Changes in Consumption at Retirement *

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Abstract

Previous empirical literature has found a sharp decline in consumption during the first years of retirement implying that individuals do not save enough for their retirement. This phenomenon is called the *retirement consumption puzzle*. In contrast to some of the previous studies, we find no evidence of the retirement consumption puzzle. Consumption is defined as nondurable expenditure, a more comprehensive measure than only food used in many of the previous studies. Food expenditure at retirement decreases. The latter could be explained by a reallocation of the budget shares after retirement to adjust to a new stage in the life cycle.

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1 Introduction

A central implication of the life cycle model is that individuals and households smooth their consumption over the life cycle to avoid fluctuations induced by predictable changes to income. Probably the most important predictable change in one's income is that linked to retirement. It is therefore interesting to look at what happens to household consumption at that point in time.

The first paper to do so, for the UK, was a study by Banks, Blundell and Tanner (1998), who used repeated cross sections from the Family Expenditure Survey to construct synthetic panels showing a remarkable drop around retirement ages. Such evidence is potentially damaging for the life cycle model.

Several possible interpretation of the decline in consumption are possible. The first is that individuals are myopic and fail to provide sufficient financial resources for the drop in income associated with retirement. According to this interpretation, when individuals are faced with the reduced income following retirement, they are forced to reduce consumption. A second and very different interpretation is that measured consumption determines utility not on its own but

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interacted with several other variables, including labor supply. If consumption and leisure are not separable in the utility function, then the increase in leisure time associated with retirement could be behind the drop in consumption. Consumers are not supposed to smooth consumption but marginal utility. If this depends on leisure, changes in labor supply will be linked to changes in consumption. Banks, Blundell and Tanner (1998) try to address this issue by using preferences estimated from an Euler equation on consumption. They identify changes in marginal utility induced by drops in labor supply, by using information on consumption during unemployment spells. They conclude that changes in hours worked can explain as much as two thirds of the observed decline in consumption, but leave the remaining third unexplained.

Bernheim, Skinner and Weinberg (2001) have used longitudinal data from the Panel Study of Income Dynamics (PSID) to look at the same issue in the US. The decline in consumption during the first year of retirement is 24% for the first quartile of income, 15% for the second quartile and 9% for the third and fourth quartile. They also analyze separately food consumed at home and away from home finding a drop for the first year of retirement by 34% and 14%, respectively. The authors therefore reject the Life Cycle model predictions during retirement and suggest that individuals behave according to a *rule of thumb* or hyperbolic discounting theories. While the PSID has the advantage of following the same individuals over time, it only measures the consumption of food. Obviously such a measure is very limited.

This is the first paper that follows the same individuals at the moment of retirement and uses a comprehensive consumption measure. We use the panel component of the Consumer Expenditure Survey (CEX) from 1980 to 2000. The CEX is the most comprehensive survey in the US for expenditure of nondurable and durable goods. This feature allows us to consider a more accurate measure of expenditure than in most of the previous literature for the US, that had basically included only food expenditure to approximate consumption.

Our main result is that we do not find evidence of the *retirement consumption puzzle.* Nondurable expenditure does not change at retirement. Our evidence suggests that individuals smooth consumption during the first year of retirement. Moreover, if we focus on food expenditure, as some other studies have done, we do observe a decline in expenditure associated with retirement. Our evidence is therefore consistent with that presented by Bernheim, Skinner and Weinberg (2001).

Some previous studies have used the CEX constructing synthetic panels using the cross-sectional dimension of the data, where the results depend on cohorts sample sizes and the CEX

is not designed as a survey for middle-aged or elderly like the HRS, causing less precision in the estimation using pooled cross-sectional data. Moreover, these studies cannot analyze accurately changes in consumption at the moment of retirement as some of the heterogeneity across individuals might be smoothed out by averaging cohorts spending. One of our contributions it to exploit the panel component of the CEX to analyze the *retirement consumption puzzle.*

Some other studies have used panel data such as the PSID and the Health and Retirement Study (HRS) but the consumption measure is very limited. Only the HRS with the Consumption and Activities Mail Survey (CAMS), applied to a subsample of HRS respondents, could also provide panel data with a more comprehensive measure of consumption similar to the CEX. However, CAMS only includes a subsample of HRS respondents so sample sizes are small.

Hurd and Rohwedder (2008) exploit a subsample of HRS 2000 merged to CAMS waves 2001, 2003, and 2005, find that spending declines between 1 to 6% and non-durable spending between 0.5 to 3.5% after retirement. Change in consumption varies by level of household wealth; households in the lowest quartiles of income show a higher decline in spending consistent with the findings of Bernheim, Skinner and Weinberg (2001).

Our study includes larger sample sizes of households that retire between 1980 and 2000. We analyze two decades of changes in consumption at the moment of retirement, making it more robust to specific years economic conditions as some of the previous studies that cover a shorter period. We use the most suitable data set available to measure consumption, therefore we can conclude with this study that the *retirement consumption puzzle* does not exist. If indeed there is a puzzle, it is about food expenditure. Previous studies can provide an explanation for the *retirement food puzzle* as follows.

Consumption (and in particular food consumption) does not determine utility directly, but enters in a *household production function,* together with other inputs, such as leisure time, home labor and so on. One could then think that retirement corresponds to a shift in the home production function and to a substitution between market goods and services with home produced goods and services. Hurd and Rohwedder (2005) investigate whether the drop in consumption is anticipated and the implications of the home production model. The authors use the Health and Retirement Study (HRS) and a supplemental survey CAMS for 2001. They show evidence that the reduction in consumption that households anticipate is consistent with the outcomes at retirement. Also, the pattern of spending is consistent with models of household production for which time and market goods jointly produce utility. The household production model predicts

a discontinuous change in expenditure due to the substitution for leisure at retirement. The decline in spending at retirement is between 15% to 20%. They find a higher amount of time spent on home production for retirees than for not retired. A decrease in work related expenses and a substitution of purchased goods for home production is the explanation for the *retirement consumption puzzle* in this is study.

Aguiar and Hurst (2005) also analyze the home production model implications with the Continuing Survey of Food Intake of Individuals (CSFII), a detailed survey on food expenditure and food intake, and the National Human Activity Pattern Survey (NHAPS), which collects time spent on home production. They find a drop in food expenditure but not in food intake, providing consistent evidence with the Home Production Model. According to Aguiar and Hurst, there is no consumption puzzle.

Aguiar and Hurst (2007) using scanner data at household level on grocery expenses from ACNielsen's Homescan Survey found that individuals later in the life cycle shop more frequently buying goods at a lower price. Elderly households use more discounts and spend more time shopping, indicating a lower opportunity cost of time than younger households. They find a decrease in expenditure but an increase in consumption taking into account time spent on shopping and home production after middle age. According to their findings we should start observing a decline in food expenditure from middle age given that individuals start decreasing expenditure and increasing time shopping and in home production. However, this type of data sources does not capture items bought in markets and might have sample selection issues.

For a review on the *retirement consumption puzzle* see Hurst (2008). The author main conclusion is that the life cycle model including home production and unexpected shocks such as health shocks can predict consumption patterns at retirement age.[1] However, these conclusions

[1] There are several other papers that have looked at the drop of consumption around retirement in different countries or test different hypothesis. Miniaci, Monfardini and Weber (2003) using an Italian data set do not obtain evidence of a *retirement consumption puzzle* in Italy. In contrast, for Italy, Battistin, Brugiavini, Rettore, and Weber (2008) using a regression discontinuity approach find a decline in non-durable consumption by 9.8%.

Angeletos, Laibson, Repetto, Tobacman and Weinberg (2001) analyze the implications of hyperbolic preferences. Households with hyperbolic preferences act impatiently in the short term which is not consistent with the long term planning. The latter leads to a lower wealth accumulation than initially planned and consumption is more sensitive to changes in income. The simulations predict a decline by 14.5% in consumption around retirement. The authors test empirically the implications of this model using data from the PSID. They find a decline by 11.6%

mainly apply to food expenditure as there are no changes in overall consumption as shown in this paper. The decline in food could reflect a reallocation of the budget share of expenditure items at retirement. The latter is consistent with a change in preferences after retirement. Hence, food expenditure may not be an accurate measure to test the predictions of Life Cycle Model.

The results of our study contribute to the debate on consumption behavior during old age. This type of analysis is also relevant for policymakers to assess the welfare of individuals at

in consumption during a period of four years around retirement, which could be explained with the predictions of the hyperbolic consumption model.

Haider and Stephens (2007) use expected retirement dates as instrument for retirement instead of age as in some of the previous studies. They found that expected retirement predicts accurately retirement decisions using data from the Retirement History Survey (RHS) and the HRS. The authors found a decrease in consumption by 10% with the RHS data and no effect with the HRS for households that retire when expected. Using expected retirement dates results in a lower drop in consumption according to the evidence of the RHS. However, the authors cannot explain the remaining fall in consumption. They do not find evidence that supports the home production and bargaining models predictions. Recent findings for the UK in Smith (2006) show that only individuals with involuntary retirement drop food spending at retirement. Blau (2008) shows with a theoretical model including uncertainty and discrete employment decisions that a drop in consumption at retirement can be explained only for households that retire as a result of an unexpected shock. Households that retire as planned smooth consumption at retirement.

