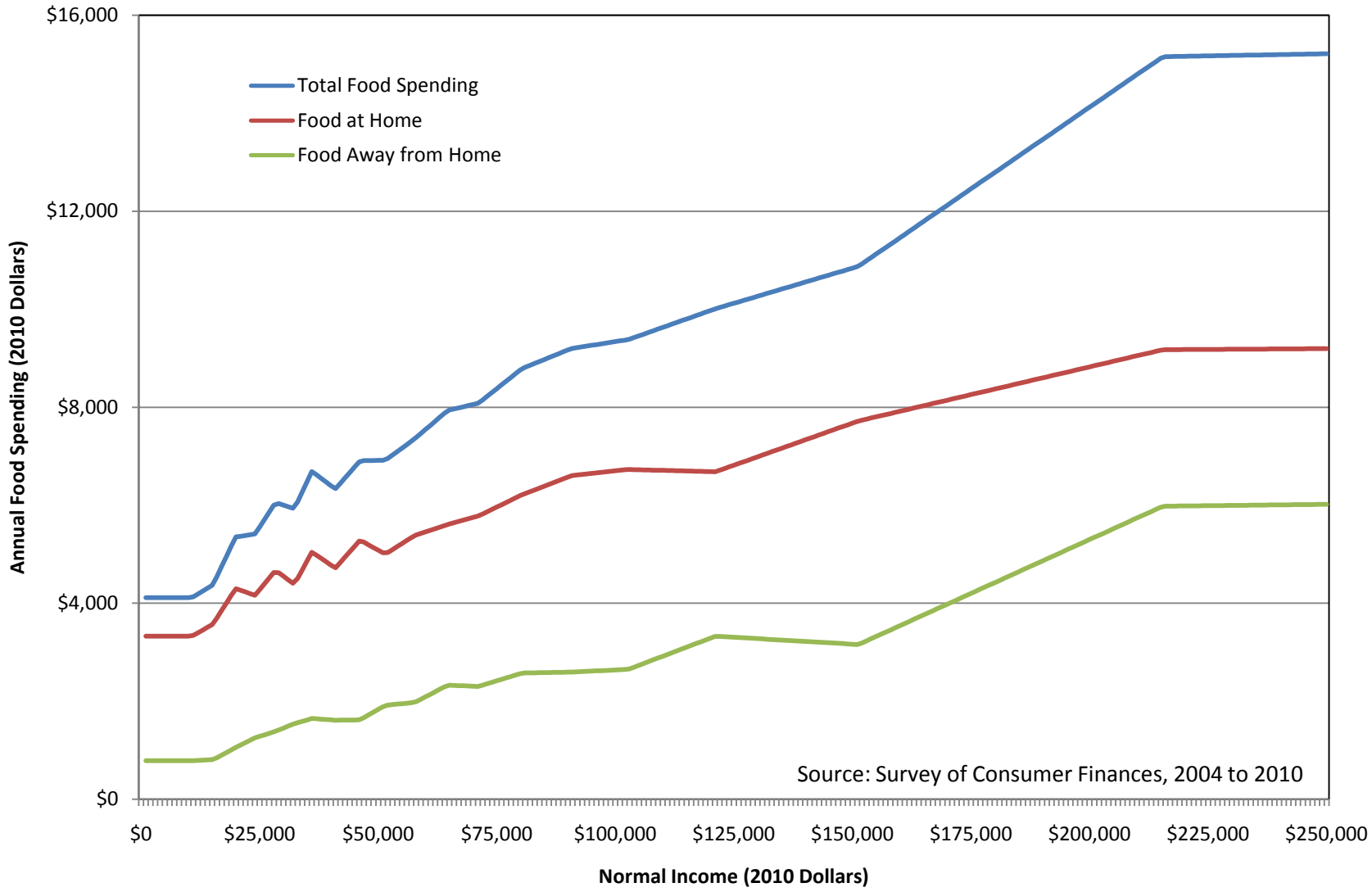

Table 1. Percentiles of Actual and Self-Reported Normal Income

Actual income

Survey	Percentile					
Year	20th	50th	80th	90th	95th	99th
1995	$17,405	$43,513	$84,851	$116,325	$159,438	$356,808
1998	$18,524	$44,633	$91,024	$125,325	$174,238	$474,429
2001	$20,597	$48,934	$100,781	$145,629	$207,802	$629,882
2004	$21,782	$49,751	$102,812	$148,900	$212,714	$561,814
2007	$21,520	$49,561	$102,892	$147,604	$216,773	$725,881
2010	$20,384	$45,758	$94,592	$142,311	$205,335	$614,374

