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Does the Retirement Consumption Puzzle Differ Across the Distribution?

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Abstract

Previous research has repeatedly found a puzzling one-time drop in the mean and median of consumption at retirement, contrary to the predictions of the life-cycle hypothesis. However, very little is known as to whether these effects vary across the consumption distribution. This study expands upon the previous work by examining changes in the consumption distribution between the non-retired and the retired using quantile regression techniques on pseudo-cohorts from the cross-sectional data of the 1990-2007 Consumer Expenditure Survey. The results indicate that there are insignificant changes between these groups at the lower end of the consumption distribution, while there are significant decreases at the higher end of this distribution. In addition, these changes in the distribution are gradually larger in magnitude when moving from the lower end to the higher end, which is found using several different measures of consumption. Work-related expenditures are instead shown to decrease uniformly across the consumption distribution. This evidence reveals that there is a progressive distributional component to the retirement consumption puzzle.

JEL codes: J26, D91, D12.
Keywords: retirement, life-cycle model, household consumption.

1 Introduction

The basic forward-looking life-cycle model states that the marginal utility of consumption should remain smooth through the retirement transition, as the change in income at retirement should be predictable for each individual (Modigliani and Brumberg, 1954). Contrary to this model, a body of empirical research has instead found a discontinuous one-time drop in consumption upon retirement, also known as the retirement consumption puzzle (see Attanasio and Weber, 2010, for a review). Hamermesh (1984) was the first study to document this discontinuous drop using data for the United States, providing insufficient savings as the explanation. This result has since been found to exist for several other countries as well, including Germany (Schwerdt, 2005), Italy (Battistin et al., 2009), Japan (Wakabayashi, 2008), and the United Kingdom (Banks, Blundell, and Tanner, 1998).

More recent research using U.S. data has instead suggested that there may be no such puzzle (Hurst, 2008). Fisher et al. (2008) showed that the puzzle disappears when using a broader measure of consumption flows, instead of using food expenditures to represent consumption as it had previously been used in much of the literature. Aguiar and Hurst (2005) further supported the finding that food expenditure is a poor proxy for the consumption of retirees, by arguing that individuals substitute toward the home production of food in retirement and by showing that the quality and quantity of food consumed remains constant in retirement despite the drop in food expenditures.

Others have found that the consumption drop only takes place for those that retire unexpectedly due to illness, disability, or involuntary unemployment (Haider

and Stephens, 2007; Smith, 2006). Blau (2008) developed a modified life-cycle model that incorporates this uncertainty in the timing of retirement, predicting discontinuous drops in consumption only for those households that retired unexpectedly. This model predicts heterogeneity in the retirement consumption response based on whether a household experienced an unexpected retirement. It is also possible that there is further heterogeneity within this group depending on how prepared they were for retirement, as an individual who unexpectedly retires closer to their planned retirement date is expected to have a smaller drop in consumption relative to other individuals.

Despite the potential heterogeneity, the literature has thus far only focused on changes in consumption upon retirement at the mean or median, implicitly assuming that these changes (or lack thereof) were uniform across all individuals. This approach is very restrictive, however, in that it does not allow for an understanding of any potential distributional impacts. Analyzing the impact of retirement at only the mean or median may mask important information which can only be unveiled by looking at the differences in these changes across the entire consumption distribution. A distributional approach can also improve the understanding of the retirement consumption puzzle by showing that the results derived at the mean may be driven by only a certain part of the distribution.

While there are no papers in the literature that solely investigate the distributional aspects of the retirement consumption puzzle, there are two papers that offer some initial insight into this topic, both using a panel data approach. Bernheim, Skinner, and Weinberg (2001) estimated the drop in consumption at retirement

across well-defined sub-groups based on wealth and income replacement rate quartiles, finding that the percentage drop is larger for those with lower wealth and those with lower income replacement rates. In a more recent study, Aguila, Attanasio, and Meghir (2011) used the panel element of the Consumer Expenditure Survey to examine the changes in quarterly expenditures for individuals that retire during the year within a surveyed household. They found significant changes at retirement across the entire expenditure distribution which differ greatly in magnitude across the distribution and display a regressive pattern, in that the changes in consumption are negative for low consumption households and positive for high consumption households.

The current paper extends and complements this previous work by exclusively focusing on the distributional aspects of the retirement consumption puzzle. This is done by estimating over a greater number of observations at each point in the distribution using large pseudo-cohorts constructed from the cross-sectional data of the 1990-2007 Consumer Expenditure Survey. A series of quantile regressions is used on this data to analyze the changes between the non-retired and the retired across the entire distribution of consumption. This is the first paper to use a pseudo-cohort approach in order to investigate whether retirement differentially affects certain parts of the consumption distribution.