Ameriks, Caplin, and Leahy (2007) analyze retirement expenditure expectations for individuals that have annuities contracts using the Survey of Financial Attitudes and Behavior (FAB) and the Survey of Participant Finances (SPF). The main results are that the expected level of consumption at retirement for working households is lower than the actual decline for those retired. Working individuals expect a decrease in consumption by 10%. In contrast, those retired experience a fall by 4% only. Hence, consumption at retirement is higher than expected.

The difference between consumption retirement expectations and outcomes is explained by the authors as a result of the stock market boom and that necessities in retirement are higher than expected.

Recent studies using the CEX are Slesnick and Ulker (2005) and Fisher, Johnson, Marchand, Smeeding and Torrey (2008). Slesnick and Ulker (2005) find that individuals smooth consumption during retirement. They show a significant drop in food and consumer services but a small decline in total expenditure. Fisher, Johnson, Marchand, Smeeding and Torrey (2008) obtain a decline in food expenditure and a smaller drop in total household expenditure during retirement. Both studies use the repeated cross sections of the CEX. The contribution of this study with respect to the previous is exploiting the panel component of the CEX and using a more complete

retirement. It has direct consequences for the design of policies to promote savings through compulsory pension schemes, fiscal and labor market regulation, among others.

The rest of the paper is organized as follows. In Section 2, we describe the data we use and present some descriptive evidence from the CEX on life cycle profiles for total expenditure on non durable and services and on food expenditure. In addition, we also present life cycle profiles for participation rates. In section 3, we present a simple empirical framework to study the relationship between changes in retirement status and changes in consumption given the structure of the CEX sample. We then present the results we obtain by applying this approach. Section 4 concludes.

2 Consumption Profiles Using Recall and Diary Data

The main data source we use is the Bureau of Labor Statistics Consumer Expenditure Survey (CEX) from 1980 to 2000. While the CEX has a long history, going back to the beginning of the 20th century, it is only in 1980s that the BLS started to collect this information, with the main purpose of computing the weights for the Consumer Price Index, in a continuous and consistent fashion.

The CEX is made of two different and independent samples. The first is the so called Quarterly Interview survey and is a rotating panel. Households are interviewed every quarter over a period of one year and then dropped out of the sample. In each interview, they answer detailed and retrospective questions about expenditure on a variety of different commodities during each of the three months preceding the interview. The information collected in the interview is almost exhaustive of personal consumption expenditure. However, for some items, notably food, is quite synthetic.[2] The second component of the CEX is known as the Diary sample and is made of a series of repeated cross section that have no longitudinal dimension. Each household is on the survey for a two week period, during which time they fill in a diary reporting the details of their expenditure. Until 1985, the Diary survey contained only information on frequently purchased items, such as food. Since 1986, instead, the information in the diary is, at least in theory, exhaustive. However, it should be stressed that the BLS uses the Diary survey to gather high

measure to capture consumption.

[2] In the case of food, the Interview sample contains only information on total food at home and total food outside the home. The only item that is not collected in the Interview survey (but is collected in the Diary survey) is 'Personal care'.

quality information on frequently purchased items, while the interview survey is used to get information on items that are purchased less often. Indeed, when publishing summary statistics (and for the computations of the CPI weights), the two different surveys are used for different items. The Diary survey is considerably smaller than the Interview survey.

As the main purpose of this study is to look at *changes* in consumption around retirement, we will crucially use the longitudinal dimension of the Interview survey. However, before delving in the analysis of the retirement transition, we present some descriptive evidence on the life cycle profile of consumption and participation rates. For the former, we will be using synthetic cohort data and decided to use both the Diary and the Interview survey, as suggested in Attanasio, Battistin and Ichimura (2007). For a detailed description of the CEX see Battistin (2004).

We report profiles for total nondurable consumption expenditure and for food consumption. The former is defined as in Attanasio and Weber (1995). The definition includes food consumed at home, food consumed away from home, alcohol, tobacco, clothing, footwear, personal care products, public and private transport, utilities, and services. As the BLS, to compute average consumption, we use both the interview and the diary samples: in particular, food consumption is constructed using the diary sample, while the averages for less frequently purchased items are estimated from the interview sample.

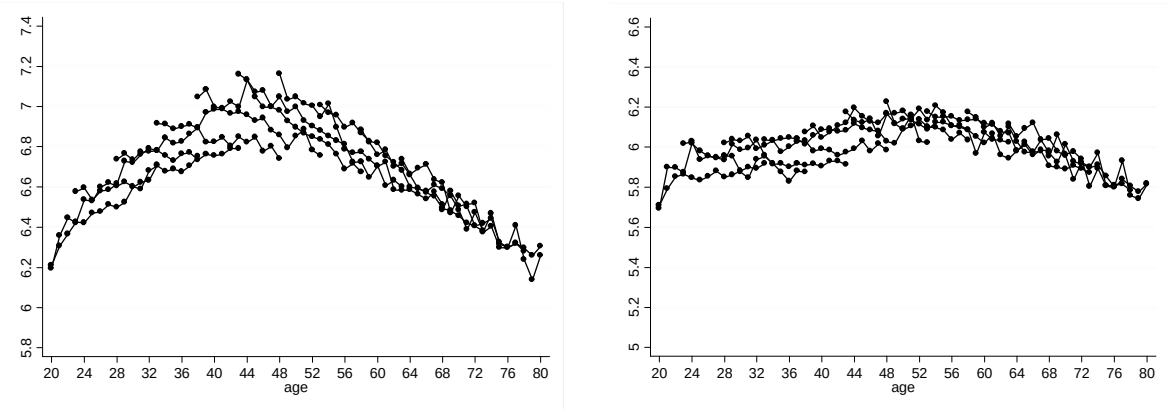
In addition to durable expenditure, (which clearly differs from the consumption of durables) we also exclude expenditure on education and health. Both of these items can be seen as investment rather than consumption. Moreover, in the case of health, the CEX records out-of-pocket expenditure and does not report consumption of health services covered by insurance. All expenditure variables are deflated with the Consumer Price Index (CPI). The characteristics of the sample are described in the Appendix.

To estimate life cycle profile, we first have to define year of birth cohorts. We define cohorts using the year of birth of the household head, and using five-year intervals. In Table 1 we report the cohort definition, as well as the average cell size in the two data sets. We include 14 cohorts in total. It should be stressed that cell sizes vary over time. In 1998, for instance, the size of the Interview sample was increased considerably.

Figure 1 presents cohort age profiles for total nondurables. Each connected segment represents the consumption (in real terms) of a given cohort, as it is observed from 1980 to 2000.

Table 1: Cohorts average cell size using the CEX 1980-2000

Cohort	Date of birth	Age in 1980	Age in 2000	Average cell size	
				Interview	Diary
1	1970-1974	6-10	26-30	419	210
2	1965-1969	11-15	31-35	594	280
3	1960-1964	16-20	36-40	791	363
4	1955-1959	21-25	41-45	1001	427
5	1950-1954	26-30	46-50	1092	421
6	1945-1949	31-35	51-55	1024	367
7	1940-1944	36-40	56-60	809	293
8	1935-1939	41-45	61-65	663	238
9	1930-1934	46-50	66-70	637	222
10	1925-1929	51-55	71-75	633	227
11	1920-1924	56-60	76-80	591	207
12	1915-1919	61-65	81-85	484	171
13	1910-1914	66-70	86-90	405	139
14	1905-1909	71-75	91-95	290	104