Self-Reported Normal income

Survey	Percentile					
Year	20th	50th	80th	90th	95th	99th
1995	$19,610	$44,347	$84,851	$116,230	$159,548	$319,097
1998	$20,558	$47,338	$91,029	$125,325	$171,904	$405,752
2001	$22,676	$50,391	$100,781	$144,873	$201,562	$527,841
2004	$24,108	$52,066	$105,175	$153,627	$212,714	$531,785
2007	$23,552	$52,254	$102,857	$145,449	$215,481	$632,974
2010	$24,402	$50,825	$101,651	$152,476	$223,632	$614,987

Ratio of Actual to Self-Reported Normal Income Percentiles

Survey	Percentile					
Year	20th	50th	80th	90th	95th	99th
1995	89%	98%	100%	100%	100%	112%
1998	90%	94%	100%	100%	101%	117%
2001	91%	97%	100%	101%	103%	119%
2004	90%	96%	98%	97%	100%	106%
2007	91%	95%	100%	101%	101%	115%
2010	84%	90%	93%	93%	92%	100%

Source: Survey of Consumer Finances.

Table 2. Distribution of the Gap Between Actual and Self-Reported Normal Income

Survey Year	All Households Average Gap Between Actual and Normal Income	Households with Actual and Normal Income > $0 Average Gap Between Actual and Normal Income	Households with Actual and Normal Income > $0 Variance of Percent Gap Between Actual and Normal[1]	Households with Actual and Normal Income > $5,000 Average Gap Between Actual and Normal Income	Households with Actual and Normal Income > $5,000 Variance of Percent Gap Between Actual and Normal[1]
1995	-$573	-$288	0.127	-$132	0.083
1998	$2,511	$2,676	0.134	$2,796	0.091
2001	$4,075	$4,183	0.105	$4,306	0.085
2004	-$963	-$659	0.124	-$522	0.091
2007	$3,415	$3,648	0.108	$3,795	0.084
2010	-$5,423	-$4,647	0.145	-$4,515	0.109

Source: Survey of Consumer Finances.

[1] Variance of [ln(actual income)–ln(normal income)].

Table 3. Asymmetry in the Gap Between Actual and Self-Reported Normal Income

Survey Year	Families Reporting Actual Income Lower than Normal Income: Percent of All Households	Mean Difference	Median Difference	Families Reporting Actual Income Greater than Normal Income: Percent of All Households	Mean Difference	Median Difference
1995	17%	-$21,671	-$14,461	9%	$36,040	$14,504
1998	16%	-$24,412	-$14,698	10%	$64,233	$16,230
2001	14%	-$32,671	-$16,115	11%	$80,918	$18,896
2004	20%	-$28,696	-$14,181	9%	$53,995	$18,081
2007	14%	-$31,482	-$16,389	9%	$87,611	$16,377
2010	25%	-$35,995	-$17,077	6%	$60,309	$14,844

Source: Survey of Consumer Finances.

