

Consumption vs. Expenditure

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Abstract

Previous authors have documented a dramatic decline in food expenditures at the time of retirement. We show that this is matched by an equally dramatic rise in time spent shopping for and preparing meals. Using a novel data set that collects detailed food diaries for a large cross-section of U.S. households, we show that neither the quality nor the quantity of food intake deteriorates with retirement status. We also show that unemployed households experience a decline in food expenditure and food consumption commensurate with the impact of job displacement on permanent income. These results highlight how direct measures of consumption distinguish between anticipated and unanticipated shocks to income while measures of expenditures obscure the distinction.

I. Introduction

Standard tests of the permanent income hypothesis (PIH) using data on nondurables typically equate consumption with expenditure.¹ However, as noted by Becker (1965), consumption is the output of “home production” which uses as inputs both market expenditures and time.² To the extent possible, individuals will substitute away from market expenditures as the relative price of time falls. In this sense, an individual’s opportunity cost of time has a direct bearing on the total cost of consumption, making market expenditures a poor proxy for actual consumption.

In this paper, we directly examine the link between food expenditures, time spent on food production, and actual food consumption. To do this, we exploit a novel dataset - the Continuing Survey of Food Intake of Individuals (CSFII) – which tracks the dollar value, the quantity, and the quality of food consumed within U.S. households. We find that agents, in response to forecastable income changes, smooth consumption, but not necessarily expenditures, as predicted by the standard PIH model augmented with home production.

We use this data to revisit two major stylized facts in the household consumption literature: household non-durable consumption drops significantly during both retirement and unemployment.³ The majority of researchers documenting these stylized facts use food expenditures as their measure of non-durable consumption. Some authors have interpreted the decline in expenditure at the onset of retirement as being evidence that some households do not plan sufficiently for retirement (Bernheim et. al. (2001)), while others conclude that there is

¹ This literature is vast. See surveys by Browning and Lusardi (1996) and Attanasio (1999). We use the terms Permanent Income Hypothesis, Life-cycle Model, and “consumption smoothing” to refer to the class of models in which agents seek a constant marginal utility of consumption (up to an adjustment for differences between time preference and the interest rate).

² See also Ghez and Becker (1975). Becker’s insight was revived and extended by, among others, Benhabib, Rogerson, and Wright (1991), Greenwood and Hercowitz (1991), Rios-Rull (1993), and Baxter and Jermann (1999). Rupert, Rogerson and Wright (1995, 2000), McGrattan, Rogerson, and Wright (1997), and Aguiar and Hurst (2005) provide empirical evidence documenting the importance of home production.

³ See, for example, Banks, Blundell, and Tanner (1998), Bernheim, Skinner, and Weinberg (2001), Haider and Stephens (2003) for retirement and Stephens (2001) for unemployment.

some unexpected news about lifetime resources that occurs at the time of retirement (Banks et al (1998)). Using the CSFII data, we find that consumption expenditures fall by 17 percent at retirement. However, this decline is accompanied by a 53 percent increase in time spent in food production.

Given the sharp increase in time spent shopping for and preparing food, the pattern for expenditures may differ significantly from the pattern of actual consumption. To explore the response of consumption during retirement, we perform a comprehensive analysis of individual food diaries of retirement-age household heads. We first document that nutritional summary statistics of individual diets do not vary by retirement status. While rough aggregates, many of these measures display strong income elasticities across working-age employed households. Second, we identify several individual food categories that display large income elasticities. Again, we find the frequency which retirees consume any of the individual food categories is essentially identical to nonretirees with similar demographics. Third, we examine consumption categories for which we can identify an observable quality component. For example, while retirees are less likely to eat away from home, the difference comes almost exclusively from a decline in visits to fast food restaurants. We find, however, that the probability of dining at a restaurant with table service does not vary across retirement status.

To construct an aggregate consumption index, we project permanent income on the household's entire consumption basket using a sample of middle aged households. As one would expect, out of sample tests verify that consumption patterns have significant forecasting power for permanent income. We then test whether the permanent income implied by observed consumption varies across retirement status for older households. Again, the data rule out any sizeable drop in consumption.

We perform the same battery of tests to determine whether unemployment results in a consumption decline. As with retirement, the unemployed experience a decline in expenditures in both food at home and food away from home, with total food expenditure falling 19 percent. The unemployed increase time spent in food production as well, although to a lesser extent than the retirees. In sharp contrast to retirement, however, our tests indicate that unemployment results in a significant decline in consumption. Controlling for demographics, our consumption index for unemployed households suggests a 5 percent decline in lifetime resources. Given that other researchers have documented that involuntary job loss results in a persistent decline in annual income of roughly 8-10 percent (Huff-Stevens, 1997), these results are consistent with the PIH in the absence of perfect social insurance and provide an interesting counterpoint to retirement. That is, direct observation of consumption indicates a quantifiable difference between an unanticipated shock to permanent income and an anticipated shock such as retirement. This difference is obscured when one looks solely at expenditure.

This paper breaks new ground by looking directly at food production. Food expenditure has been used extensively in the estimation of consumption Euler equations using micro data sets (Browning and Lusardi, 1996). The reason for the prominent use of food consumption is two fold. First, panel data sets, primarily the *Panel Study of Income Dynamics* (PSID), report only food expenditures out of the class of nondurable goods. Second, food is a necessary good with a small income elasticity, making it a strong test for consumption smoothing. However, as we show in this paper, the elasticity of substitution between time and expenditures may be large in the production of food intake. Given home production, we conclude that certain expenditures, particularly expenditures on food, are poor proxies for actual household consumption and mask the extent to which individuals smooth consumption in practice.

II. Data

For our primary analysis, we use data from the *Continuing Survey of Food Intakes by Individuals* (CSFII) collected by the U.S. Department of Agriculture. The survey is cross sectional in design and is administered at the household level. We pool the two most recent cross sectional surveys; the first interviewed households between 1989 and 1991 (CSFII_89) and the second interviewed households between 1994 and 1996 (CSFII_94).

The CSFII_89 and CSFII_94 were designed to be nationally representative. Based on sample averages, the demographic coverage of the CSFII closely tracks that of the PSID. The 1989 data also includes an additional data set that oversamples low income households. Unless we are specifically looking at the behavior of low income households, we restrict all of our analysis to the main samples. When analyzing individual-level data, we restrict our analysis to household heads. When more than one person in the household identified themselves as being the head, we selected the male head to maintain consistency with alternative household datasets, such as the PSID. All together, the two surveys cover over 30,000 individuals in nearly 15,000 households. The response rates for both surveys were high.⁴

CSFII respondents are asked to report their average expenditures per week over the previous three months for food purchased at grocery and specialty stores for consumption at home (“food at home”) and food purchased and consumed at restaurants, fast food places, and cafeterias (“food away from home”). We have converted all expenditure variables to 1996 dollars using the June CPI. Each household member in the CSFII data also filled out detailed food diaries, recording their total food intake during a particular 24-hour period, with the CSFII_89 collecting three days and CSFII_94 two days of diaries, respectively. When

⁴ Approximately 80 percent (CSFII_89) to 85 percent (CSFII_94) of eligible households contacted participated in the survey and 67 percent (CSFII_89) to 78 percent (CSFII_94) of participants completed the full multiple-day diaries.

computing our food intake measures, we average over each respondent's set of completed diaries.

The data sets track standard economic and demographic characteristics of its survey respondents including age, educational attainment, race, gender, occupation, employment status, hours worked, retirement status, family composition, geographic census region, whether the household lives in an urban area, home owner status, and household income. The survey also asks respondents detailed questions regarding health status, health knowledge, and preference for nutrition.⁵

Aside from a question regarding shopping frequency, the CSFII data does not explicitly track time spent on home production. To examine the extent to which households spend time in food production, we make use of an additional data set: the *National Human Activity Pattern Survey* (NHAPS) conducted for the United States Environmental Protection Agency by the Survey Research Center at the University of Maryland and administered between the fall of 1992 and the fall of 1994. The study was a random-digit telephone survey of households in the continental U.S. Only one, randomly selected, individual per household was included in the survey. The total sample included 9,386 individuals.