(a) logarithm of nondurables

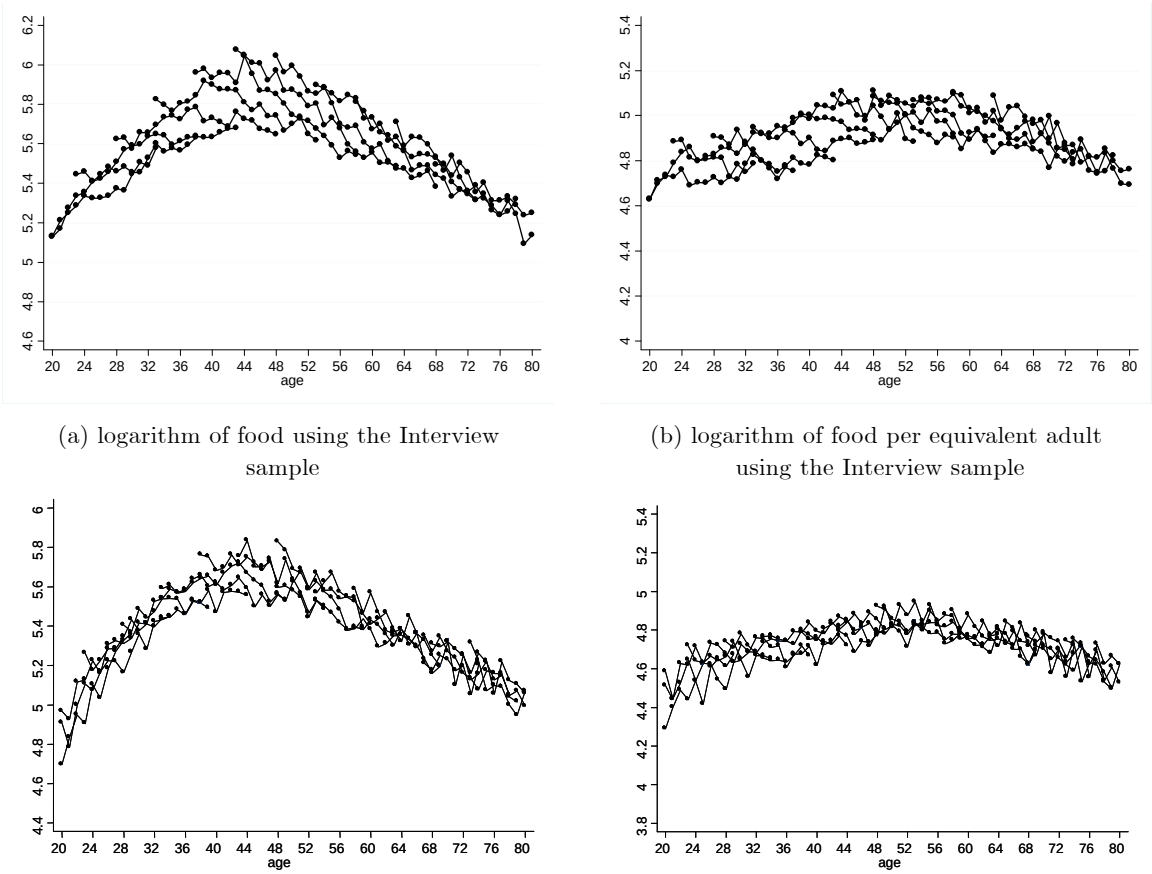
(b) logarithm of nondurables per equivalent adult

Figure 1: Cohort age profile of nondurable expenditure

Different cohorts will be observed over different intervals of their life cycle. Adjacient cohorts will be observed over overlapping intervals at different points in time. Figure 1 (a) shows the hump shaped profile documented in previous studies. In Figure 1(b) we deflate total household expenditure by the number of adult equivalents, using the OECD adult equivalence scale (Attanasio, Battistin and Ichimura, 2007). After taking into account family composition, the life cycle profile is much flatter.

We plot the cohort age profile for food expenditure from the Interview and Diary samples in Figure 2. In both cases, total food includes food consumed at home and away from home. Figure 2 (a) and Figure 2 (b) were obtained using the Interview sample and Figure 2 (c) and Figure 2 (d) the Diary data.The vertical differences between cohorts appear to be higher when using the Interview sample are observed. Also, after correcting for family composition the profile shows

more variation in food expenditure than for total nondurables.



(a) logarithm of food using the Interview sample

(b) logarithm of food per equivalent adult using the Interview sample

(c) logarithm of food using the Diary sample

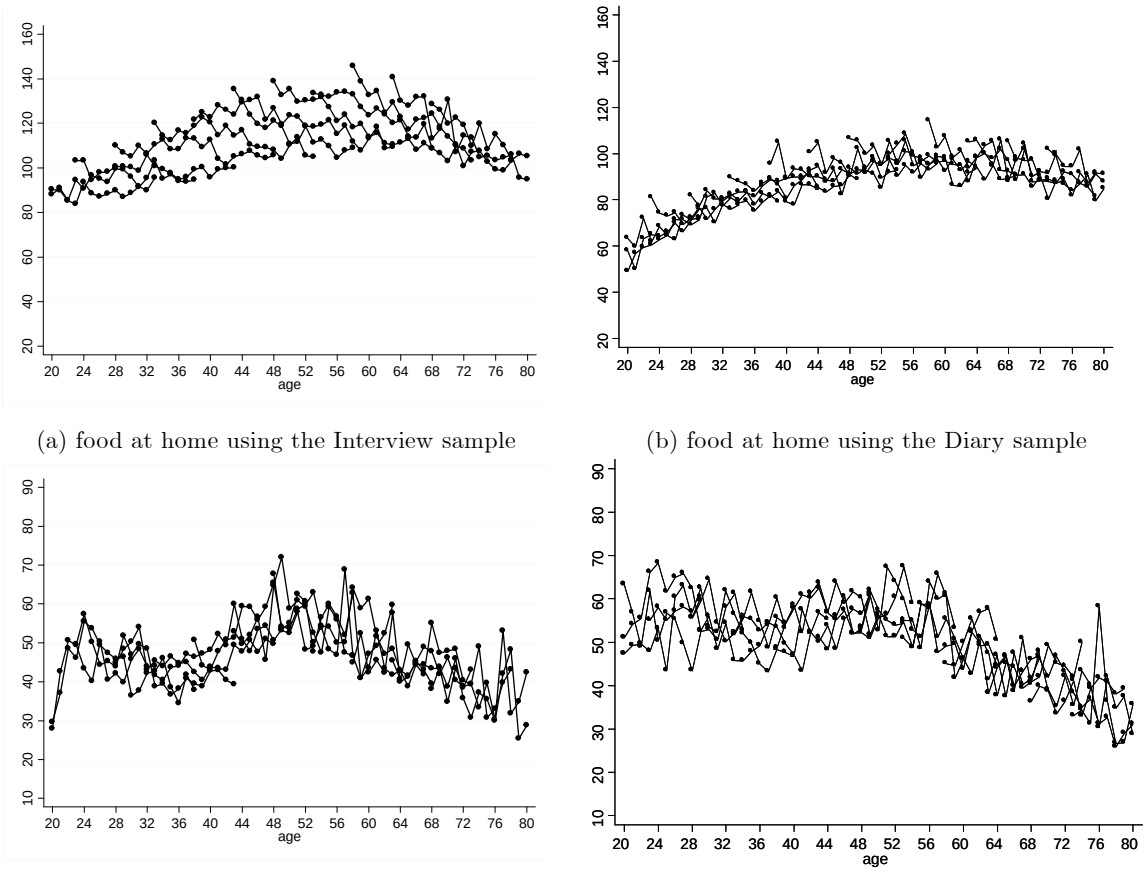
(d) logarithm of food per equivalent adult using the Diary sample

Figure 2: Cohort age profile of food

The main purpose of the profiles reported in Figure 1 and 2 for our analysis is to check whether we can identify sizeable drops in consumption after age 60, that is after household heads start retiring in large numbers. Staring at Figure 1 and Figure 2, we can observe a smooth drop for nondurables and total food per equivalent adult after age 60. There are no strong differences between nondurables and food cohort profiles.

In Figure 3, we analyze the components of total food in more detail. Food consumed at home obtained from the Interview and Diary samples is shown in Figure 3 (a) and Figure 3 (b), while Food consumed away from home is presented in Figure 3 (c) and Figure 3 (d). All these figures report consumption per adult equivalent: the left panel refers to Figures from the Interview survey, while the right -hand side to Diary survey figures. It is worth highlighting that some individuals in the sample do not report expenditure of food consumed away from home, so the cohort profile is constructed with the unconditional average expenditure including the zeros. In both samples food out of home shows a clear decline around retirement age that continues

during retirement. Food consumed at home has a flatter profile.



(a) food at home using the Interview sample

(b) food at home using the Diary sample

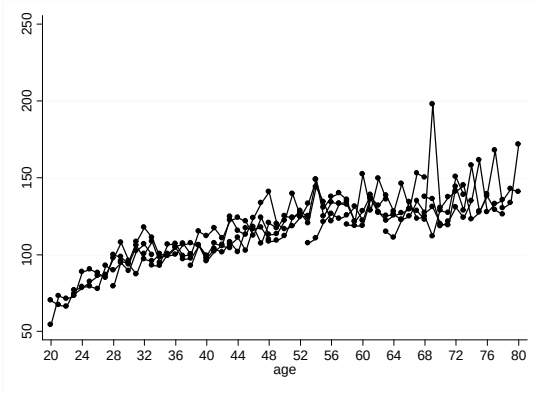
(c) food away using the Interview sample

(d) food away using the Diary sample

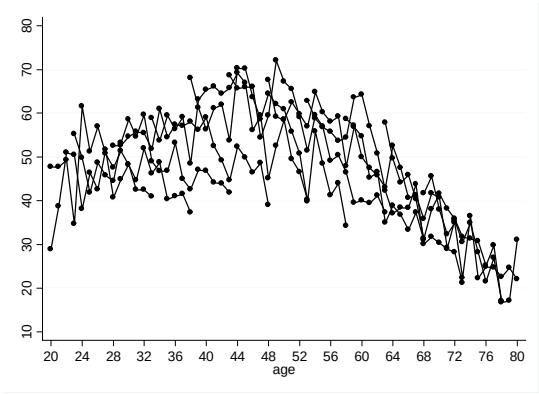
Figure 3: Cohort age profile of food at home and away from home per equivalent adult

In Figure 3 diary data is compared with recall data for the same categories. Diary data is intended to provide more accurate information on food than the recall data from the Interview survey. In both cases, they show similar profiles validating the use of the interview sample for the analysis. Moreover, the cohort profiles suggest that the drop in total food around retirement is mainly due to the decline in food consumed out of home. Figure 4 presents expenditure per equivalent adult for other categories included in the definition of total nondurables.

