Consumption versus Expenditure

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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 whereas measures of expenditures obscure the distinction.

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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 data set—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 these data to revisit two major stylized facts in the household consumption literature: household nondurable consumption drops significantly during both retirement and unemployment.[3] The majority of researchers documenting these stylized facts use food expenditures as their measure of nondurable 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); others conclude that there is 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 on food production.

Given the sharp increase in time spent shopping for and preparing food, the pattern of expenditures may differ significantly from the pat-

[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), Ríos-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, e.g., Banks, Blundell, and Tanner (1998), Bernheim, Skinner, and Weinberg (2001), and Haider and Stephens (2003) for retirement and Stephens (2001) for unemployment.

tern 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 that the frequency with which retirees consume any of the individual food categories is essentially identical to that of 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 sizable drop in consumption.

We perform the same battery of tests to determine whether unemployment results in a decline in consumption. Like retirees, 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 retirees. In sharp contrast to retirement, however, our tests indicate that unemployment results in a significant decline in consumption. Conditional on demographics, the change in our consumption index experienced by 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 (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). There are two reasons for the prominent use of food consumption. 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 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. On the basis of sample averages, the demographic coverage of the CSFII closely tracks that of the PSID. The 1989 data also include 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 himself or herself as being the head, we selected the male head to maintain consistency with alternative household data sets, 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 consumer price index. Also, household members in the CSFII data each 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,

[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.

respectively. When 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 their 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, homeowner 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 do not explicitly track time spent on home production. To examine the extent to which households spend time on food production, we make use of an additional data set: the National Human Activity Pattern Survey (NHAPS) conducted for the U.S. 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 United States. 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 that in the CFSII data, it does include age, gender, race, educational status, census region, current work 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 PIH, forward-looking agents will smooth their marginal utility of consumption across predictable income changes such as retirement. However, there is a large literature that documents that upon retirement household expenditures fall dramatically (see, e.g., Banks et al. 1998; Bernheim et al. 2001; Haider and Stephens 2003; Hurd and Rohwedder 2003; Hurst 2003; Miniaci, Monfardini, and Weber 2003).

[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 the Environmental Protection Agency's report EPA/600/R-96/148 (July 1996) for a detailed description of the survey methodology and coding classifications.

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 6–10 percent between the pre- and postretirement periods for the typical household.[7] 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 declines in expenditure 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 et al. (1998) use the British Family Expenditure Survey to document that total expenditures decline sharply at the incidence of retirement.

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.[8] 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 nonretired counterparts

[7] As seen in Bernheim et al.'s 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.

[8] In fig. 1, we focus on male heads because the probability that a woman is a household head increases with age (given differences in mortality rates across the sexes). Given that women eat less than men, 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.