As part of the survey, each respondent was asked to provide a minute-by-minute time diary of the previous 24 hour day, which was aggregated to 91 time use categories.⁶ We use two of these aggregate time use categories: “minutes spent preparing food” and “minutes spent shopping for food”. While the NHAPS demographic information is less extensive than in the CFSII data, it does include: age, gender, race, educational status, census region, current work

⁵ See the Data Appendix of Aguiar and Hurst (2004) for a detailed discussion of the CSFII survey methodology and a comparison of the sample demographics in the CSFII to the sample demographics from other large household based surveys.

⁶ See EPA report EPA/600/R-96/148 (July 1996) for a detailed description of the survey methodology and coding classifications.

status, whether the individual is retired, whether the individual is unemployed, the size of the household to which the individual belongs, and whether the individual is a homeowner or renter.

III. Expenditure and Time Use among the Retired

According to the permanent income hypothesis, forward looking agents will smooth their marginal utility of consumption across predictable income changes such as retirement. However, there is a large literature which documents that upon retirement household expenditures fall dramatically.⁷ The literature refers to such a finding as “the retirement consumption puzzle”.

Specifically, using PSID data, Bernheim et al. (2001) find that total food expenditure declines by 6 to 10 percent between the pre and post retirement periods for the typical household.⁸ Haider and Stephens (2003) find a decline in food expenditures ranging from 10 to 15 percent using alternative data and empirical methodologies. Bernheim et al document that all households except those in the top income replacement or wealth quartiles experience a decline in expenditures within four years of retirement, with the poorest households experiencing the sharpest decline. Hurst (2003) finds a reduction in food expenditure of 11 percent for the median household. These papers find expenditure declines for both food purchased at grocery stores and food purchased away from home. Moreover, the decline in expenditures at the time of retirement is not limited to food. Banks, Blundell and Tanner (1988) use the British Family Expenditure Survey to document that total expenditures decline sharply at the incidence of retirement.

⁷ For example, see Banks, Blundell, and Tanner (1998), Bernheim, Skinner and Weinberg (2001), Miniaci, Monfardini and Weber (2002), Haider and Stephens (2003), Hurd and Rohwedder (2003) and Hurst (2004).

⁸ From Bernheim et al (2001) Table A1, households in the second wealth quartile and second income-replacement quartile experience an expenditure decline of 10 percent in the two years after retirement. Households in the third wealth and third income quartiles experience a decline of 6 percent.

In this and the subsequent two sections, we use the CSFII and NHAPS data sets to illustrate that the retirement consumption puzzle is no puzzle at all once we disentangle consumption from expenditure. To examine food expenditure, time spent on food production, and food consumption at the onset of retirement, we restrict both the CSFII and NHAPS samples to include only households with heads between the ages of 57 and 71 for which there is a full set of control variables (2,052 household heads and 1,308 individuals for the CSFII and NHAPS samples, respectively).

To begin, we document the “retirement consumption puzzle” using expenditure from the CSFII data sets. Figure 1 plots the average total expenditure on food for households with a male head aged 57 - 71, by three year age ranges.⁹ As retirement propensities increase with age, household expenditure declines sharply with age. Prior to peak retirement years (60-62) and after peak retirement years (66-68), household expenditure on food declines by 13 percent for male headed households (p -value < 0.01). Households with a retired head (male or female) spend 11 percent less per month on food than their non-retired counterparts (\$377 vs. \$423 per month, p -value of difference < 0.01). These magnitudes are consistent with the evidence provided by Bernheim et al (2001) and Haider and Stephens (2004), who use panel data.

The decline in consumption expenditures with age or at the time of retirement is robust to the inclusion of a rich set of controls designed to capture changing demographics and health among older households. The top portion of Table 1 reports the estimates to the following regression:

$$\ln(x_{it}) = \alpha_0 + \alpha_1 \text{Retired}_{it} + \alpha_2 Z_{it} + \mu_{it} \quad (3.1)$$

⁹ In Figure 1, we focus on male heads because the probability that a female is a household head increases with age (given differences in mortality rates across the sexes). Given that females eat less than males, we may observe consumption falling with age simply as a result of differences in sample composition. In all our regression work below, we focus on the full sample of household heads and include controls to account for changes in sample composition.

where x_{it} is total food expenditure, expenditures on food “at home”, or expenditures on food “away from home”, depending on the specification, for household i in year t . $Retired_{it}$ is a dummy variable equal to 1 if the household head i is retired in year t , and Z_{it} is the vector of year, region, demographic and health controls. Specifically, the Z vector includes a series of controls for household composition including dummies for time, the household’s family size and census region, and the head’s education, race, sex, and responses to detailed health questions.¹⁰

Given that the timing of retirement can also be correlated with unmeasured variables which affect the household's expenditure decisions, we estimate (3.1) via an instrumental variable procedure. As is common in the literature, we use age as our instrument for retirement. Age naturally has strong predictive power for the household head's retirement status. The adjusted R-squared of a regression of household retirement status on age controls is 0.19 (with an associated F -statistic of 119.0). The top rows of Table 1 report that controlling for year, region, demographic and health controls, retired households spend 17 percent less on total food (p -value < 0.01), 15 percent less on food at home (p -value = 0.01), and 31 percent less on food away from home (p -value = 0.01).^{11, 12}

While expenditure declines with retirement status, time spent on food production dramatically increases with retirement status, where we define food production as shopping for

¹⁰ See the Data Appendix to Aguiar and Hurst (2004) for a full description of the health question.

¹¹ Haider and Stephens (2003) argue that self-reported retirement expectation is a better instrument for retirement than age. Using this instrument, they find that expenditure declines by 8-10 percent at retirement. In the CSFII data, we only observe a cross section of households and retirement expectations are not asked. Median regression (not reported) indicates that, in the CSFII data, the median decline in expenditure across retirement status is comparable to the mean decline.

¹² As retirement has been defined according to the head’s status, it may be the case that a spouse continues to work. We find that roughly 30 percent of nonretired households in our 57-71 sample have a spouse who works, while that percentage falls by half for retired households. As would be expected due to both permanent income and home production considerations, a working spouse raises expenditure by roughly 10 percent (p -value = 0.01) in non-retired households. The presence of a working spouse in “retired” households raises expenditure by roughly 14 percent (p -value < 0.01). The point estimate from estimating the interaction term suggests that a working spouse mitigates the fall in expenditure due to retirement, but the scarcity of retired households with working spouses limits the estimate’s precision.

food and preparing meals. Figure 1 shows that male household heads aged 66-68 spend 21 percent more time on food production than those aged 60-62. The pattern persists when directly comparing retired to non-retired households. For the NHAPS sub-sample of individuals aged 57-71, retired individuals spend 27 percent more time on food production per day than their non-retired counterparts (47 minutes vs. 37 minutes, p-value of difference < 0.01). While not reported, the data suggest that men experience a larger increase in food production time during retirement than women, although from a lower base.

To assess retirement's impact on time use controlling for household demographics, we estimate the following regression:

$$h_{it} = \alpha_0 + \alpha_1 Retired_{it} + \alpha_2 Z_{it} + u_{it} \quad (3.2)$$

where h_{it} measures individual i 's propensity to shop for food or total daily time spent (in minutes) on food production. The CSFII data asks households whether they do their major shopping at least once a week. The NHAPS, as mentioned above, records time spent shopping for food and time spent preparing meals. For the NHAPS data, we also use a dummy variable indicating whether time spent on food production is positive and the log of time spent on food production (if positive) as alternative dependent variables. *Retired* and *Z* are defined as above.¹³ As before, we instrument for retirement status using age dummies.

The lower rows of Table 1 shows that retired households are 17 percentage points (over a base probability of 66 percent) more likely to do their major food shopping on a weekly basis (p-value < 0.01). Likewise, retired households spend 18 more minutes per day on food production (p-value = 0.02) and spend 53 percent more time on food production, conditional on food production being positive (p-value < 0.01). The breakdown between shopping and preparation

¹³ Given that the demographic variables recorded in the NHAPS data are much more limited, the *Z* vector for time spent on food production include only year, region, sex, household size, education and race controls. The NHAPS dataset does not include any health measures.