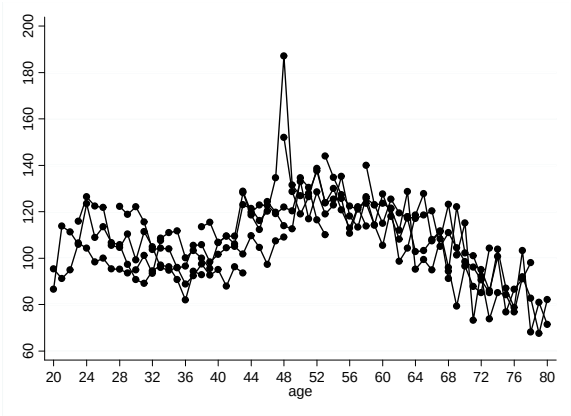
Finally, in Figure 4, we plot the profiles for different expenditure categories. In particular, in Figure 4 (a), we plot household and personal expenditures which includes utilities, household maintenance and repairs, and personal services. This category is a complement to leisure, showing an increasing trend around retirement age. Clothing and transportation are shown in Figure 4 (b) and Figure 4 (c). They are considered work related expenses and present a clear decline after age 50. Figure 4 (d) presents entertainment expenditure which could be a complement to leisure or work related and shows a decreasing trend. The decline around retirement age for total



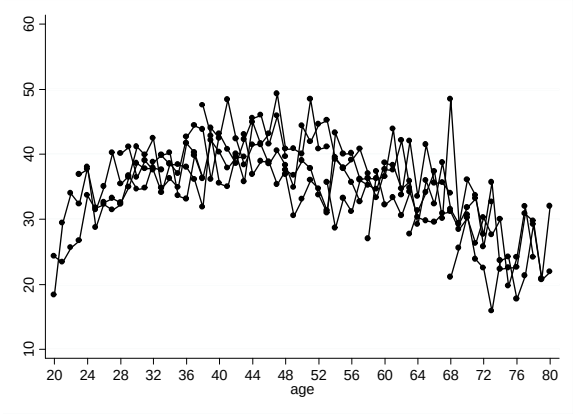
(a) household and personal services



(b) clothing



(c) transportation



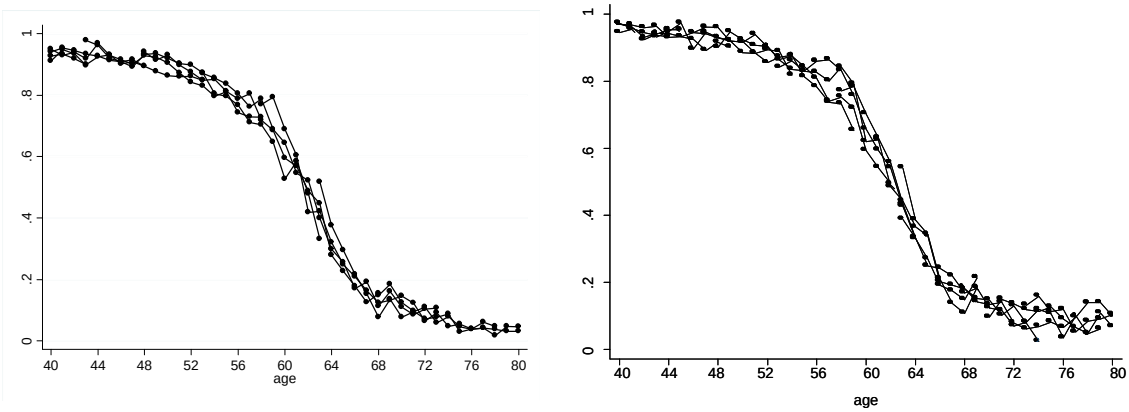
(d) entertainment

Figure 4: Cohort age profile of various expenditure categories per equivalent adult

nondurables is mainly due to the drop in food consumed out of home, clothing, transportation, and entertainment. Household and personal expenditures increases and food consumed at home maintain constant around retirement age. Aguiar and Hurst (2008) pooling the interview CEX cross-sectional data find that non-durable and food consumption decline around retirement age. They also find that other components such as transportation and clothing decline, and spending on housing services, utilities, and entertainment remains constant or increases slightly.

Having documented the main life cycle trends in non durable consumption and some of its components, we now turn to the evidence on participation rates, focussing on household heads. Figure 5 shows the cohorts labor force participation rate, estimated using the Interview and Diary samples. The vertical differences between cohorts are very small, indicating no cohort effects. The labor force participation rate of the Diary sample in Figure 5 (b) is similar to the participation rate of the Interview in Figure 5 (a). We observe a sharper decline in labor force participation from age 60 to 65.

It is worth noticing that in the Interview and Diary samples, some individuals retire during their fifties as observed in Figure 5. The latter is due to specific incentives to claim a pension



(a) labor force participation rate using the Interview sample

(b) labor force participation rate using the Diary sample

Figure 5: Labor force participation rate

from occupational pension schemes and involuntary retirement decisions as a result of negative shocks. Rust and Phelan (1997) find that unhealthy individuals are more than twice likely to apply for a pension at the early retirement age. They also show that most of individuals retire at age 62 and 65.

According to US Social Security rules, early retirement is possible at age 62 and the normal retirement age is 65. The early retirement pension represents 80% of the normal retirement benefits. Individuals have incentives to reach the normal retirement age because the increase in benefits is actuarially fair (Diamond and Gruber, 1999). The pension is computed with the average wage of the highest 35 years of the worker career (AIME). Pensions are adjusted with the Consumers Price Index (CPI). Also, most of workers in the US are covered by social security and a growing number have personal or occupational pensions.

While the figures we reported so far contain raw cohort means, it may be worth putting some structure on the data to try to identify age profiles. We therefore proceed to smooth the observed profiles by assuming no systematic time effects and some simple cohort effects. We then estimate smooth age profiles for consumption and its componentes (and for participation rates) using OLS. We report the smoothed profile in Figure 6. The decline in food consumed out of home, transport, and clothing coincides with the drop we observe in the labor force participation rate in Figure 5. Household and personal services have an increasing trend. Total food and food consumed at home starts declining later in the life cycle after age 62.

In sum, food away from home clearly declines more than food at home. The smooth drop in total nondurables is driven by the decline in clothing, transport and food out of home which are work related expenses. Household and personal services that are complements to leisure do not

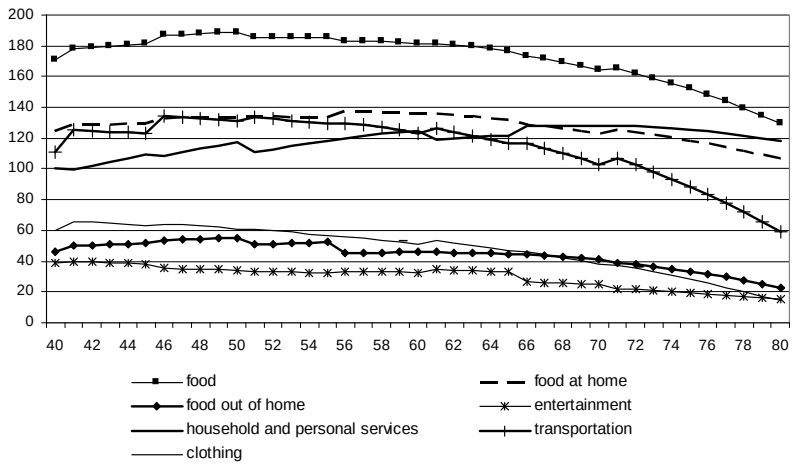


Figure 6: Smoothed profiles of the main expenditure categories

decline around retirement age. Food consumed at home has a smoother decreasing pattern. In the following section, the analysis will only focus in the Interview sample. The Interview recall questions for food are comparable to the food questions in the HRS, RHS and the PSID data sets used in previous studies.