Table 4. Actual and Normal Income by Normal Income Vingtile, 2010

Normal Income Vingtile	Mean Normal	(Mean Actual Income)/(Mean Normal Income)	Distribution of Actual to Normal Income			
			5th Percentile	10th Percentile	90th Percentile	95th Percentile
All	$83,924	94%	12%	16%	170%	245%
1	$8,365	115%	40%	55%	133%	194%
2	$13,559	100%	67%	84%	114%	116%
3	$18,250	95%	51%	68%	111%	111%
4	$22,473	95%	54%	68%	108%	109%
5	$26,434	96%	50%	65%	108%	110%
6	$30,347	94%	41%	61%	105%	105%
7	$34,014	93%	43%	58%	105%	120%
8	$38,842	90%	31%	48%	105%	120%
9	$43,904	91%	42%	52%	104%	120%
10	$49,223	88%	33%	47%	103%	112%
11	$54,347	91%	39%	65%	104%	105%
12	$60,428	93%	39%	64%	104%	104%
13	$66,984	94%	42%	65%	105%	106%
14	$74,264	92%	41%	58%	105%	110%
15	$83,939	93%	50%	63%	106%	108%
16	$96,354	90%	41%	53%	105%	105%
17	$112,490	94%	54%	68%	108%	108%
18	$137,286	92%	42%	60%	110%	111%
19	$181,971	90%	38%	54%	114%	118%
20	$536,214	96%	19%	32%	175%	245%

Source: Survey of Consumer Finances.

Table 5. Deviations From Normal Income in 2010 Relative to Panel-Based Income Movement

Actual and Normal Income in the 2010 SCF Cross-Section

Percentile of Normal Income in 2010	Percentile of Actual Income in 2010					
	Less than 20th	20th–39.9th	40th–59.9th	60th–79.9th	80th–100th	All
Less than 20th	**78.1**	20.9	0.8	0.2	0.0	100
20th–39.9th	12.7	**63.2**	22.6	1.3	0.1	100
40th–59.9th	5.8	10.4	**63.3**	20.4	0.2	100
60th–79.9th	2.1	3.5	11.0	**70.9**	12.5	100
80th–100th	1.0	0.6	2.5	7.2	**88.8**	100
All	100	100	100	100	100	

Movement Across Income Groups in the 2007-2009 SCF Panel

Percentile of Income in 2007	Percentile of Income in 2009					
	Less than 20th	20th–39.9th	40th–59.9th	60th–79.9th	80th–100th	All
Less than 20th	**69.4**	22.0	5.4	2.1	1.1	100
20th–39.9th	19.0	**49.1**	23.6	6.4	1.9	100
40th–59.9th	6.7	21.2	**45.1**	22.9	4.0	100
60th–79.9th	3.0	6.5	22.7	**50.0**	17.8	100
80th–100th	1.9	1.2	3.5	18.3	**75.2**	100
All	100	100	100	100	100	

Source: Survey of Consumer Finances.

Table 6. Income and Food Spending Growth in the Survey of Consumer Finances (SCF)
(Percent indexes based on inflation-adjusted measures, 2004=100)

	Survey Year					
	1995	**1998**	**2001**	**2004**	**2007**	**2010**
Normal Income						
Aggregate	68%	76%	91%	100%	107%	107%
Mean	77%	83%	96%	100%	103%	102%
Median	85%	91%	97%	100%	100%	98%
Actual Income						
Aggregate	69%	80%	97%	100%	112%	101%
Mean	78%	87%	102%	100%	108%	96%
Median	87%	90%	98%	100%	100%	92%
Total Food Spending						
Aggregate				100%	101%	101%
Mean				100%	98%	96%
Median				100%	97%	93%
Food at Home						
Aggregate				100%	102%	104%
Mean				100%	99%	99%
Median				100%	113%	109%
Food Away from Home						
Aggregate				100%	99%	93%
Mean				100%	96%	88%
Median				100%	91%	80%

Source: Survey of Consumer Finances.
Note: Food data available starting in 2004.

Table 7: Food Spending by Vingtile of Normal Income[1]