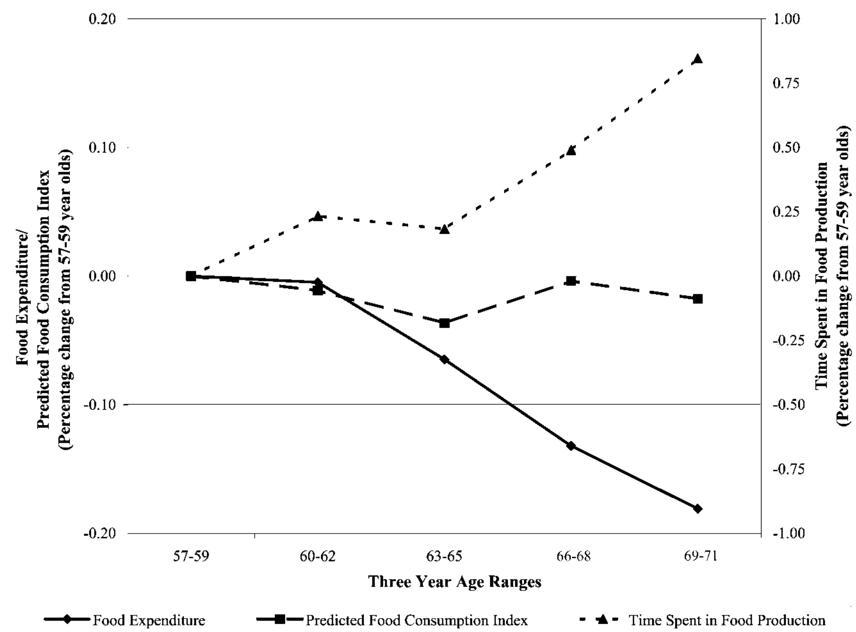

Fig 1.—Percentage change in food expenditure, predicted food consumption index, and time spent on food production for male household heads by three-year age ranges. Data are taken from the pooled 1989–91 and 1994–96 cross sections of the CSFII, excluding the oversample of low-income households. The sample is restricted to male household heads (1,510 households). All series were normalized by the average levels for household heads aged 57–59. All subsequent years are the percentage deviations from the age 57–59 levels. See Sec. IV for details of data and derivation of food consumption index

TABLE 1
INSTRUMENTAL VARIABLE REGRESSION OF CHANGES IN FOOD EXPENDITURE, SHOPPING FREQUENCY, AND TIME SPENT ON FOOD PRODUCTION BY RETIREMENT STATUS, WITH DEMOGRAPHIC AND HEALTH CONTROLS

Dependent Variable	Coefficient on Retirement Dummy
Expenditure:	
Log total food expenditure	−.17
	(.05)
Log food expenditure at home	−.15
	(.05)
Log food expenditure away from home	−.31
	(.11)
Shopping frequency:	
Dummy: shop for food at least once per week	.17
	(.05)
Time spent on food production:	
Total time spent on food production (in minutes)	18.3
	(6.9)
Dummy: time spent on food production is positive	.07
	(.06)
Log of time spent on food production, conditional on time spent being positive	.53
	(.18)

NOTE.—Expenditure and shopping frequency data are taken from the pooled 1989–91 and 1994–96 cross sections of the CSFII. The sample is restricted to include only households with heads between the ages of 57 and 71 (2,052 households). Log specifications are restricted to a subset of the sample that reports strictly a positive value for the dependent variable. Shopping frequency refers to the following 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 taken from the NHAPS. Food production (measured in minutes) is the sum of time spent shopping for food and time spent preparing food. The sample restricts individuals in the NHAPS to be between the ages of 57 and 71 who had time spent on food production less than six hours (1,308 observations). Only eight individuals in the sample had daily food production in excess of six hours. The table reports the results from an instrumental variable regression of the dependent variable on a dummy variable indicating whether the household head is 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 the text for the full definition of demographic, health, region, time, and education controls included. Huber-White standard errors are in parentheses.

(\$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 (2003), 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 first three rows of table 1 report the estimates of the following regression:

$$\ln(x_{it}) = \alpha_0 + \alpha_1 \text{retired}_{it} + \alpha_2 \mathbf{Z}_{it} + \mu_{it}, \qquad (1)$$

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; retired_{it} is a dummy variable equal to one if the household head i is retired in year t; and $\mathbf{Z}_{it}$ is the vector of year, region, demographic, and health controls. Specifically, the $\mathbf{Z}$ 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.[9]

Given that the timing of retirement can also be correlated with unmeasured variables that affect the household's expenditure decisions, we estimate (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^2 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 when we add 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).[10]

While expenditure declines with retirement status, time spent on food production dramatically increases with retirement status (we define food production as shopping for 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 we directly compare retired to nonretired households. For the NHAPS subsample of individuals aged 57–71, retired individuals spend 27 percent more time on food production per day than their nonretired counterparts (47 minutes vs. 37 minutes; p-value of difference < .01). While we do not report this, 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:

$$h_{it} = \alpha_0 + \alpha_1 \text{retired}_{it} + \alpha_2 \mathbf{Z}_{it} + u_{it}, \tag{2}$$

[9] See the data appendix to Aguiar and Hurst (2004) for a full description of the health question.

[10] 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 observe only 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.

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 age 57–71 sample have a spouse who works; that percentage falls by half for retired households. As would be expected because of both permanent income and home production considerations, a working spouse raises expenditure by roughly 10 percent (p-value = 0.01) in nonretired 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.

where h_{it} measures individual i's propensity to shop for food or total daily time spent (in minutes) on food production. The CSFII 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 as alternative dependent variables a dummy variable indicating whether time spent on food production is positive and the log of time spent on food production (if positive). The variable retired and **Z** are defined as above.[11] As before, we instrument for retirement status using age dummies.