3 Empirical Evidence using Longitudinal Data

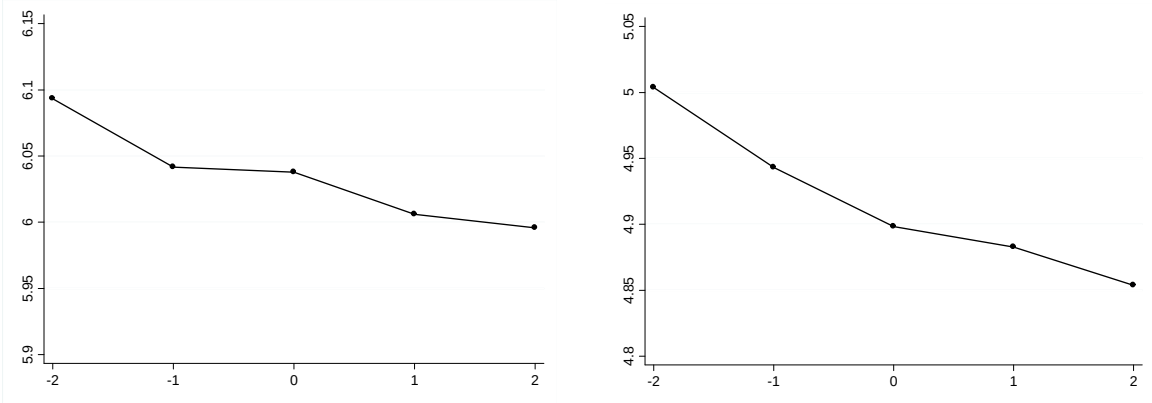
The Interview sample of the CEX is a rotating panel. Individuals are interviewed quarterly for a year. In this section, the main focus is to analyze consumption patterns around retirement age. It is worth exploiting the panel component of the CEX as a source of rich information on household expenditure even when the panel span is short in comparison to the PSID or HRS.

We first observe an individual (and his/her retirement status) in the first of the four available interviews. The retirement status is observed again nine months later. We have similar observations for all the adults in the households, including the household head's spouse. We can therefore observe, transition into retirement.

Several different definitions of retirement are possible. We could define as retired an individual that works less than 500 hours per year, or an individual that receives a pension or an individual that declares himself or herself retired. We chose the first definition, which is the same as the one used by Bernheim, Skinner and Weinberg (2001). However, below we also check the robustness of our results when we use an alternative definition.

It is worth stressing that retirement is far from being an absorbing state: we also observe individuals transiting from retirement to work. Our sample includes 750 households that transition

from working to retirement between 50 to 74 years old. Individuals in the sample are classified according to their labor status given their number of working hours in full-time or part-time and not working. A detailed description of this classification is presented in the Appendix.



(a) logarithm of nondurables (b) logarithm total food

Figure 7: Expenditure categories adjusted with equivalence scales around retirement using the panel structure of the CEX

Head of households that transition from full-time work to retirement represent 89% of the sample. This is consistent with previous empirical evidence that most workers transition from full-time jobs to retirement as a result of labor market rigidities (Rust and Phelan, 1997). It is easier to change jobs than to reduce the number of working hours in the current work before retirement.[3] Also, workers have incentives to continue with the same number of working hours because many Defined Benefit occupational pension schemes are final salary.

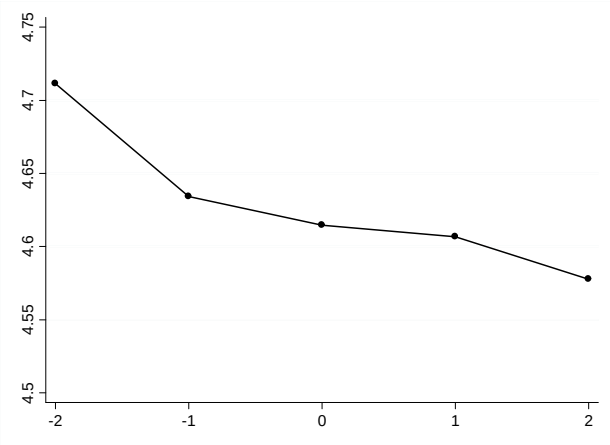


Figure 8: Food at home adjusted with equivalence scales around retirement using the panel structure of the CEX

[3] An issue that cannot be addressed with this data set is whether newly retirees move to another city or town where they can afford a higher living standard, spending less of their budget. The CEX does not follow individuals when they move address.

Figure 7 and Figure 8 show the average household expenditure two quarters before and two quarters after the head of family retires. All the observations are included in -1, 0, and 1. Zero represents the moment that the head of family transitions to retirement. Household expenditure is adjusted with equivalence scales. In Figure 7, we can observe that food expenditure has a higher drop than total nondurables. Nondurables decline by 3.6% from -1 to 1 and total food by 6%. Figure 8 shows that food at home decreases by 2.7% from -1 to 1. The change in food at home is smoother than the change in total food. This could be explained by food out of home decreasing much more than food consumed at home as shown in the cohort profiles.

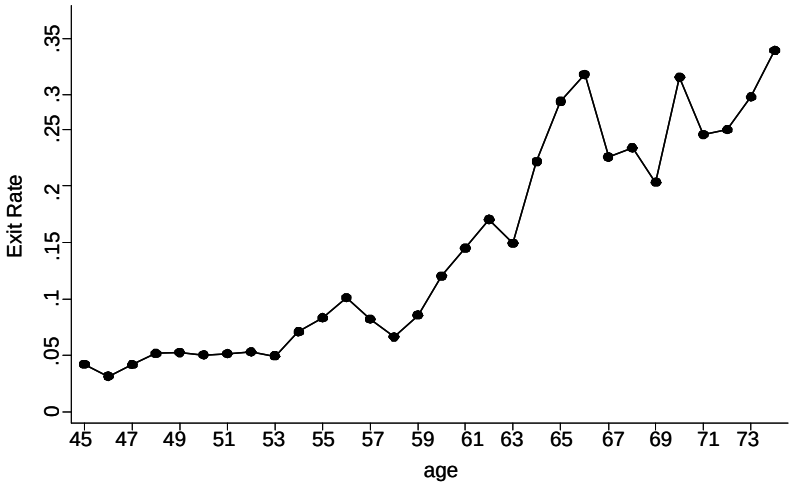


Figure 9: Exit rate for head of households

Figure 9 shows the hazard or exit rate for head of households. We can observe a peak at age 62. The latter coincides with eligibility for early retirement. There is also a higher peak around age 65 which coincides with normal retirement. The hazard rate is consistent with previous findings using the Current Population Survey (CPS) reported in Diamond and Gruber (1999). The following section presents a simple empirical method to analyze consumption patterns for different labor market transitions around retirement age.

3.1 Simple Empirical Framework

We use a simple regression method to capture the change in household consumption around retirement age. The model is estimated within a linear difference-in-differences approach:

$$\ln C = I\alpha + G\gamma + T\beta + X\delta + u \tag{1}$$

G is a stacked matrix $NT \times k$ and k is the total number of variables. The matrix G includes dummy variables for each group j of households according to their labor status in the first and last interview. Labor status questions are only applied in the first and last interview of the panel span, thus we include only households that completed at least the first and last interviews. The group j has four options of labor status: 11 indicates the head of household is working in both interviews and this is the benchmark, 00 is not working in both interviews, 01 is not working in the first interview and working in the last interview, and 10 are households that transition from working to retirement. Households in the 10 category exit the labor market during the second and third interview. Household consumption is analyzed just before retirement that corresponds to the first interview, and after retirement which is the last interview.

I is a dummy variable that indicates the interview period, the first or last interview of household i. In this case, the last interview has value one and the first interview value zero. The matrix T includes the interaction terms $(I * G)$ and show the marginal effect on consumption for each group j with respect to the households whose head worked during all the panel span $(j = 11)$. In particular, the estimate for group $j = 10$ is the parameter of interest to analyze changes in consumption for transitions from employment to retirement. The model includes a matrix X of household demographic characteristics and time dummies. The demographic characteristics are head of household age, age squared, family size, number of children under 18 years old, and a dummy indicating couples households.

The limitation is that this simple method does not distinguish between unexpected shocks and expected changes. Unexpected events such as health shocks could affect labor supply decisions and consumption patterns. Unfortunately, health status is not reported in the CEX and health expenditure might not be an accurate measure because of differences on health care insurance coverage. An alternative is to estimate the impact on consumption around retirement age with Instrumental Variables methods (IV). In this case $T = 2$ and IV methods cannot be used.

However, previous studies have found that health problems account for a small proportion of

individuals' retirement decisions. French (2005) finds that health has a small effect explaining the decline of labor force participation around retirement age. Using the PSID, labor force participation decreases by 71% between age 55 and 70, bad health explains only 7% of this decline. Hurd and Rohwedder (2006) using the HRS find that for 66% of individuals, health was not a factor that influenced their retirement decision. The PSID and HRS that are the main panel surveys to analyze retirement behavior, indicate a small proportion of individuals retire due to health problems.

3.2 Results

This section presents the results of the simple regression method discussed above. Table 2 shows the results of the change in consumption around retirement age. The sample includes singles and couples households. The reference are head of househoulds that stayed working during the four interviews (G_{11}). The regressions also include household demographic characteristics, age and age squared of the head of household, a dummy to indicate a couple or single household, and time dummies. G_{11} has 5,858 individuals working during the period of observation, G_{00} has 5,511 persons that were not working, G_{10} includes 716 that transition from employment to retirement and G_{01} has 232 that re-enter the labor market.

The main finding for those individuals that retire during the panel span (G_{10}) is no effect on nondurable expenditure. The latter suggests that individuals smooth consumption at retirement. In a further analysis dividing nondurables in food and non-food expenditure, we find that food declines by 6% and there is no effect on non-food nondurables but the coefficient has a positive sign. In this study, we find a drop in food expenditure as many of the previous studies for the US have documented as the *retirement consumption puzzle.* We show that a broader measure of nondurables expenditure indicates a smooth change in consumption at retirement consistent with the Life Cycle model predictions.