(not reported) indicates that retirees spend 42 percent more time shopping than nonretirees and 54 percent more time preparing food, conditional on demographics and positive time spent on the activity.¹⁴

Our primary analysis concerns food. However, the NHAPS data also tracks time spent shopping for non-grocery household goods. During retirement, households increase their propensity to shop for other goods by 50 percent and their total time spent shopping for other goods by 64 percent. This suggests that expenditure may not be an accurate measure of actual consumption for non-food goods.

It should be noted that 18 minutes a day is a sizeable increase in time spent on food production. The 18 minutes per day translates into an additional 9 hours per month of food production. If households value their time during retirement at half the sample's average pre-retirement wage of \$18, this would translate into an additional \$81 per month of food production. During retirement, total monthly expenditures on food, conditional on demographics, declines by about \$70 per month. That is, if one values the time of retired households at half their pre-retirement wage, the increase in time spent in food production for retired households is roughly the same as their decline in food expenditure.

IV. Nutrition, Consumption Categories and Luxury Goods in Retirement

The CSFII data provide tremendously detailed accounts of an individual's dietary habits. To assess whether an individual's food consumption changes in retirement, we explore the data in four ways. First, we examine the nutritional composition of the individual's diet. Secondly, we examine individual categories of food consumption. In both cases, we identify nutritional

¹⁴ The fact that time spent on home production and shopping increases with retirement status is consistent with the majority of work which examines time use. For example, see Juster and Stafford (1985), Hurd and Rohwedder (2003), Blaylock (1989), Cronovich, Daneshvary, and Schwer (1997) and Aguiar and Hurst (2005).

measures and consumption categories that exhibit strong income elasticities. Third, we explore consumption goods that have an observable quality component. Lastly, we form a consumption index that aggregates numerous individual consumption categories and test whether this index varies with retirement status.

The CSFII reports summary statistics for each individual's daily diet. We start our analysis by focusing on 8 nutritional measures: total calories, vitamin A, vitamin C, vitamin E, calcium, saturated fat, cholesterol, and protein. Our methodology has two components. First, we establish that these nutritional measures vary with lifetime resources. Second, we show whether the consumption of these nutritional measures changes with retirement status.

Panel I of Table 2 reports the income elasticity of these nutritional measures for a sample of household heads between the ages of 45 and 55 who are working full time.¹⁵ To obtain this elasticity, we estimate an IV regression of the log of the nutrition measure on the log of income as well as controls for race, sex, family composition, height and health controls. We instrument current household income with occupation, education, education and occupation interactions, and sex and race interactions. Aside from the log calories regression, all other regressions in Panel I include log calories as an additional control. In the second panel, we regress this same dependent variable on a dummy variable equal to 1 if the household head is retired (instrumented with age dummies). This sample is the same used to compute the estimates in Table 1 (household heads aged 57 – 71). As with the results in Table 1, this regression also includes race, sex, year, region, household composition, and health controls.

As perhaps should be expected, log calories vary slightly with permanent income within a cross section of middle aged, working households, with an estimated elasticity of 0.06 (p -value =

¹⁵ We computed the income elasticities reported in Tables 2 and 3 for households working full time on two alternative samples: 1) households aged 25 – 55 and 2) households aged 57 – 71. The results for the former sample are discussed in Aguiar and Hurst (2004). The estimated income elasticities were nearly identical across the three different samples we analyzed.

0.02). However, other dietary components respond strongly to variation in income. Specifically, the income elasticities of vitamin A and vitamin C are over 0.40 (p -values < 0.01) and the income elasticities of vitamin E and calcium are 0.24 and 0.10, respectively (p -values < 0.01). Likewise, cholesterol and saturated fat are inferior goods (respectively, income elasticities equal to -0.22 and -0.10, p -values < 0.01). The results are robust to the inclusion of controls for whether the household head is taking specific vitamin supplements. Furthermore, nonlinear estimation (not reported) confirms that vitamins (either A, C, or E) are a strictly increasing function of income over all observed income ranges. Likewise, cholesterol is a strictly declining function of income over all observed income ranges. The results are consistent with individuals consuming inexpensive calories by switching their diet towards fat and cholesterol and away from vitamins and calcium. The suggestion that “fat” is cheap and “healthy diets” are expensive is consistent with a large literature on nutrition and income.^{16, 17}

The results from Panel I of Table 2 suggest that if an individual enters retirement with too few resources, we may observe the composition of their diet shifting away from vitamin-rich foods towards fat and cholesterol. As seen in Panel II of Table 2, there is no evidence that the nutritional quality of a household’s diet deteriorates during retirement. In fact, retired households consume higher quality diets (as measured by more vitamins and less cholesterol) compared to their working counterparts. If the decline in expenditure represented a fall in actual consumption, we would expect to observe either total calories declining or the quality of calories deteriorating. The data support neither of those predictions.

¹⁶ See, for example, Subramanian and Deaton (1996) or Bhattacharya, Currie, and Haider (2001, 2003).

¹⁷ One potential concern with the regression is that income may be correlated with nutritional literacy or other preferences for a healthy diet. To address this, we use CSFII measures of nutritional preference and nutritional literacy. Households are specifically asked about their preference regarding a healthy diet and whether they are informed about the dangers of unhealthy diets. We included a number of these controls in the specifications reported in Tables 2 and 3 and found little impact on the reported coefficients. More to the point, the exercise is designed to highlight aspects of diet that distinguish rich from poor households in the cross-section, and then test whether retirees’ lower expenditure is manifested as a “low income” diet.

Moving beyond nutritional aggregates, we also observe detailed food intake for each individual. The CSFII data tracks the quantities consumed (in grams) in a given day using thousands of 8-digit food codes. The structure of these food codes is similar to that of SIC occupation and industry codes. As a result, we can aggregate these food codes up to broader classifications. For much of our analysis, we use three digit food codes (e.g. natural cheeses, cottage cheeses, processed cheeses, etc.). The reason we do not always exploit the 8-digit food code categories is that often there are only a handful of households that consume any given specific type of food category on a given day. There are some instances below, however, where we do use the 8-digit food codes. We have explored hundreds of the individual 3-digit and 8-digit consumption categories. Table 3 reports the results from only a few of these categories. The categories we chose were ones which had strong income elasticities among working households or ones which were suggested to us by other researchers. While only a handful of the categories are presented, it should be stressed that we found no evidence that individuals experienced a systematic consumption decline upon retirement among all the goods we explored.

Table 3 has essentially the same structure as Table 2. The first panel measures the income semi-elasticity of the incidence of consuming a positive amount of a given food category. The sample and controls are identical to those of Table 2. The dependent variable is a dummy variable equal to 1 if the individual consumed any of the consumption category. We report seven food categories: fresh fruit, shellfish, wine, yogurt, oat/rye/multigrain bread, hot dogs/lunch meat and ground beef. As seen from Panel I of Table 3, the first five categories all exhibit strong positive income semi-elasticities. For example, a doubling of income increases the probability that a household eats fresh fruit by 23 percentage points (p -value < 0.01), where 65 percent of the sample consumed fresh fruit. Conversely, hot dogs/lunchmeat and ground beef

have negative semi-elasticities. As seen in the second panel of Table 3, there is no evidence that individuals switch away from goods with high income elasticities at the time of retirement. For these categories, the consumption patterns of retirees look very similar to their non-retired counterparts. The only statistically significant change suggests that retirees eat better.

The analysis so far may be subject to the criticism we are missing quality differences within categories. For example, it may be that household consumption of ground beef does not change at the time of retirement. But, instead, retired households consume cheaper, low quality ground beef while pre-retired households consume more expensive, higher quality ground beef. In Table 4, we examine goods with an observable measure of quality.

First, the CSFII data set tracks the location of where each meal is consumed. Specifically, if a meal is consumed away from home, we know if it is at a fast food restaurant, a cafeteria, a bar, or at a restaurant with table service. Eating at a restaurant with table service provides more ambiance and higher quality food than a fast food establishment. As seen in Table 4, the “luxury good” quality of restaurants is clear in the data – within a cross section of household heads aged 45-55 who are working full time, a doubling of income increases the incidence of eating at a restaurant with table service by 16 percent (p-value < 0.01). The income elasticity for fast food is lower, although still positive. The positive income elasticity on fast food and cafeteria food may reflect in part how the nature of the work environment and the opportunity cost of time vary with income. Restaurant meals may also capture work-related activity as well as pure consumption. Nevertheless, it seems safe to conclude that the higher income elasticity for restaurants with table service versus fast food restaurants to a large extent reflects quality differences.