The lower rows of table 1 show 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 (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.[12]

Our primary analysis concerns food. However, the NHAPS also tracks time spent shopping for nongrocery 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 nonfood goods.

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

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

[12] The fact that time spent on home production and shopping increases with retirement status is consistent with the majority of work that examines time use. See, e.g., Juster and Stafford (1985), Blaylock (1989), Cronovich, Daneshvary, and Schwer (1997), Hurd and Rohwedder (2003), and Aguiar and Hurst (2005).

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. Second, we examine individual categories of food consumption. In both cases, we identify nutritional measures and consumption categories that exhibit strong income elasticities. Third, we explore consumption goods that have an observable quality component. Finally, 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 eight 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 A 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.[13] To obtain this elasticity, we estimate an instrumental variable regression of the log of the nutrition measure on the log of income as well as add controls for race, sex, family composition, height, and health. 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 A include log calories as an additional control. In panel B, we regress this same dependent variable on a dummy variable equal to one 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 = 0.02). However, other dietary components respond strongly to variation in income. Spe-

[13] We computed the income elasticities reported in tables 2 and 3 for households working full-time on two alternative samples: (1) household heads aged 25–55 and (2) household heads 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.

TABLE 2
Income Elasticity of Nutritional Measures among Working Households and Change in Nutritional Measures across Retirement

Dependent Variable	A. Estimated Income Elasticity: Sample: Heads Aged 45–55 Working Full-Time		B. Estimated Retirement Effect: Sample: All Household Heads Aged 57–71
	Coefficient on Log Permanent Income (1)	Mean of Dependent Variable (2)	Instrumental Variable Coefficient on Retirement Status Dummy (3)
Log calories	.06	7.59	−.02
	(.03)		(.03)
Log vitamin A	.54	8.48	.36
	(.08)		(.09)
Log vitamin C	.41	4.22	.33
	(.08)		(.09)
Log vitamin E	.24	2.03	.11
	(.04)		(.04)
Log calcium	.10	6.51	.13
	(.04)		(.04)
Log cholesterol	−.22	5.55	−.09
	(.05)		(.05)
Log saturated fat	−.10	3.18	−.07
	(.03)		(.03)
Log protein	.004	4.18	−.03
	(.02)		(.02)

Note.—Data come from the pooled CSFII_89 and CSFII_94 data sets. Sample sizes are 1,101 household heads for panel A and 2,052 household heads for panel B. All nutritional measures aside from calories, protein, and saturated fat are measured in milligrams. Saturated fat and protein are measured in grams. Col. 1 reports the coefficient on log income from an instrumental variable 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 the text for a discussion. Panel B reports the coefficient on a dummy variable indicating whether the household head was retired from an instrumental variable regression of the nutritional variable on the retirement dummy and demographic and health controls. Retirement status was instrumented with age dummies. All regressions in both panels, except when log calories is the dependent variable, include log calories as an additional control.

cifically, 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 (income elasticities equal to -0.22 and -0.10, respectively; 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 toward 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 (see, e.g., Subramanian and Deaton 1996; Bhattacharya, Currie, and Haider 2003).[14]

The results from panel A of table 2 suggest that if an individual enters retirement with too few resources, we may observe the composition of his or her diet shifting away from vitamin-rich foods toward fat and cholesterol. As seen in panel B, 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) than their working counterparts. If the decline in expenditure represented a fall in actual consumption, we would expect to observe either a decline in total calories or a deterioration of the quality of calories. The data support neither of those predictions.

Moving beyond nutritional aggregates, we also observe detailed food intake for each individual. The CSFII data track the quantities consumed (in grams) in a given day using thousands of eight-digit food codes. The structure of these food codes is similar to that of Standard Industrial Classification 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 eight-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, in which we do use the eight-digit food codes. We have explored hundreds of the individual three-digit and eight-digit consumption categories. Table 3 reports the results from only a few of these categories. The categories we chose were ones that had strong income elasticities among working households or ones that 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 upon retirement individuals experienced a systematic decline in consumption among all the goods we explored.