The drop in food could be explained by a reallocation of expenses within the household budget due to the decline in work related expenses and more time available for home production. Food is only one of the components to approximate consumption as it represents 32% of nondurable expenditure. Other components of nondurable expenditure are increasing offsetting the drop in food expenses. We conclude from these results that there is no *retirement consumption puzzle.*

Furthermore, analyzing in detail food expenses, we find that food consumed at home drops by 4.5%. Food at home is 72% of total food implying that both components of food at home and

away from home are declining at retirement. It is beyond the scope of this study to provide an explanation for decline in food expenditure. Previous evidence suggest that individuals spend more time on home production during retirement (Hurd and Rohwedder, 2005). Aguiar and Hurst (2005) show that food intake does not change after retirement but food expenses decline and time spent on home production increases. Persons around retirement age spend more time shopping and with more frequency, and using discounts (Aguiar and Hurst, 2007).

Table 2: Impact on consumption around retirement including single and couple households

	Nondurables	Total food	Food at home	Non-food nondurables
$I * G_{00}$	0.0303	0.0372	0.0284	0.0279
	[0.0100**]	[0.0106**]	[0.0103**]	[0.0129**]
$I * G_{01}$	0.0141	0.0458	0.0625	0.0033
	[0.0373]	[0.0374]	[0.0365*]	[0.0497]
$I * G_{10}$	-0.0070	-0.0608	-0.0452	0.0112
	[0.0216]	[0.0229**]	[0.0246*]	[0.0279]
No. observations	25,960	25,960	25,960	25,960

**estimates are significant at 5% level of confidence. *estimates are significant at 10% level of confidence. Regressions also include dummy variables for year, month and their interactions, age, age squared, family size, an indicator for children under 18 years old, an indicator for couple, a dummy for last interview, and the group dummies for the head of household labor status. The standard errors are robust to heteroskedasticity corrected with the Huber-White method and serial correlation within households.

For the group that was not working during all the time observed (G_{00}), we find an increase by 3% on nondurable expenditure. They also show an increase in food by 3.7% and in non-food nondurables by 2.7%. In that case we find that some households start receiving in the last period of observation social security benefits, supplemental security income (SSI), unemployment or other worker's compensations, private pensions, food stamps, or other welfare benefits. We obtain that 51.9% of G_{00} mainly between age 62 and 68, start receiving in the last interview social security benefits or other compensations. The average increase in income between the first and last interview for group G_{00} is 4.8%, and for those individuals in group G_{00} that start obtaining benefits in the last interview is 43.8%. Some of these individuals might have retired early as a result of employer provided pension incentives and subsequently start claiming social security benefits or other welfare compensations.

We estimated the specifications in Table 2 excluding from group G_{00} those individuals that start receiving in the last period a social security benefit or any other welfare compensation. The findings are no change in nondurable expenditure or none of its components, around retirement as expected. These results are presented in Table 4 of the Appendix. We also observe in Table 2

an increase in consumption for an additional household member, a higher expenditure for couple households than for singles, and a decline in nondurable household expenditure for another children under 18 years old. For individuals that re-enter the labor market (G_{01}) in comparison to those that stay working (G_{11}) the coefficients have a positive sign as expected and the increase in expenditure is higher in food than in non-food nondurables.

For group G_{11} we find an average change in income by 3.15%, for G_{10} is -18.2%, and for G_{01} is 18.7%. As expected those that stay working during all the period of observation show a modest change in income. Those that retire decrease substantially their income and individuals that re-enter the labor market present an increase in their household earnings. We show the results including only couples and taking into account hours of leisure of the wife in Table 3.

Table 3: Impact on consumption around retirement including couple households

	Nondurables	Total food	Food at home	Non-food nondurables
$I * G_{00}$	0.0261	0.0317	0.0250	0.0232
	[0.0108**]	[0.0111**]	[0.0109**]	[0.0139*]
$I * G_{01}$	-0.0085	0.0370	0.0555	-0.0276
	[0.0391]	[0.0400]	[0.0388]	[0.0520]
$I * G_{10}$	-0.0056	-0.0543	-0.0505	0.0131
	[0.0226]	[0.0244**]	[0.0246**]	[0.0293]
No. observations	21,682	21,682	21,682	21,682

**estimates are significant at 5% level of confidence. *estimates are significant at 10% level of confidence. Regressions also include dummy variables for year, month and their interactions, age, age squared, family size, an indicator for children under 18 years old, wife hours of leisure, the difference between the age of the head and the age of the wife, a dummy for last interview, and the group dummies for the head of household labor status. The standard errors are robust to heteroskedasticity corrected with the Huber-White method and serial correlation within households.

The findings in Table 3 follow the same tendency as the estimations including singles. For those households whose husband transitions from employment to retirement, there is no effect on nondurables and non-food nondurables. Food drops by 5.4% and food at home by 5.0%. The increase in hours of leisure of the wife, decreases expenditure on nondurables, non-food nondurables and total food but there is no effect on food at home. The estimates have the expected sign as more leisure of the wife may substitute food out of home and other expenses.

Table 4 presents the same specifications as in Table 2 for the sample that includes singles and couples but with an alternative definition of retiree including individuals that work less than 500 hours per week and receive social security benefits or other compensations around retirement age. We can observe no effect on nondurables, food, food at home and non-food nondurables for group G_{00} as expected.

Table 4: Impact on consumption around retirement including single and couple households excluding from group G00 those that receive compensations in the last interview

	Nondurables	Total food	Food at home	Non-food nondurables
$I * G_{00}$	-0.0022	0.0186	0.0195	-0.0134
	[0.0127]	[0.0132]	[0.0132]	[0.0164]
$I * G_{01}$	0.0150	0.0461	0.0621	0.0037
	[0.0374]	[0.0376]	[0.0365*]	[0.0497]
$I * G_{10}$	-0.0076	-0.0615	-0.0464	0.0107
	[0.0216]	[0.0229**]	[0.0246*]	[0.0279]
No. observations	20,236	20,236	20,236	20,236

**estimates are significant at 5% level of confidence. *estimates are significant at 10% level of confidence. Regressions also include dummy variables for year, month and their interactions. The standard errors are robust to heteroskedasticity corrected with the Huber-White method and serial correlation within households.

4 Conclusions

This paper analyzes the *retirement consumption puzzle* using a broader definition of expenditure than in most of the previous studies that use mainly food expenses. In addition, we examine labor market transitions around retirement age with the panel component of the CEX. The empirical estimations show no effect for nondurables, and a decline in food for households whose head transitions from employment to retirement. Food represents 32% of total nondurables. The drop in total food is due to the decline in food consumed at home and out of home around retirement age. Previous studies have given some explanations for the decline of food at retirement consistent with the Home Production model. The cohort profiles analysis shows that other work-related categories such as clothing and transportation start decreasing around retirement age.

These results suggest there is no *retirement consumption puzzle* and contrary to some of the previous studies, we find that individuals smooth consumption at retirement as predicted by the Life Cycle Model. Food expenditure should not be used to approximate consumption as it is a very narrow definition that could provide misleading results.

References

Aguiar, M., Hurst, E., 2005. Consumption versus Expenditure. *Journal of Political Economy*, 113, 5, 919–948.

Aguiar, M., Hurst, E., 2007. Lifecycle Prices and Production. *American Economic Review,* 97, 5, 1533-1559.

Aguiar, M., Hurst, E., 2008. Deconstructing Lifecycle Expenditure. University of Chicago, *Mimeo.*

Ameriks, J., Caplin, A., Leahy, J., 2007. Retirement Consumption: Insights from a Survey. *The Review of Economics and Statistics,* 89, 2, 265–274.

Angeletos, G., Laibson, D., Repetto, A., Tobacman, J., Weinberg, S., 2001. The Hyperbolic Consumption Model: Calibration, Simulation, and Empirical Evaluation. *Journal of Economic Perspectives,* 15, 3, 47–68.

Attanasio, O., Battistin, E., Ichimura, H., 2007. What Really Happened to Consumption Inequality in the US?, in: Berndt, E., Hulten, C. (Eds.), *Hard-to-Measure Goods and Services: Essays in Honor of Zvi Griliches*, University of Chicago Press, Chicago, Illinois.

Attanasio, O., Weber, G., 1995. Is Consumption Growth Consistent with Intertemporal Optimization? Evidence from the Consumer Expenditure Survey. *The Journal of Political Economy*, 103, 6, 1121-1157.

Banks, J., Blundell, R., Tanner, S., 1998. Is there a Retirement-Savings Puzzle? *American Economic Review*, 88, 4, 769–788.

Battistin, E., 2004. Errors in Survey Reports of Consumption Expenditures. University of Padova, *Mimeo.*

Battistin, E., Brugiavini, A., Rettore, E., Weber, G., 2008. The Retirement Consumption Puzzle: Evidence from a Regression Discontinuity Approach. Institute for Fiscal Studies, Working Paper W08/05.

Bernheim, D., Skinner, J., Weinberg, S., 2001. What Accounts for the Variation in Retirement Wealth Among U.S. Households. *American Economic Review*, 91, 4, 832–857.