However, there is no evidence that individuals decrease their propensity to eat at restaurants with table service upon retirement. Table 4 reports that retired households are 18 percentage points less likely to eat out, consistent with the 31 percent difference in expenditure on food away from home. However, the decline in eating away from home is due to individuals ceasing to eat at fast food restaurants and cafeterias. In fact, the propensity to eat at a restaurant with table service is 29 percent for both individuals aged 60-62 (pre peak retirement years) and for individuals aged 66-68 (post peak retirement years).¹⁸

One question that arises is how much of the observed drop in expenditure on meals away from home is accounted for by the decline in fast food and cafeteria meals. The lack of direct measures of expenditure across the different types of establishments necessitates an indirect calculation. All else equal, a retired household spends 31 percent less on food away from home than a non-retired household (Table 1). The average monthly expenditure for non-retired households aged 57-71 on food away from home is \$85, implying a difference in levels of roughly \$26 per month. Table 4 indicates that retired households are 0.20 percentage points less likely to frequent fast food restaurants or cafeterias, or roughly 6 fewer trips per month. In order for fast food and cafeteria meals to account for the entire decline requires an average expenditure of \$4.33 per trip. The fact that this number is not particularly large is consistent with the hypothesis that much of the decline in expenditure on food away from home can be accounted for by less frequent visits to fast food and cafeteria establishments.

Another quality characteristic for which we have data is the leanness of meat. Specifically, the 8 digit food codes distinguish between whether the household consumed regular or lean

¹⁸ As mentioned in footnote 12, there are some elderly households in which the spouse works (including those in which the head is retired). We find that having a working spouse raises expenditure by roughly 11 percent among (all) elderly households, all else equal. However, the evidence suggests that the non-working spouse mitigates the effect of this decline in expenditure on consumption. That is, in a regression of our consumption measures on a "working spouse" dummy variable plus our usual controls, the coefficient on the working spouse dummy variable are typically close to zero. The prominent exception is that households in which the wife works are significantly more likely to eat out at restaurants with table service.

ground beef. While ground beef is an inferior good, Table 3 documented that the propensity to eat ground beef does not increase with retirement status. Among working households, conditional on eating ground beef, the choice of lean ground beef is positively related to income, with a semi-elasticity of 0.44. However, retirees are just as likely as their nonretired counterparts to consume high quality ground beef. The results are also shown in Table 4.

Additionally, we can directly test whether individuals switch toward lower quality goods, within a given food category, upon retirement. For most food items, information on the brand of that good is unavailable. However, we do have brand information for cereal. We find that among household heads aged 57-71 who eat cereal, 13 percent of retirees eat “store brand” cereal, roughly identical to the 14 percent rate among non-retirees (p -value of difference = 0.67).

The categories highlighted in the analysis thus far represent only a small fraction of the CSFII data available. The difficulty with exploiting the full range of data is how to aggregate the various components. Our approach is to derive the weights for the individual food categories within our consumption index by projecting the permanent income of prime aged working households on the quantities consumed of various types of foods. As we have shown above, there is a relationship between a household’s permanent income and the composition of their diet. To explore this relationship formally, we estimate our consumption index as follows:

$$\ln(y^{perm,i}) = \beta_0 + \alpha_1 c_{1,t}^i + \dots + \alpha_J c_{J,t}^i + \beta_X \ln(x_t^i) + \beta_\theta \theta_t^i + \beta_{age} age_t^i + \beta_{age^2} (age_t^i)^2 + \varepsilon_t^i \quad (4.1)$$

where y^{perm} is an estimate of the household’s permanent income, c_1, \dots, c_J represent the quantity consumed of food $j=1, \dots, J$, θ is a vector of taste controls, age is the age of the individual, and x is the total monthly expenditure for the individual’s household. As shown in Aguiar and Hurst

(2004), the inclusion of expenditures along with quantities controls for differences in prices paid across households.¹⁹

We estimate (4.1) on a sample of household heads from our CSFII data who are between the ages of 25 and 55 and who report working full time (2,966 individuals). The permanent income for each employed household head is estimated as above using race, sex, industry, and occupation controls.²⁰ For our consumption measures, we selected 79 3-digit food categories (listed in Appendix Table A1) plus our 8 nutritional measures displayed in Table 2. The vector of taste controls (θ) includes the household head's race, sex, family composition, multiple health status controls, and region of residence.

To explore how well food consumption predicts income, we split the sample into two. We estimated (4.1) for full-time employed individuals aged 25-55 in the *odd* years of our survey. The R-squared of this regression was 0.53. Food consumption items on their own explain 21 percent of the variation in permanent income, while the incremental R-squared of the addition of the food variables to the expenditure, age and taste controls was 12 percent. Using the regression coefficients, we predicted permanent income out-of-sample for full-time employed individuals aged 25-55 in the *even* years of the sample. The R-squared from the out-of-sample regression of actual income on predicted income was 0.42 (omitting demographics and expenditure and using food alone produced an out-of-sample R-squared of 0.09). This out-of-sample forecasting power indicates that diet is fairly informative regarding a household's permanent income.

There are two things to note with respect to the estimation of (4.1). First, we do not have the actual permanent income for retired households. However, the goal of this paper is to ask

¹⁹ Also, as shown in Aguiar and Hurst (2004), aside from simply being interpreted as a estimate of a consumption index, this expression can be used to derive an approximation to the Lagrange multiplier on lifetime resources in a canonical lifecycle model augmented to include home production.

²⁰ We bootstrap standard errors in (4.1) to adjust for the fact that permanent income is predicted for each household.

whether retired households act like their lifetime resources have unexpectedly declined once they entered retirement. Using (4.1) we can predict a household’s implied permanent income based upon what they eat. Specifically, we obtain the parameters of the aggregation function from the estimates of (4.1) and form $\ln \hat{C} \equiv \hat{\alpha}_1 c_1 + \dots + \hat{\alpha}_n c_n + \hat{\beta}_X \ln X$ for each individual (including retired households), where again expenditure is included to control for price heterogeneity. Given the specification, the units of our consumption index are in log permanent income dollars. A one percent decline in our consumption index implies that households are consuming as if their permanent income had fallen by one percent. Figure 1 plots $\ln \hat{C}$ for male household heads in the CSFII data between the ages of 57 and 71, by three year age ranges. While expenditure falls dramatically for households in the peak retirement age, the consumption index remains essentially constant. Indeed, the pure “quantity” component of the index, obtained by subtracting $\hat{\beta}_X \ln X$ from $\ln \hat{C}$, increases slightly in retirement. This is the optimal response to the lower cost of consumption in retirement, with the small size of the increase being consistent with a low inter-temporal elasticity of substitution for food.

Using the same procedure we followed with expenditure, we regress the consumption index on retirement status and taste controls. Formally, we estimate:

$$\ln \hat{C} = \gamma_0 + \gamma_1 Retired_{it} + \gamma_2 Z_{it} + v_{it} \quad (4.2)$$

where *Retired* and *Z* are defined as in (3.1) and (3.2). As before, we instrument retirement status with age controls. The results are reported in the first row of Table 5. We find no evidence that our consumption index varies across retirement status. The coefficient on γ_1 is -0.006. We have performed a number of robustness checks and found the impact of retirement remains negligible across numerous alternative specifications (see Appendix 2 of Aguiar and Hurst (2004) for details).

In the preceding analysis, we formed our consumption index by projecting permanent income on consumption patterns. An alternative methodology projects expenditure on consumption patterns. The estimated index weights under this approach will be the implied prices for the benchmark group of working households. With these prices, we then can compare the implied cost (at “benchmark prices”) of the consumption of retirees with that of non-retirees.

To perform this analysis, we re-estimate (4.1), but with log expenditure as our dependent variable rather than income (removing expenditure as a control). Note that the fit of this regression is hampered by the fact that our quantities represent food intake by an individual over a few days, while expenditure represents household purchases over the entire month. Nevertheless, we find that food diaries have substantial predictive power. The adjusted R-squared of the first stage is 0.28, while the incremental adjusted R-squared associated with the inclusion of food controls is 0.05. Moreover, the correlation between a household’s predicted expenditure and that household’s predicted permanent income is 0.6.