Table 3 has essentially the same structure as table 2. Panel A measures the income semielasticity of the incidence of consuming a positive amount of a given food category. The sample and controls are identical

[14] 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 to test whether retirees' lower expenditure is manifested as a "low-income" diet.

TABLE 3
Income Semielasticity of Food Categories among Working Households and Change in Propensity to Consume Food Categories in Retirement

Dependent Variable	A. Estimated Income Semielasticity: Sample: Heads Working Full-Time Aged 45–55		B. Estimated Retirement Effect: Sample: All Household Heads Aged 57–71
	Coefficient on Log Permanent Income (1)	Mean of Dependent Variable (2)	Instrumental Variable Coefficient on Retirement Status Dummy (3)
Dummy: eat fruit	.23	.65	.14
	(.05)		(.04)
Dummy: eat shellfish	.06	.06	−.02
	(.02)		(.02)
Dummy: drink wine	.15	.09	−.03
	(.03)		(.03)
Dummy: eat yogurt	.17	.10	.01
	(.03)		(.03)
Dummy: eat oat/rye/multigrain bread	.12	.13	.06
	(.03)		(.04)
Dummy: eat hot dogs/lunch meat	−.16	.50	−.06
	(.05)		(.05)
Dummy: eat ground beef	−.11	.20	−.01
	(.04)		(.04)

Note.—Data come from the pooled CSFII_89 and CSFII_94 data sets. Sample sizes are 1,101 household heads for panel A and 2,052 household heads for panel B. The dependent variable is a dummy variable taking the value one if the respondent consumed the listed item, and zero otherwise. Col. 1 reports the coefficient on log income from an instrumental variable 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 the text for a discussion. Panel B reports the coefficient on a dummy variable indicating whether the household head was retired from an instrumental variable regression of the consumption dummy on the retirement dummy and demographic and health controls. Retirement status was instrumented with age dummies.

to those of table 2. The dependent variable is a dummy variable equal to one 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 A of table 3, the first five categories all exhibit strong positive income semielasticities. For example, a doubling of income increases the probability that a household eats fresh fruit by 23 percentage points (p-value < 0.01), with 65 percent of the sample consuming fresh fruit. Conversely, hot dogs/lunch meat and ground beef have negative semielasticities. As seen in panel B 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 those of their nonretired counterparts. The only statistically significant change suggests that retirees eat better.

The analysis so far may be subject to the criticism that 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. Instead, retired households consume cheaper, low-quality ground beef, whereas preretired 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 where each meal is consumed. Specifically, if a meal is consumed away from home, we know whether it is at a fast-food restaurant, a cafeteria, a bar, or a restaurant with table service. 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 occurs because individuals cease 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 (before peak retirement years) and individuals aged 66–68 (after peak retirement years).[15]

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

[15] As mentioned in n. 10, 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 nonworking 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 is 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.

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

	A. Estimated Income Semielasticity: Sample: Heads Aged 45–55 Working Full-Time		B. Estimated Retirement Effect: Sample: All Household Heads Aged 57–71
Dependent Variable	Coefficient on Log Permanent Income (1)	Mean of Dependent Variable (2)	Instrumental Variable Coefficient on Retirement Status Dummy (3)
Propensity to eat away from home:			
Dummy: individual eats away from home (all establishments)	.16 (.04)	.72	−.18 (.05)
Dummy: individual eats at a cafeteria	.12 (.03)	.13	−.07 (.03)
Dummy: individual eats at a fast-food establishment	.10 (.05)	.42	−.16 (.04)
Dummy: individual eats at a restaurant with table service	.16 (.05)	.41	−.03 (.05)
Propensity to switch away from high quality:			
Dummy: individual eats "lean" ground beef*	.44 (.12)	.53	.13 (.13)

Note.—Data come from the pooled CSFII_89 and CSFII_94 data sets. Sample sizes are 1,101 household heads for panel A and 2,052 household heads for panel B. The dependent variable is a dummy variable taking the value one if the 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 eight-digit food codes categorize whether the beef consumed by individuals was lean or not. Col. 1 reports the coefficient on log income from an instrumental variable regression of the dummy variable on log income and race, sex, height, health, year, and region controls; 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 the text for a discussion. Panel B reports the coefficient on a dummy variable indicating whether the household head was retired from an instrumental variable regression of the consumption dummy on the retirement dummy and demographic and health controls. Retirement status was instrumented with age dummies.