Blau, D., 2008. Retirement and Consumption in a Life Cycle Model. *Journal of Labor Economics*, 26, 35–71.

Browning, M., Lusardi, A., 1996. Household Saving: Micro Theories and Micro Facts. *Journal of Economic Literature*, 1797–1855.

Engen, E. M., Gale, W. G., Uccello, C. E., 1999. The Adequacy of Household Saving. *Brookings Papers on Economic Activity*, 2, 65–187.

Fisher, J., Johnson, D., Marchand, J., Smeeding, T., Torrey, B., 2008. The Retirement Consumption Conundrum: Evidence from a Consumption Survey. *Economics Letters*, 99, 3, 482–485.

French, E., 2005. The effect of health, wealth and wages on labor supply and retirement behavior. *Review of Economic Studies*, 72, 2, 395–427.

Haider, S. J., Stephens, M., 2007. Is There a Retirement-Consumption Puzzle? Evidence Using Subjective Retirement Expectations. *The Review of Economics and Statistics*, 89, 2, 247–264.

Hamermesh, D. S., 1984. Consumption During Retirement: The Missing Link in the Life Cycle. *The Review of Economics and Statistics*, 66, 1, 1–7.

Hurd, M. D., 1990. Research on the Elderly: Economic Status, Retirement, and Consumption and Saving. *Journal of Economic Literature*, 28, 6, 565–637.

Hurd, M., Rohwedder, S., 2005. The Retirement-Consumption Puzzle: Anticipated and Actual Declines in Spending at Retirement. RAND, Working Paper 242.

Hurd, M., Rohwedder, S., 2006. Some Answers to the Retirement-Consumption Puzzle. NBER, Working Paper 12057.

Hurd, M., Rohwedder, S., 2008. The Retirement Consumption Puzzle: Actual Spending Change in Panel Data. RAND, Working Paper WR-563.

Hurst, E., 2008. The Retirement of a Consumption Puzzle. NBER, Working Paper.

Lundberg, S., Startz, R., Stillman, S., 2003. The Retirement-Consumption Puzzle: A Marital Bargaining Approach. *Journal of Public Economics*, 87, 5, 1199-1218.

Miniaci, R., Monfardini, C., Weber, G., 2003. Is There a Retirement Consumption Puzzle in Italy? IFS, Working Paper W03/14.

Rust, J., Phelan, C., 1997. How Social Security and Medicare affect retirement behavior in a world of incomplete markets. *Econometrica*, 65, 4, 781–831.

Slesnick, D., Ulker, A., 2005. The Consumption of the Elderly: Evidence from the Consumer Expenditure Survey. The University of Texas at Austin, Working Paper.

Smith, S., 2006. The retirement-consumption puzzle and involuntary early retirement: Evidence from British Household Panel Survey. *Economic Journal*, 116, 510, C130–C148.

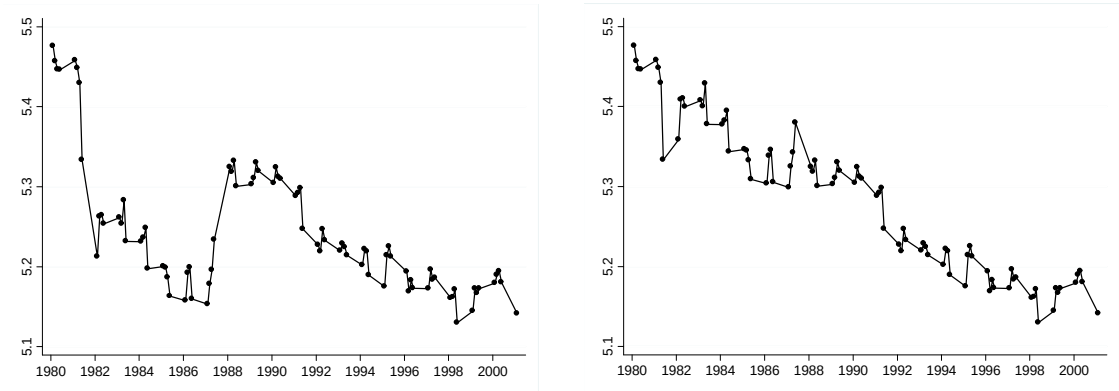
White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48, 817–838.

Appendix

CEX Data

This section provides a brief description of the characteristics of the sample obtained from Consumer Expenditure Survey (CEX). The main features of the CEX taken into account when constructing the sample are as follows. First, in 1986 and 1996 the CEX sample was completely refreshed so the last interviews for households in 1985 and 1995 are lost. Second, some variables present topcoding. The topcoding rules were made consistent from 1980 to 2000. The change in methodology from 1996 onwards is converted to the original previous to 1996.

Third, names and codification of variables changed in some years, so these were detected and made consistent. Finally, the questions of food consumed at home were phrased differently between 1982 and 1987. Figure 10 (a) shows the quarterly series of food consumed at home from 1980 to 2000. We can observe a change in scale between 1982 and 1987. This was corrected to make the scale consistent with all the other time periods. Food consumed at home corrected for this problem is shown in Figure 10 (b). The codification, topcoding and corrections to the scale problem are based on Battistin (2004).



(a) Food at home

(b) Food at home correction 1982-1987

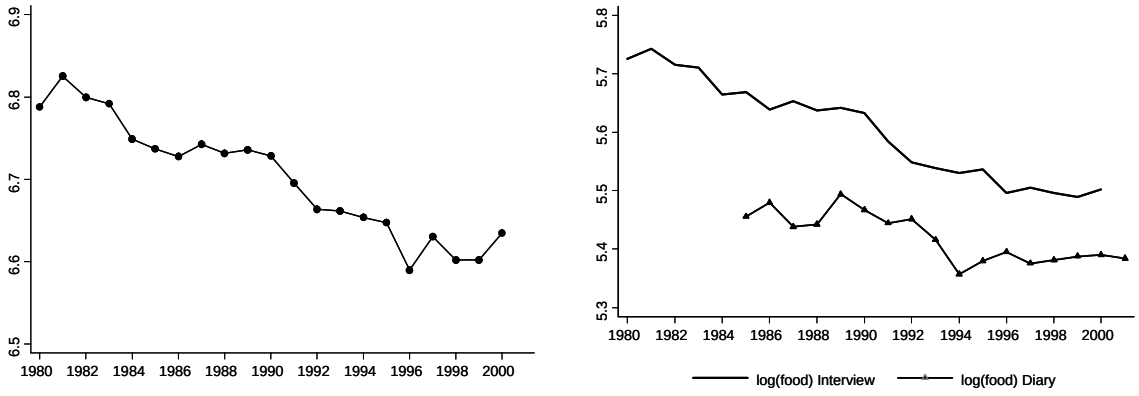
Figure 10: Food consumed at home 1980-2000

In the Interview and Diary sample are selected out households that report zero expenditure in order to avoid some sources of measurement error. Also, households whose head of family is self-employed or households that live in student housing are dropped out. In couples households, the male is considered the head of household. Only households that completed at least the first and last interviews are included in the Interview sample and for the Diary sample those that have records for the two weeks. In the analysis, we include households whose head of family is male. In the Interview sample, the first interview only collects household demographic information so the actual first interview about household expenses is applied the second time the household is

visited. We include in this study households that completed the first and last interviews where the survey instrument, not only the household roster, was applied.

In few cases the age of the head of household changes up to three times during the four quarters interviewed. Households that changed the age of the head of households more than once were selected out. The Interview questionnaire reports the expenditure of the previous three months to the interview date. We use only the last month immediate to the interview. The average of the three months reported every quarter was compared to the expenditure of the previous month to the interview but there are no substantial differences. The explanation is that the questionnaire requires the usual weekly expenditure of the previous three months in food categories. Each monthly measure is computed with information on the usual weekly expenditure of the quarter so the monthly measures are in most cases identical.

The data is deflated with the Consumer Price Index (CPI) from the Bureau of labor Statistics (BLS). In the CPI, the weight of an item is derived from reported expenditures on that item using the CEX from 1993, 1994, and 1995. The Stone Price Index is not used because its construction with weights at the household level, may include other endogeneity sources to the estimations. The data for the cohort profiles was corrected for seasonality with a simple model which includes monthly dummy variables. The presence of business cycles is explored in the data but no clear pattern appears. Also, the cohort profiles data is adjusted with the OECD equivalence scale that assigns 1 to the first adult and 0.7 to the additional adults, and 0.5 to each child under 18 years old (Attanasio, Battistin and Ichimura, 2007).



(a) Logarithm of nondurable expenditure using Interview sample

(b) Logarithm of food expenditure using Interview and Diary sample

Figure 11: Expenditure categories 1980-2000

The only puzzling issue is that expenditure follows a decreasing trend over time as shown in Fig. 11. A decreasing pattern over time for nondurables is observed in Figure 11 (a). In Figure

11 (b) food expenditure in the Interview and Diary survey also decline over time. The later does not affect our estimations because we are examining changes in consumption patterns during the panel span for households with different labor market transitions.