We then predict the implied expenditure for each retired household using their consumption bundle and the estimated coefficients: $\ln \hat{x}_i = \hat{\alpha}_1 c_1^i + \dots + \hat{\alpha}_j c_j^i + \hat{\beta}_\theta \theta$. After which, we regress this measure using the same controls as (4.2). The coefficient on retirement status is shown in row II of Table 5. Like our predicted consumption index, predicted expenditure does not vary with retirement status (coefficient = -0.005; p-value = 0.67). Even though actual expenditure is falling sharply with retirement status, predicted expenditure based upon the household’s consumption bundle remains constant. This further suggests that prices paid by retired households are falling sharply during retirement.²¹

²¹ The fact that households pay lower prices for a given consumption good (as measured by UPC code) has been documented by Aguiar and Hurst (2005). They find that, on average, households over the age of 65 pay approximately 5 percent lower prices for a given UPC coded good compared to middle-aged households.

One interesting result documented by Bernheim et al (2001) concerns the heterogeneity of expenditure declines in retirement across income and wealth groups. In particular, they find that the lowest quartile of the wealth distribution experiences a disproportionate decline in expenditures. Our analysis so far has focused on the average behavior of households. Unfortunately, our dataset does not contain detailed wealth or pension data. With respect to wealth, individuals in the CSFII are only asked the amount of liquid wealth they have if it is below \$5,000. Additionally, we know if the household owns their own home. With this data in hand, we identify a subset of “low wealth” households defined as those with less than \$1,000 in liquid assets and who do not own their home. This subset contains 369 individuals, or roughly 10 percent of our sample.²²

Compared with the full sample of households and consistent with Bernheim et al (2001), low wealth individuals experience a larger expenditure decline in retirement (25 percent (p-value = 0.04) vs 17 percent (p-value = 0.01)). However, given the small sample, power is an issue. In particular, we cannot precisely estimate the effect of retirement on consumption of low wealth households for many of our consumption measures. One pattern we can identify concerns restaurant meals: compared with non-retired low wealth households, low wealth retirees are less likely to dine at restaurants with table service (-12 percentage point decline, p-value = 0.10). We also find that low wealth retirees consume roughly the same amount of fruit as low wealth non retirees (4 percent increase, p-value = 0.71) and are much less likely to consume calories (19 percent decline, p-value = 0.04). The comparable numbers for the full sample were, respectively, -3 percentage points, 23 percent and 6 percent. Overall, we conclude that the average household is modeled well by the PIH in the sense that they smooth consumption across

²² For this analysis, we included the over sample of low income households to increase our sample size. The low income households were only included if they met our definition of low wealth.

predictable income shocks such as retirement. However, there may be a segment of the population with very low wealth that experiences a measured consumption decline upon retirement.

One final piece of corroborating evidence comes from a question posed in the 1968 PSID. Specifically, households were asked, “Are there any special ways you try to keep the food bill down?” If the respondents answer yes, the PSID asked them to list which (perhaps more than one) methods were used. In the sample of 816 household heads aged 57 through 71, retirees were slightly more likely than non-retirees to answer yes to this question (57 and 51 percent, respectively). However, conditional on answering yes and controlling for sex, education, and marital status, retirees were 9.5 percentage points less likely than non-retirees to respond that they reduced their food expenditures by “eating cheaper or lower quality foods” (p-value=0.07). Moreover, the response “eating less” was as common among non-retirees as retirees. However, retirees were 7 percentage points more likely to list shop for bargains, make own meals, or grow own food, as methods to reduce food costs (p-value=0.38).²³

In this section, we have marshaled evidence indicating that households do not suffer consumption (as opposed to expenditure) declines at retirement. A typical concern with finding that a variable has no effect is the power of the test. That is, are we confident that our procedure would detect a significant effect if one indeed existed? The fact that our forecasts based on consumption predict both permanent income and expenditure out of sample is one argument to mitigate this concern. Second, as we discuss in the next section, our consumption-based measure of income responds to unemployment status.

²³ Of non-retirees who reported taking action to reduce their food bill, 15 percent listed “eating cheaper or lower quality foods,” and 42 percent reported “shopping for bargains”, “making own meals”, or “growing own food.”

V. Consumption Changes during Unemployment

In this section, we use the data and methodology developed in the previous section to analyze the changes in consumption when workers become unemployed. To the extent that unemployment represents an unanticipated shock to lifetime resources, the PIH does not predict that consumption will remain constant across unemployment status. However, theory does suggest that unemployed agents should spend more time in home production to reduce the price paid for a unit of consumption.

For our analysis, we use the sample of household heads between the age of 25 and 55 that are either full time employed or unemployed. We do not exclude the over sample of the poor from the 1989-91 CSFII survey, which provides more unemployed and comparable employed individuals. We also re-estimate each specification restricting the sample to heads with 12 years or less of schooling. This “low education” sub-sample contains a set of employed individuals that are perhaps more comparable to the unemployed, partially mitigating the concern that we are comparing inherently different employed and unemployed households in the cross-section. Our full sample consists of 3,874 household heads, 7 percent of whom are unemployed. Our low educated sample consists of 1,927 household heads, with 10 percent being unemployed. Likewise, we create similar samples within the NHAPS dataset, with 3,364 individuals (4.6 percent unemployed) and 1,258 (7.0 percent unemployed), respectively.

As with retirement, we first document that unemployed households spend less on food than their employed counterparts. To control for other observables, we estimate:

$$\ln(x_{it}) = \beta_0 + \beta_1 \text{Unemployed}_{it} + \beta_2 Z_{it} + v_{it} \quad (5.1)$$

where x_{it} is total food expenditure, expenditures on food “at home”, or expenditures on food “away from home”, depending on the specification, for household i in year t . Unemployed_{it} is a

dummy variable equal to 1 if household head i is unemployed in year t . As before, the Z vector includes the same series of health and demographic controls included when estimating (3.1).

The results of estimating (5.1) are reported in Columns I (full sample) and II (low educated sample) of Table 6. For the full sample, total expenditure on food falls by roughly 19 percent in unemployment (p -value < 0.01), with food at home falling by 9 percent (p -value $=0.02$) and food away from home falling by 42 percent (p -value < 0.01). For the low educated sample, the comparable numbers are -21 percent, -15 percent, and -38 percent (p -values for all < 0.01). These numbers are comparable in magnitude to those reported by other researchers.²⁴ The fact that our cross-sectional declines in expenditure are of similar magnitude to those found using panel data is reassuring regarding the ability of our demographic variables to control for inherent differences between employed and unemployed households.

As predicted by theory, unemployed households spend more time shopping and preparing food. Columns I and II of Table 6 report regressions of time use on unemployment status, controlling for demographics. Unemployed individuals spend, on average, 12 minutes more than employed individuals in food production or 28 percent more time conditional on reporting a positive amount of time (p -values < 0.01). The numbers are similar when restricting analysis to the low-educated sample.