* The sample was additionally restricted to include only those household heads who reported eating ground beef (159 for panel A and 270 for panel B).

food away from home than a nonretired household (table 1). For nonretired household heads aged 57–71, the average monthly expenditure 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 six fewer trips per month. In order for fast-food and cafeteria meals to account for the entire decline, households must spend, on average, \$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 eight-digit food codes distinguish between whether the household consumed regular or lean 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 semielasticity 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 nonretirees (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 its diet. To explore this relationship formally, we estimate our consumption index as follows:

$$\ln (y^{\text{perm},i}) = \beta_0 + \alpha_1 c_{1,t}^i + \cdots + \alpha_J c_{J,t}^i + \beta_X \ln (x_t^i) + \beta_{\boldsymbol{\theta}} \boldsymbol{\theta}_t^i + \beta_{\text{age}} \text{age}_t^i + \beta_{\text{age}^2} (\text{age}_t^i)^2 + \epsilon_t^i, \tag{3}$$

where y^{perm} is an estimate of the household's permanent income; c_1, …, c_J represent the quantity consumed of food $j = 1, \ldots, J$; $\boldsymbol{\theta}$ 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.[16]

We estimate (3) 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.[17] For our consumption measures, we selected 79 three-digit food categories (listed in Appendix table A1) plus our eight nutritional measures displayed in table 2. The vector of taste controls ($\boldsymbol{\theta}$) 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 (3) for full-time employed individuals aged 25–55 in the *odd* years of our survey. The R^2 of this regression was 0.53. Food consumption items on their own explain 21 percent of the variation in permanent income, whereas the incremental R^2 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^2 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^2 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 (3). First, we do not have the actual permanent income for retired households. However, the goal of this paper is to ask whether retired households act as though their lifetime resources have unexpectedly declined once they entered retirement. Using (3), we can predict a household's implied permanent income on the basis of what its members eat. Specifically, we obtain the parameters of the aggregation function from the estimates of (3) and form $\ln \hat{C} \equiv \hat{\alpha}_1 c_1 + \cdots + \hat{\alpha}_1 c_1 + \hat{\beta}_X \ln X$ 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.

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

[17] We bootstrap standard errors in (3) to adjust for the fact that permanent income is predicted for each household.

TABLE 5
Instrumental Variable 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	−.006 (.02)
2. Log of predicted food expenditure	−.004 (.014)

Note.—The dependent variable for regression 1 is the predicted log food consumption index using reported food consumption measures and total monthly food expenditures (from eq. [3]). The reported coefficient for row 1 is γ_1 from (4). The dependent variable for regression 2 is predicted expenditure using reported food consumption measures. Data for rows 1 and 2 are taken from the pooled 1989–91 and 1994–96 cross sections of the CSFII. The sample is restricted to include only households with heads between the ages of 57 and 71 (2,052 households). See the text for additional details and the list of additional regressors. Bootstrap standard errors from 500 repetitions are reported in parentheses.

A 1 percent decline in our consumption index implies that households are consuming as though their permanent income had fallen by 1 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 intertemporal 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

$$\ln \hat{C} = \gamma_0 + \gamma_1 \text{retired}_{it} + \gamma_2 \mathbf{Z}_{it} + \nu_{it}, \tag{4}$$

where retired and $\mathbf{Z}$ are defined in (1) and (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 that the impact of retirement remains negligible across numerous alternative specifications (see Aguiar and Hurst [2004, app. 2] 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 nonretirees.