The labor status variable in both samples is classified by the number of reported working hours per year. In the Interview and Diary surveys is recorded how many weeks did the individual work in the previous 12 months and the number of hours per week. In the case the response is zero, the individual is classified as not working due to retirement, illness, disability, studying, among others. In the Interview survey, these questions are only included in the first and last interviews. The response in the last interview has an overlapping period that corresponds to the first three months or the last quarter for the first interview response. Households are classified in every interview as working (full-time or part-time) and not working considering the structure of the labor status questions.

Full-time work is defined as working more than 1,500 hours per year and 52 weeks. Part-time work represents between 500 and 1,500 hours per year and 52 weeks. Not working status is defined by self-report or working less than 500 hours per year and 52 weeks. We use the same definition as in Bernheim, Skinner and Weinberg (2001). Individuals that report working less than 52 weeks are classified as leaving employment (full-time or part-time) or not working according to the proportion of number of hours per year declared. In this specific group, the unemployment start date is not possible to identify.

The employment questions are also applied in the second and third interviews but only to individuals that reported not working in the first interview and are changing working status. The responses in these interviews were examined for individuals working less than 52 weeks in the last interview. In most of the cases the employment responses in the second and third interviews do not capture individuals who started working in that term as indicated by the response of the last interview. Therefore, as the labor status responses in the second and third interviews are not reliable, they are not considered in the analysis.

The unemployment spells do not affect the outcomes from the first interview because in order to be included in the sample, individuals should be working full-time or part-time or not working in the first period. This effect contaminates the outcomes of the last interviews when the number of hours per year that individuals report is assumed to be consecutive. Therefore, only individuals reporting full-time or part-time work, and not working in the last interview are considered. In the case of individuals that transition from employment to retirement, those that

report in the last interview up to the equivalent of 9 months working as in the first interview are included. We do not consider individuals that retire during the previous three months to the last interview because this coincides with the period in which expenditure is reported and as the exact date of retirement is not asked, we cannot classify them properly. For those that re-enter the labor market reporting at least the equivalent to 3 months working full-time or part-time in the last interview and not working in the first interview are considered in the classification.

The variable that indicates the number of household earners was also explored as a possibility to reflect labor status. However, this variable gives misleading results because individuals that report working less than 52 weeks per year are also considered as working.

Results

This section presents the detailed results for Table 2, Table 3, and Table 4 including all control variables.

Table 5: Impact on consumption around retirement including single and couple households

	Nondurables	Total food	Food at home	Non-food nondurables
Intercept	6.5758	5.2531	4.3775	6.0198
	[0.3998**]	[0.3787**]	[0.3580**]	[0.4974**]
Age	0.0016	0.0041	0.0191	0.0063
	[0.0126]	[0.0118]	[0.0112*]	[0.0157]
Age^2	-0.0001	-0.0001	-0.0001	-0.0001
	[0.0001]	[0.0001]	[0.0001**]	[0.0001]
Family size	0.1383	0.1447	0.1766	0.1393
	[0.0059**]	[0.0056**]	[0.0059**]	[0.0074**]
Children under 18 years old	-0.1079	-0.0739	-0.0627	-0.1338
	[0.0098**]	[0.0095**]	[0.0094**]	[0.0123**]
Couple (dummy=1)	0.4044	0.3426	0.3894	0.4749
	[0.0155**]	[0.0142**]	[0.0143**]	[0.0199**]
I (dummy=1 last interview)	-0.0213	-0.0299	-0.0175	-0.0184
	[0.0069**]	[0.0073**]	[0.0071**]	[0.0088**]
G_{00}	-0.2707	-0.2033	-0.0982	-0.3198
	[0.0134**]	[0.0125**]	[0.0119**]	[0.0169**]
G_{01}	-0.2484	-0.1774	-0.0867	-0.3015
	[0.0417**]	[0.0383**]	[0.0357**]	[0.0522**]
G_{10}	-0.1427	-0.1092	-0.0539	-0.1626
	[0.0225**]	[0.0218**]	[0.0228**]	[0.0280**]
$I * G_{00}$	0.0303	0.0372	0.0284	0.0279
	[0.0100**]	[0.0106**]	[0.0103**]	[0.0129**]
$I * G_{01}$	0.0141	0.0458	0.0625	0.0033
	[0.0373]	[0.0374]	[0.0365*]	[0.0497]
$I * G_{10}$	-0.0070	-0.0608	-0.0452	0.0112
	[0.0216]	[0.0229**]	[0.0246*]	[0.0279]
No. observations	25,960	25,960	25,960	25,960

**estimates are significant at 5% level of confidence. *estimates are significant at 10% level of confidence. Regressions also include dummy variables for year, month and their interactions. The standard errors are robust to heteroskedasticity corrected with the Huber-White method and serial correlation within households.

Table 6: Impact on consumption around retirement including couple households

	Nondurables	Total food	Food at home	Non-food nondurables
Intercept	8.3566	6.2779	4.7749	8.1017
	[0.4412**]	[0.4273**]	[0.4007**]	[0.5397**]
Age	0.0001	0.0012	0.0137	0.0079
	[0.0131]	[0.0124]	[0.0117]	[0.0162]
Age^2	-0.0001	-0.0001	-0.0001	-0.0001
	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Family size	0.1170	0.1295	0.1571	0.1133
	[0.0056**]	[0.0055**]	[0.0053**]	[0.0068**]
Children under 18 years old	-0.0961	-0.0658	-0.0508	-0.1194
	[0.0099**]	[0.0098**]	[0.0094**]	[0.0124**]
Wife hours of leisure	-0.1759	-0.0819	0.0085	-0.2281
	[0.0177**]	[0.0174**]	[0.0165]	[0.0211**]
(age of head − age wife)	0.0021	0.0011	0.0016	0.0028
	[0.0009**]	[0.0008]	[0.0008**]	[0.0011**]
I (dummy=1 last interview)	-0.0106	-0.0236	-0.0128	-0.0059
	[0.0072]	[0.0076**]	[0.0074*]	[0.0091]
$I * G_{00}$	0.0261	0.0317	0.0250	0.0232
	[0.0108**]	[0.0111**]	[0.0109**]	[0.0139*]
$I * G_{01}$	-0.0085	0.0370	0.0555	-0.0276
	[0.0391]	[0.0400]	[0.0388]	[0.0520]
$I * G_{10}$	-0.0056	-0.0543	-0.0505	0.0131
	[0.0226]	[0.0244**]	[0.0246**]	[0.0293]
No. observations	21,682	21,682	21,682	21,682

**estimates are significant at 5% level of confidence. *estimates are significant at 10% level of confidence. Regressions also include dummy variables for year, month and their interactions, and the group dummies for the head of household labor status. The standard errors are robust to heteroskedasticity corrected with the Huber-White method and serial correlation within households.

Table 7: Impact on consumption around retirement including single and couple households with an alternative definition of retirement

	Nondurables	Total food	Food at home	Non-food nondurables
Intercept	7.2466	5.7016	4.6585	6.7622
	[0.4547**]	[0.4300**]	[0.4058**]	[0.5672**]
Age	-0.0209	-0.0109	0.0097	-0.0182
	[0.0144]	[0.0136]	[0.0128]	[0.0180]
Age^2	0.0000	0.0000	-0.0001	0.0000
	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Family size	0.1275	0.1354	0.1689	0.1258
	[0.0065**]	[0.0060**]	[0.0063**]	[0.0081**]
Children under 18 years old	-0.0999	-0.0619	-0.0503	-0.1259
	[0.0105**]	[0.0100**]	[0.0098**]	[0.0132**]
Couple (dummy=1)	0.3971	0.3343	0.3874	0.4673
	[0.0174**]	[0.0160**]	[0.0165**]	[0.0224**]
I (dummy=1 last interview)	-0.0178	-0.0274	-0.0169	-0.0144
	[0.0069**]	[0.0073**]	[0.0072**]	[0.0088]
G_{00}	-0.2628	-0.2006	-0.1090	-0.3069
	[0.0165**]	[0.0154**]	[0.0149**]	[0.0210**]
G_{01}	-0.2446	-0.1735	-0.0876	-0.2961
	[0.0418**]	[0.0383**]	[0.0356**]	[0.0523**]
G_{10}	-0.1395	-0.1064	-0.0539	-0.1688
	[0.0225**]	[0.0218**]	[0.0228**]	[0.0280**]
$I * G_{00}$	-0.0022	0.0186	0.0195	-0.0134
	[0.0127]	[0.0132]	[0.0132]	[0.0164]
$I * G_{01}$	0.0150	0.0461	0.0621	0.0037
	[0.0374]	[0.0376]	[0.0365*]	[0.0497]
$I * G_{10}$	-0.0076	-0.0615	-0.0464	0.0107
	[0.0216]	[0.0229**]	[0.0246*]	[0.0279]
No. observations	20,236	20,236	20,236	20,236

**estimates are significant at 5% level of confidence. *estimates are significant at 10% level of confidence. Regressions also include dummy variables for year, month and their interactions. The standard errors are robust to heteroskedasticity corrected with the Huber-White method and serial correlation within households.