The last row of Table 6 indicates that unemployed households experience a significant change in actual consumption. As discussed in section 4, we use observed food consumption and food expenditure measures for each household to fit a consumption index for each individual in the unemployment sample. Using all employed households as a comparison group, Column I

²⁴ Using the PSID, Stephens (2001) finds that household food expenditure declines by roughly 10 percent following involuntary job loss of the household head. Using the British Family Expenditure survey, Banks, Blundell, and Tanner (1998) find unemployed households experience a 7.6 percent decline in food at home and domestic energy and a 52 percent decline in work-related expenses which include restaurant meals, transport, and adult clothing.

of Table 6 reports that unemployed household heads experience a 5 percent drop in consumption (p -value < 0.01). For the comparison group of low-educated employed households, Column II of Table 6 reports that unemployed household heads experience a 4 percent drop in consumption (p -value < 0.01). We have performed a number of robustness checks and found that over the alternative specifications, the estimated drop in implied lifetime resources for the unemployed ranged from 4 percent to 8 percent. In each case, we were able to reject a zero change in our consumption index or predicted expenditure at standard confidence levels.²⁵

Finally, we look more closely at the effect of unemployment on food away from home. As noted above, expenditure in this category drops roughly 40 percent, ten points more than the 30 percent decline observed in retirement. Recall that retiree's decline in the propensity to eat away from home was largely confined to the reduced frequency of fast food and cafeteria meals. Table 7 breaks down the propensity to eat food away from home by type of establishment for the unemployed, controlling for the full set of demographics and health variables. Column I of Table 7 focuses the analysis on the full unemployment sample, while column II of Table 7 focuses the analysis on the low education unemployment sample. The first row reports that the probability of eating out declines by roughly 25 percentage points in unemployment, compared to a sample mean of 70 percent. As with retirees, the probability of eating fast food or cafeteria meals show dramatic declines in unemployment, with fast food declining 20 percentage points (vs. a sample mean of 43 percent) and cafeterias declining 8 points (vs. a sample mean of 8 percent). Both declines are statistically significant at the 1 percent level. However, unemployed household heads also experience a large decline in visits to restaurants with table service. For the low educated sample, the incidence of dining out at such establishments declines 15 percentage points (p -value < 0.01) in unemployment, with a sample mean frequency of 28

²⁵ See Aguiar and Hurst (2004) for details.

percent. In contrast to the retirees, the unemployed therefore experience a significant loss in terms of the quality of their consumption of meals away from home.

Consistent with the decline in the consumption index and the propensity to eat at restaurants with table service, unemployed households experience declines in food consumption quality along other dimensions. Specifically, relative to their employed counterparts, unemployed households consumed 16 percent less vitamin C, 12 percent less vitamin A, and 14 percent less vitamin E. Additionally, unemployed households were 5 percentage points more likely to consume hotdogs, 3 percentage points less likely to consume shellfish, and 9 percentage points less likely to consume fresh fruit.

The data on the quality and quantity of food consumed indicate that unemployed households experience a measurable drop in utility. The decline in lifetime resources implied by the pattern of consumption and expenditure is roughly 5 percent. This number is similar to the estimates of the shock to permanent income due to job loss. For example, Huff-Stevens (1997) estimates that job displacement reduces earnings (relative to pre-unemployment) by roughly 9 percent six or more years after the onset of unemployment. The change in consumption during unemployment provides an interesting counterpoint to the notable absence of such a decline during retirement. This further suggests that if there were a meaningful decline in consumption associated with retirement, our tests have enough power to detect it.

VI. Discussion and Conclusion

The data on food consumption analyzed in this paper indicate that consumption is much more stable across individuals with similar permanent income but different current income than are expenditures. The evidence suggests that agents are able to smooth consumption by substituting time for expenditures. One concern with our study is that we analyze a cross section

of individuals when the PIH concerns an individual over time. We have a fairly rich set of demographic and health variables that help control for individual heterogeneity. More importantly, we find fluctuations across individuals in expenditures that are not present in consumption. In particular, we quantitatively match the behavior of expenditures during retirement and unemployment that have been documented by other researchers with panel datasets, while at the same time documenting that consumption behaves much differently than expenditures.

The key issue is whether our measures of food intake capture the utility of food consumption. Throughout the paper, we measure food quantity and quality along a number of dimensions. All of the measures tell a consistent story. The individual income elasticities, the out-of-sample checks, and the fact that the unemployed show a consumption decline confirm that our measures are able to detect a decline in permanent income when present. Our analysis indicates that consumption is stable both absolutely and relative to expenditures, during anticipated shocks to income such as retirement. If there is a margin of substitution through which utility from the consumption of food declines during retirement, it is not apparent from extremely detailed food diaries.

While food consumption represents only a portion of the household's total consumption bundle, the ability to shop for bargains and utilize other means of home production applies to much broader classes of goods. Although we do not have direct data on consumption of other goods, the analysis in this paper suggests that expenditure may be a misleading measure of consumption more generally. What we can conclude directly from the evidence in this paper is that any decline in total consumption due to temporary or anticipated fluctuations in income occurs along dimensions other than food. This is perhaps expected given the fact that food is a

necessary good and amenable to home production. However, it provides an important contrast to conclusions drawn from studies using food expenditures.

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**Table 1: IV Regression of Changes in Food Expenditure, Shopping Frequency,
And Time Spent on Food Production By Retirement Status,
with Demographic and Health Controls**

<i>Dependent Variable</i>	<i>Coefficient on Retirement Dummy</i>
<i>Expenditure</i>	
Log Total Food Expenditure	-0.17 (0.05)
Log Food Expenditure "At Home"	-0.15 (0.05)
Log Food Expenditure "Away from Home"	-0.31 (0.11)
<i>Shopping Frequency</i>	
Dummy: Shop for food at least once per Week	0.17 (0.05)
<i>Time Spent on Food Production</i>	
Total Time Spent on Food Production (in minutes)	18.3 (6.9)
Dummy: Time Spent on Food Production is Positive	0.07 (0.06)
Log of Time Spent on Food Production, Conditional on Time Spent Being Positive	0.53 (0.18)

Notes – Expenditure and shopping frequency data are from the pooled 1989-1991 and 1994-1996 cross sections of the Continuing Survey of the Food Intake of Individuals. The sample is restricted to include only households with heads between the age of 57 and 71 (2,052 households). Log specifications restricted to subset of sample which reports strictly positive value for dependent variable. Shopping frequency refers to the question "On average, how often does someone do a major (grocery) shopping for this household?" The sample mean of the dummy variable for shopping at least once per week is 0.66. Time Use data are from the National Human Activity Pattern Survey (NHAPS). Food production (measured in minutes) is the sum of time spent "shopping for food" and time spent "preparing food." Sample restricts individuals in the NHAPS to be between the ages of 57 and 71 who had time spent on food production less than 6 hours (1,308 observations). Only 8 individuals in the sample had daily food production in excess of 6 hours. Table reports the results from an IV regression of the dependent variable on a dummy variable indicating whether the household head retired and a vector of demographic, health, region, time, and education controls. One year age dummies of the household head are used to instrument for retirement status. See text for the full definition of demographic, health, region, time and education controls included. Huber-White standard errors are presented in parenthesis.

Table 2: Income Elasticity of Nutritional Measures among Working Households and Change in Nutritional Measures Across Retirement

Dependent Variable	I. Estimated Income Elasticity Sample: Heads Working Full Time Aged Between 45 and 55		II. Estimated Retirement Effect Sample: All Household Heads Aged Between 57 and 71	
	Coefficient on Log Permanent Income	Mean of Dependent Variable	IV Coefficient on Retirement Status Dummy	
Log Calories	0.06 (0.03)	7.59	-0.02 (0.03)	
Log Vitamin A	0.54 (0.08)	8.48	0.36 (0.09)	
Log Vitamin C	0.41 (0.08)	4.22	0.33 (0.09)	
Log Vitamin E	0.24 (0.04)	2.03	0.11 (0.04)	
Log Calcium	0.10 (0.04)	6.51	0.13 (0.04)	
Log Cholesterol	-0.22 (0.05)	5.55	-0.09 (0.05)	
Log Saturated Fat	-0.10 (0.03)	3.18	-0.07 (0.03)	
Log Protein	0.004 (0.02)	4.18	-0.03 (0.02)	

Notes: Data comes from pooled CSFII_89 and CSFII_94 datasets. Sample sizes for Panels I and II, respectively, are 1,101 household heads and 2,052 household heads. All nutritional measures, aside from calories, protein and saturated fat are measured in milligrams. Saturated fat and protein are measured in grams. The first column in Panel I reports the coefficient on log income from an IV regression of the nutritional measure on log income and race, sex, height, health, year and region controls, where indicators of permanent income are used as instruments for log income. The instruments include occupation, education, education and occupation interactions, and sex and race interactions. Huber-White standard errors are in parentheses. See text for discussion. Panel II reports the coefficient on a dummy variable indicating whether the household head was retired from an IV regression of the nutritional variable on the retirement dummy, demographic and health controls. Retirement status was instrumented with age dummies. All regressions in both Panels I and II, aside from when log calories is the dependent variable, include log calories as an additional control.