To perform this analysis, we reestimate (3), 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, whereas expenditure represents household purchases over the entire month. Nevertheless, we find that food diaries have substantial predictive power. The adjusted R^2 of the first stage is 0.28, and the incremental adjusted R^2 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 its consumption bundle and the estimated coefficients: $\ln \hat{x}_i = \hat{\alpha}_1 c_1^i + \cdots + \hat{\alpha}_J c_J^i + \hat{\beta}_\theta \boldsymbol{\theta}$. Then we regress this measure using the same controls as (4). The coefficient on retirement status is shown in row 2 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 on the household's consumption bundle remains constant. This further suggests that prices paid by retired households are falling sharply during retirement.[18]

One interesting result documented by Bernheim et al. (2001) concerns the heterogeneity of declines in expenditure at 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 data set does not contain detailed wealth or pension data. With respect to wealth, individuals in the CSFII are asked the amount of liquid wealth they have only if it is below $5,000. Additionally, we know whether the household owns its own home. With these data in hand, we identify a subset of "low-wealth" households defined as those with less than $1,000 in liquid assets and that do not own their home. This subset contains 369 individuals, or roughly 10 percent of our sample.[19]

Compared with the full sample of households and consistent with

[18] The fact that households pay lower prices for a given consumption good (as measured by universal product 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 universal product coded good than middle-aged households.

[19] For this analysis, we included the oversample of low-income households to increase our sample size. The low-income households were included only if they met our definition of low wealth.

Bernheim et al. (2001), low-wealth individuals experience a larger decline in expenditures at 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 nonretired 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 nonretirees (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 average households are modeled well by the PIH in the sense that they smooth consumption across 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 answered yes, the PSID asked them to list which (perhaps more than one) methods were used. In the sample of 816 household heads aged 57–71, retirees were slightly more likely than nonretirees to answer yes to this question (57 and 51 percent, respectively). However, conditional on their answering yes and with controls added for sex, education, and marital status, retirees were 9.5 percentage points less likely than nonretirees 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 nonretirees as among retirees. However, retirees were seven percentage points more likely to list shopping for bargains, making own meals, or growing own food as methods to reduce food costs (p-value = 0.38).[20]

In this section, we have marshaled evidence indicating that households do not suffer declines in consumption (as opposed to expenditure) 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

[20] Of nonretirees 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."

concern. Second, as we discuss in the next section, our consumption-based measure of income responds to unemployment status.

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 ages of 25 and 55 who are either full-time employed or unemployed. We do not exclude the oversample of the poor from the 1989–91 CSFII survey, which provides more unemployed and comparable employed individuals. We also reestimate each specification restricting the sample to heads with 12 years or less of schooling. This "low-education" subsample contains a set of employed individuals who 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-education sample consists of 1,927 household heads, with 10 percent being unemployed. Likewise, we create similar samples within the NHAPS data set, with 3,364 (4.6 percent unemployed) and 1,258 (7.0 percent unemployed) individuals, 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

$$\ln (x_{it}) = \beta_0 + \beta_1 \text{unemployed}_{it} + \beta_2 \mathbf{Z}_{it} + v_{it}, \qquad (5)$$

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 one if household head i is unemployed in year t. As before, the $\mathbf{Z}$ vector includes the same series of health and demographic controls included when estimating (1)

The results of estimating (5) are reported in columns 1 (full sample) and 2 (low-education 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

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	Full Sample: Coefficient on Unemployment Dummy (1)	Low-Education Sample: Coefficient on Unemployment Dummy (2)
Expenditure:		
Log total food expenditure	−.19	−.21
	(.03)	(.04)
Log food expenditure at home	−.09	−.15
	(.03)	(.04)
Log food expenditure away from home	−.42	−.38
	(.07)	(.09)
Time spent on food production:		
Total time spent on food production (in minutes)	11.6	11.6
	(4.1)	(5.4)
Dummy variable: spend positive time on food production	.08	.07
	(.04)	(.05)
Log of time spent on food production, conditional on time spent being positive	.28	.26
	(.09)	(.12)
Consumption:		
Log of food consumption index	−.05	−.04
	(.01)	(.02)

Note.—Expenditure and consumption data are taken from the CSFII data sets. For both cols. 1 and 2, the sample was restricted to include households with heads between the ages of 25 and 55 who either were working full-time or were unemployed. The additional sample of low-income households from the 1989–91 survey is also included. The sample size for col. 1 is 3,874 household heads. In col. 2, we imposed the additional restriction that the household head had accumulated 12 years or less of schooling. The sample size for col. 2 is 1,927 household heads. Log specifications include only those households with a strictly positive dependent variable. See the text for additional details. The data on time use come from the NHAPS data (3,364 observations for the full sample and 1,258 for the low-education sample). This sample was restricted to include individuals between the ages of 25 and 55 who either were working full-time or were unemployed. Food production refers to shopping for food or preparing meals. Coefficients come from an ordinary least squares regression of the dependent variable on an unemployment dummy and a series of demographic, year, region, health, and education controls. See the text for a full description of the variables included. See Sec. 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).

the low-education 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.[21] The fact that our cross-sectional declines in expenditure are of a magnitude similar 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.