Normal Income Vingtile	Mean Normal Income	Mean Annual Food Spending		(Mean Food Spending)/ (Mean Normal Income)	
		Food At Home	Food Away	Food At Home	Food Away
All	$83,750	$5,523	$2,200	6.7%	2.7%
1	$7,644	$3,241	$778	39.0%	9.4%
2	$12,877	$3,598	$818	27.8%	6.3%
3	$17,457	$3,804	$923	22.2%	5.4%
4	$21,934	$4,242	$1,134	19.8%	5.3%
5	$26,289	$4,427	$1,339	17.2%	5.2%
6	$30,539	$4,617	$1,428	16.1%	5.0%
7	$34,319	$4,727	$1,610	14.3%	4.9%
8	$38,608	$4,729	$1,655	12.8%	4.5%
9	$43,430	$4,935	$1,612	11.7%	3.8%
10	$48,980	$5,184	$1,765	11.3%	3.8%
11	$54,483	$5,267	$1,969	10.1%	3.8%
12	$61,122	$5,458	$2,127	9.5%	3.7%
13	$67,998	$5,639	$2,278	8.6%	3.5%
14	$75,359	$6,017	$2,379	8.3%	3.3%
15	$84,886	$6,528	$2,621	7.9%	3.2%
16	$96,645	$6,612	$2,613	7.2%	2.8%
17	$111,701	$6,635	$2,949	6.1%	2.7%
18	$134,164	$7,246	$3,457	5.5%	2.6%
19	$178,322	$7,943	$3,897	4.6%	2.3%
20	$532,773	$9,667	$6,706	1.8%	1.2%

Source: Survey of Consumer Finances.

[1] Vingtile break-points were calculated by pooling normal incomes from 2004, 2007, and 2010.

Table 8. Year Dummy and Income Shock Parameter Estimates for Various Engel Curve Food Regressions

	Model Specification		
Food Spending Category	**Model 1: Income Spline[1] and Year Dummies Only**	**Model 2: Income Spline[1], Year Dummies, and Additional Demographics[2]**	**Model 3: Income Spline[1], Year Dummies, Additional Demographics[2], and Self-Reported Transitory Shocks**
Total Food Spending			
2007 Year Dummy	-125	-175**	-179**
2010 Year Dummy	-303***	-339***	-334***
Positive income shock			.0004**
Negative income shock			-.0014***
Adjusted R-squared	0.2973	0.3822	0.3829
Food Away from Home			
2007 Year Dummy	-76	-68	-71
2010 Year Dummy	-256***	-240***	-236***
Positive income shock			.0003*
Negative income shock			-.0010***
Adjusted R-squared	0.2252	0.2354	0.2366
Food at Home			
2007 Year Dummy	-49	-107*	-108*
2010 Year Dummy	-47	-99*	-98*
Positive income shock			.0002
Negative income shock			-.0004
Adjusted R-squared	0.1734	0.3475	0.3476

Source: Survey of Consumer Finances

Sample size for all regressions: 15,435. Significance levels: *(10%), **(5%), ***(1%)

[1]Linear-spline segments for each vingtile of normal income. Coefficients not reported.

[2]Additional controls include marital status, age, number of children, lives in MSA, and region. Coefficients not reported.

Table 9. Year Dummy and Income Shock Parameter Estimates by Normal Income Quintile[1]

	Quintile of Normal Income				
Food Spending Category	**Lowest Quintile**	**Second Quintile**	**Third Quintile**	**Fourth Quintile**	**Fifth Quintile**
Total Food Spending					
2007 Year Dummy	-179	-322*	-381**	-6	21
2010 Year Dummy	-309*	-482***	-462***	-49	-195
Positive income shock	.0553***	.0099	.0209***	.0114***	.0004*
Negative income shock	.0400	-.0266**	-.0086	-.0181***	-.0013***
Food Away from Home					
2007 Year Dummy	-90	-162	-184*	-100	170
2010 Year Dummy	-227**	-231**	-163	-355***	-89
Positive income shock	.0223**	.0138**	.0081**	.0051**	.0002*
Negative income shock	.0026	-.0167**	-.0138***	-.0147***	-.0009***
Food at Home					
2007 Year Dummy	-90	-160	-197	94	-149
2010 Year Dummy	-82	-251**	-299**	305**	-106
Positive income shock	.0330***	-.0039	.0127***	.0063**	.0002
Negative income shock	.0374*	-.0099	.0052	-.0033	-.0004

Source: Survey of Consumer Finances

Sample size for all regressions: 15,435. Significance levels: *(10%), **(5%), ***(1%)

[1]All regressions correspond to Model 3 from Table 8. Regressions include linear-spline segments for each vingtile of normal income and additional controls for marital status, age, number of children, lives in MSA, and region. Coefficients not reported. Adjusted R-squares for the three regressions are .3845 for total food, .2392 for food away, and .3486 for food at home.