Table 3: Income Semi-Elasticity of Food Categories among Working Households and Change in Propensity to Consume Food Categories in Retirement

Dependent Variable	I. Estimated Semi-Income Elasticity Sample: Heads Working Full Time Aged Between 45 and 55		II. Estimated Retirement Effect Sample: All Household Heads Aged Between 57 and 71
	Coefficient on Log Permanent Income	Mean of Dependent Variable	IV Coefficient on Retirement Status Dummy
Dummy: Eat Fruit	0.23 (0.05)	0.65	0.14 (0.04)
Dummy: Eat Shellfish	0.06 (0.02)	0.06	-0.02 (0.02)
Dummy: Drink Wine	0.15 (0.03)	0.09	-0.03 (0.03)
Dummy: Eat Yogurt	0.17 (0.03)	0.10	0.01 (0.03)
Dummy: Eat Oat/Rye/Multigrain Bread	0.12 (0.03)	0.13	0.06 (0.04)
Dummy: Eat Hotdog/Lunch Meat	-0.16 (0.05)	0.50	-0.06 (0.05)
Dummy: Eat Ground Beef	-0.11 (0.04)	0.20	-0.01 (0.04)

Notes: Data comes from pooled CSFII 89 and CSFII 94 datasets. Sample sizes for Panels I and II, respectively, are 1,101 household heads and 2,052 household heads. Dependent variable is a dummy variable taking the value one if respondent consumed the listed item and zero otherwise. The first column in Panel I reports the coefficient on log income from an IV regression of the dummy variable on log income and race, sex, height, health, year and region controls, where indicators of permanent income are used as instruments for log income. The instruments include occupation, education, education and occupation interactions, and sex and race interactions. Huber-White standard errors are in parentheses. See text for discussion. Panel II reports the coefficient on a dummy variable indicating whether the household head was retired from an IV regression of the consumption dummy on the retirement dummy, demographic and health controls. Retirement status was instrumented with age dummies.

Table 4: Income Semi-Elasticity of Restaurants with Table Service and High Quality Food among Working Households and Change in Propensity to Consume in Retirement

Dependent Variable	I. Estimated Semi-Income Elasticity Sample: Heads Working Full Time Aged Between 45 and 55		II. Estimated Retirement Effect Sample: All Household Heads Aged Between 57 and 71
	Coefficient on Log Permanent Income	Mean of Dependent Variable	IV Coefficient on Retirement Status Dummy
<i>Propensity to Eat Away from Home</i>			
Dummy: Individual Eats Away From Home (all establishments)	0.16 (0.04)	0.72	-0.18 (0.05)
Dummy: Individual Eats at a Cafeteria	0.12 (0.03)	0.13	-0.07 (0.03)
Dummy: Individual Eats at a Fast Food Establishment	0.10 (0.05)	0.42	-0.16 (0.04)
Dummy: Individual Eats at a Restaurant w/Table Service	0.16 (0.05)	0.41	-0.03 (0.05)
<i>Propensity to Switch Away from High Quality</i>			
Dummy: Individual Eats “Lean” Ground Beef ^a	0.44 (0.12)	0.53	0.13 (0.13)

Notes: Data comes from pooled CSFII_89 and CSFII_94 datasets. Sample sizes for Panels I and II, respectively, are 1,101 household heads and 2,052 household heads. Dependent variable is a dummy variable taking the value one if respondent consumed the listed item and zero otherwise. Eating away from home is defined as eating any meal at a cafeteria, bar, fast food establishment, or restaurant with table service. The 8 digit food codes categorize whether the beef consumed by individuals was lean or not. The first column in Panel I reports the coefficient on log income from an IV regression of the dummy variable on log income and race, sex, height, health, year and region controls, where indicators of permanent income are used as instruments for log income. The instruments include occupation, education, education and occupation interactions, and sex and race interactions. Huber-White standard errors are in parentheses. See text for discussion. Panel II reports the coefficient on a dummy variable indicating whether the household head was retired from an IV regression of the consumption dummy on the retirement dummy, demographic and health controls. Retirement status was instrumented with age dummies.

a – Sample additionally restricted to include only those household heads who reported eating ground beef (159 and 270 for Panels I and II, respectively).

Table 5: IV Regression of Changes in Consumption Index and Predicted Expenditure by Retirement Status, with Demographic and Health Controls

Dependent Variable	Coefficient
1. Log of food consumption index	-0.006 (0.02)
2. Log of predicted food expenditure	-0.004 (0.014)

Notes: Dependent variable for regression 1 is predicted log food consumption index using reported food consumption measures and total monthly food expenditures (using equation (4.1)). The reported coefficient for row 1 is γ_1 from (4.2). Dependent variable for regression 2 is predicted expenditure using reported food consumption measures. Data for rows 1 and 2 from the pooled 1989-1991 and 1994-1996 cross sections of the Continuing Survey of the Food Intake of Individuals (CSFII). The sample is restricted to include only households with heads between the age of 57 and 71 (2,052 households). See Section IV of the text for additional details and the list of additional regressors. Bootstrap standard errors from 500 repetitions are reported in parentheses.

**Table 6: Regression of Changes in Food Expenditure, Shopping Frequency,
And Time Spent on Food Production By Unemployment Status,
with Demographic and Health Controls**

Dependent Variable	I. Full Sample: Coefficient on Unemployment Dummy	II. Low Ed. Sample: Coefficient on Unemployment Dummy
<u>Expenditure</u>		
Log Total Food Expenditure	-0.19 (0.03)	-0.21 (0.04)
Log Food Expenditure “At Home”	-0.09 (0.03)	-0.15 (0.04)
Log Food Expenditure “Away from Home”	-0.42 (0.07)	-0.38 (0.09)
<u>Time Spent on Food Production</u>		
Total Time Spent on Food Production (in minutes)	11.6 (4.1)	11.6 (5.4)
Dummy Variable: Spend Positive Time on Food Production	0.08 (0.04)	0.07 (0.05)
Log of Time Spent on Food Production, Conditional on Time Spent Being Positive	0.28 (0.09)	0.26 (0.12)
<u>Consumption</u>		
Log of Food Consumption Index	-0.05 (0.01)	-0.04 (0.02)

Notes: Expenditure and Consumption data from the CSFII data sets. For both Columns I and II, the sample was restricted to include households with heads between the ages of 25 and 55 who were either working full time or were unemployed. The additional sample of low income households from the 1989/91 survey is also included. Sample size for Column I is 3,874 household heads. In Column II, we imposed the additional restriction that the household head had accumulated 12 years or less of schooling. The sample size for Column II is 1,927 household heads. Log specifications include only those households with a strictly positive dependent variable. See text for additional details. The data on time use comes from the NHAPS data (3,364 observations for full sample; 1,258 for low education sample). This sample was restricted to include individuals between the ages of 25 and 55 who were either working full time or were unemployed. Food production refers to shopping for food or preparing meals. Coefficients come from an OLS regression of the dependent variable on an unemployment dummy and a series of demographic, year, region, health and education controls. See text for a full description of variables included. See Section IV for details of data and derivation for food consumption index. Huber-White standard errors are in parentheses. The standard errors for the consumption index are bootstrapped (500 repetitions).

Table 7: Propensity to Eat “Away from Home” Among Working Age Households, By Unemployment Status

Dependent Variable	I. Full Sample		II. Low Education Sample	
	Coefficient on Unemployment Dummy	Mean of Dependent Variable	Coefficient on Unemployment Dummy	Mean of Dependent Variable
Dummy: Household Eat Away From Home (All establishments)	-0.25 (0.03)	0.70	-0.27 (0.04)	0.65
Dummy: Household Eat at Restaurant w/Table Service	-0.18 (0.02)	0.34	-0.15 (0.03)	0.28
Dummy: Household Eats at a Cafeteria	-0.10 (0.01)	0.12	-0.08 (0.01)	0.09
Dummy: Household Eats at a Fast Food Establishment	-0.17 (0.03)	0.45	-0.20 (0.03)	0.43

Notes – Data is from the pooled 1989-1991 and 1994-1996 cross sections of the Continuing Survey of the Food Intake of Individuals, collected by the Department of Agriculture. Sample restricted to include households with heads between the ages of 25 and 55 who were either working full time or were are unemployed. The additional sample of poorer households from the 1989/91 survey is included. Data refers to the consumption patterns of only the household head. Sample size for Panel I is 3,874 household heads. In Panel II, we imposed the additional restriction that the household head had accumulated 12 years or less of schooling. The sample size for Panel II is 1,927 household heads. Eating away from home is defined as eating any meal at a cafeteria, bar, fast food establishment, or restaurant with table service. The first column in each panel reports the results from an OLS regression of a dummy variable indicating whether the household ate a meal away from home on a dummy variable indicating whether the household head was unemployed and a vector of demographic, health, region, time, and education controls. See text for the full definition of demographic, health, region, time and education controls included. Huber-White standard errors are presented in parentheses.