[21] 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 et al. (1998) find that unemployed households experience a 7.6 percent decline in food at home and domestic energy and a 52 percent decline in work-related expenses that include restaurant meals, transport, and adult clothing.

As predicted by theory, unemployed households spend more time shopping and preparing food. Columns 1 and 2 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 we restrict analysis to the low-education sample.

The last row of table 6 indicates that unemployed households experience a significant change in actual consumption. As discussed in Section IV, we use observed food consumption and food expenditure measures for each household to fit a consumption index for each individual in the unemployment sample. With all employed households used as a comparison group, column 1 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 2 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 (see Aguiar and Hurst [2004] for details).

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, 10 points more than the 30 percent decline observed in retirement. Recall that a 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. Panel A of table 7 focuses the analysis on the full unemployment sample, and panel B 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 shows dramatic declines in unemployment, with fast food declining 20 percentage points (vs. a sample mean of 43 percent) and cafeteria meals declining eight 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-education sample, the incidence of dining out at such establishments declines 15 per-

TABLE 7
Propensity to Eat Away from Home among Working-Age Households, by Unemployment Status

	A. Full Sample		B. Low-Education Sample	
Dependent Variable	Coefficient on Unemployment Dummy (1)	Mean of Dependent Variable (2)	Coefficient on Unemployment Dummy (3)	Mean of Dependent Variable (4)
Dummy: household eats away from home (all establishments)	−.25 (.03)	.70	−.27 (.04)	.65
Dummy: household eats at restaurant with table service	−.18 (.02)	.34	−.15 (.03)	.28
Dummy: household eats at a cafeteria	−.10 (.01)	.12	−.08 (.01)	.09
Dummy: household eats at a fast-food establishment	−.17 (.03)	.45	−.20 (.03)	.43

Note.—Data are taken from the pooled 1989–91 and 1994–96 cross sections of the CSFII, collected by the Department of Agriculture. The sample is restricted to include households with heads between the ages of 25 and 55 who either were working full-time or were unemployed. The additional sample of poorer households from the 1989–91 survey is included. Data refer to the consumption patterns of only the household head. The sample size for panel A is 3,874 household heads. In panel B, we imposed the additional restriction that the household head had accumulated 12 years or less of schooling. The sample size for panel B 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. Cols. 1 and 3 report the results from an ordinary least squares 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 the text for the full definition of demographic, health, region, time, and education controls included. Huber-White standard errors are in parentheses.

centage points (p-value < 0.01) in unemployment, with a sample mean frequency of 28 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 quality of food consumption 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 five percentage points more likely to consume hot dogs, three percentage points less likely to consume shellfish, and nine 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, Stevens (1997) estimates that job displacement reduces earnings (relative to before 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 expenditures are. 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 important, 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 data sets, 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 the measures tell a consistent story. The individual income elasticities, the out-of-sample checks, and the fact that the unemployed show a decline in consumption 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 is amenable to home production. However, it provides an important contrast to conclusions drawn from studies using food expenditures.

Appendix

TABLE A1
Three-Digit Food Categories Included in the Consumption Index

Three-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	Beefsteak
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, miscellaneous)
242	Turkey
243	Duck
251	Organ meats and mixtures (livers, hearts, sweetbreads, brains, tongue)
252	Frankfurters, sausages, lunch meats, 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	Corn bread, corn muffins, tortillas

TABLE A1
(*Continued*)

Three-Digit Code	Food Category
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
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

NOTE.—Food categories used as regressors in estimating eq. (3). See the text for full details. Nutritional measures included are total calories, protein, cholesterol, vitamin A, calcium, vitamin C, vitamin E, and saturated fat.

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