Appendix Table A1: 3-Digit Food Categories Included in the Consumption Index

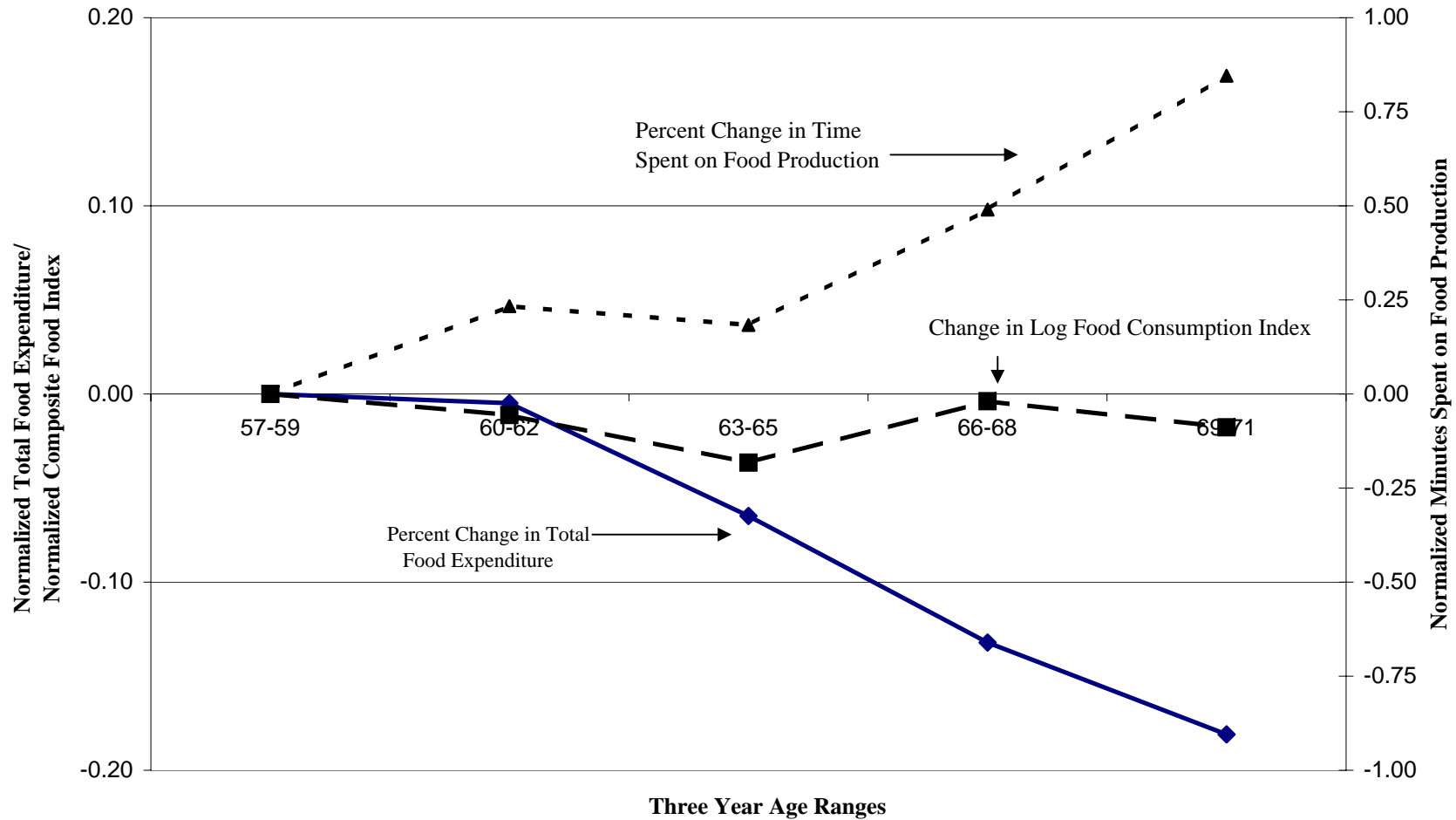
3-Digit Code	Food Category
111	Milk, fluid (regular; filled; buttermilk; and dry reconstituted)
114	Yogurt
121	Sweet dairy cream
122	Cream substitutes
123	Sour cream
131	Milk desserts, frozen
132	Puddings, custards, and other milk desserts
141	Natural cheeses
142	Cottage cheeses
143	Cream cheeses
144	Processed cheeses and cheese spreads
211	Beef steak
214	Beef roasts, stew meat, corned beef, beef brisket, sandwich steaks
215	Ground beef, beef patties, beef meatballs
216	Other beef items (beef bacon; dried beef; pastrami)
223	Ham
224	Pork roasts
226	Bacon, salt pork
227	Other pork items (spareribs; cracklings; skin; miscellaneous parts)
241	Chicken (breast; leg; drumstick; wing; back; neck or ribs; misc.)
242	Turkey
243	Duck
251	Organ meats and mixtures (liver; hearts; sweetbreads; brains; tongue)
252	Frankfurters, sausages, lunchmeats, meat spreads
261	Finfish
262	Other seafood
263	Shellfish
275	Sandwiches with meat, poultry, fish
281	Frozen or shelf-stable plate meals with meat, poultry, fish as major ingredient
311	Chicken eggs
421	Nuts
422	Nut butters
423	Nut butter sandwiches
511	White breads, rolls
512	Whole wheat breads, rolls
513	Wheat, cracked wheat breads, rolls
514	Rye breads, rolls
515	Oat breads
516	Multigrain breads, rolls
521	Biscuits
522	Cornbread, corn muffins, tortillas
531	Cakes
532	Cookies
533	Pies (fruit pies; pie tarts; cream, custard, chiffon pies; miscellaneous pies)
534	Cobblers, eclairs, turnovers, other pastries
535	Danish, breakfast pastries, doughnuts, granola bars

Appendix Table A1 (cont.): 3-Digit Food Categories Included in the Consumption Index

3-Digit Code	Food Category
551	Pancakes
552	Waffles
553	French toast
554	Crepes
561	Pastas
562	Cooked cereals, rice
571	Ready-to-eat cereals
576	Cereal grains, not cooked
611	Citrus fruits
621	Dried fruits
631	Fruits, excluding berries
632	Berries
633	Mixtures of two or more fruits
711	White potatoes, baked and boiled
712	White potatoes, chips and sticks
713	White potatoes, creamed, scalloped, au gratin
714	White potatoes, fried
715	White potatoes, mashed, stuffed, puffs
721	Dark-green leafy vegetables
722	Dark-green nonleafy vegetables
744	Tomato sauces
751	Other vegetables, raw
752	Other vegetables, cooked
811	Table fats
812	Cooking fats
813	Other fats
831	Regular salad dressings
832	Low-calorie and reduced calorie salad dressings
931	Beers and ales
932	Cordials and liqueurs
933	Cocktails
934	Wines
935	Distilled liquors
<hr/>	
Nutritional Measures Included	
<hr/>	
Total Calories	
Protein	
Cholesterol	
Vitamin A	
Calcium	
Vitamin C	
Vitamin E	
Saturated Fat	

Note: Food categories used as regressors in estimating (4.1). See text for full details.

Figure 1: Percentage Change in Food Expenditure, Composite Food Index, and Time Spent on Food Production for Male Household Heads by Three Year Age Ranges



Notes: Data is from the pooled 1989-1991 and 1994-1996 cross sections of the Continuing Survey of Food Intake of Individuals, collected by the Department of Agriculture, excluding the over sample of low income households. Sample restricted to only male household heads. Expenditure data and composite food index were both normalized by the average levels for households aged 57-59. All subsequent years are the percentage deviations from the age 57-59 levels. See Section IV for details of data and derivation for food consumption index.