The findings of this study introduce several new and important facts to the literature. Most importantly, the evidence reveals that there is a distributional component to the retirement consumption puzzle, as the changes in consumption at retirement are not uniform across the consumption distribution. While the changes are insignif-

icant at the lower end of the distribution, there are significant drops found at the higher end of this distribution, ranging from 5 to 9 percent. In particular, these consumption drops are progressive when moving up the consumption distribution, as they tend to increase in magnitude, which is shown using several different measures of consumption. The only exception to this overall pattern is for work-related expenditures, which are shown to decrease uniformly across the distribution.

2 Data and Sample

The analyses of this paper are based on data from the Consumer Expenditure (CE) Interview Survey, which contains information on the spending of American consumers. It is administered quarterly to a representative sample of households, with the same consumer unit followed for four quarters. Following Aguiar and Hurst (2009), the sample is restricted to those who appeared in all four quarterly interviews and who had positive spending on food, non-durable transportation, clothing and personal care, utilities, entertainment, and housing services.[1] These four quarterly consumption values are then aggregated to measure the annual consumption of each consumer unit. The unit of analysis is then converted to the individual, by disaggregating the CE Survey consumer units using an equivalence scale equal to the square root of family size. This equivalence scale assumes that a two-person household needs to spend approximately 41 percent more than a one-person household for

[1]This positive spending restriction removes 1,728 observations from the final sample. The results of this paper are not sensitive to their exclusion, which are available upon request.

the two consumer units to experience an equivalent level of consumption.[2]

A nontrivial advantage of the CE Survey is that it contains a large number of observations for the sufficient representation of groups at each point in the consumption distribution. Longitudinal surveys, in comparison, do not contain sample sizes large enough for these purposes. For example, the previous distributional studies using panel data range from a cohort of 450 households with around 3,500 total observations in Bernheim, Skinner, and Weinberg (2001) using the Panel Study of Income Dynamics (PSID), to a cohort of 750 households with 1,500 total observations in Aguila, Attanasio, and Meghir (2011) using the panel dimension of the CE Survey. While these numbers may be sufficient to evaluate the retirement effect at the mean, they will not be representative of the entire consumption distribution, especially for the tails of that distribution.[3]

By contrast, the pseudo-cohort sizes of the current paper are much larger, between 4,000 and 5,000 individuals each, and provide for a much better representation of the distribution as there are roughly 23,000 total observations, with over 9,000 retired and over 13,000 non-retired. Table 1 displays the construction and sample sizes of each of these pseudo-cohorts. The individual level data are aggregated into three-year age bands over three consecutive years of data to form five cohorts of older

[2]This scale is commonly used in the literature (ex. Fisher et al., 2008). The results of this paper are not sensitive to the use of an equivalence scale, which are available upon request.

[3]The model used in the current paper was re-estimated using 750 observations, bootstrapping the coefficients 10 times without replacement just to get a sense of how sensitive the coefficients are to a smaller sample size. The retirement coefficient at the 10th percentile ranges from -0.086 to +0.077, and the coefficient on the 90th percentile ranges from -0.233 to +0.131. Thus, the regressive pattern of Aguila, Attanasio, and Meghir (2011) could be replicated with a smaller sample. Therefore, the main difference between the results of the current paper and their results may be due to their considerably smaller sample size.

individuals. For example, individuals aged 50-52 in each year of 1990, 1991, and 1992 are grouped together and are followed through the data as they age together until they reach the ages of 65-67 in 2005-07. The three-year interval was chosen in order to obtain cohorts large enough to study the changes in consumption across the entire consumption distribution. And, given that the primary focus of this paper is on individuals around the retirement transition, the sample is further restricted to age groups between 50 and 79 years old.[4]

Table 1: Years of Data and Sample Size by Age and Cohort

	Years of Data					
Age	Cohort A	Cohort B	Cohort C	Cohort D	Cohort E	Sample Size
50-52	1990-92	.	.	.	.	960
53-55	1993-95	1990-92	.	.	.	1,698
56-58	1996-98	1993-95	1990-92	.	.	2,242
59-61	1999-01	1996-98	1993-95	1990-92	.	3,120
62-64	2002-04	1999-01	1996-98	1993-95	1990-92	4,052
65-67	2005-07	2002-04	1999-01	1996-98	1993-95	3,845
68-70	.	2005-07	2002-04	1999-01	1996-98	3,045
71-73	.	.	2005-07	2002-04	1999-01	2,255
74-76	.	.	.	2005-07	2002-04	1,304
77-79	.	.	.	.	2005-07	510
Sample Size	5,347	4,903	4,476	4,237	4,068	23,031

Notes: Authors' calculations of Consumer Expenditure Survey data from 1990 to 2007.

A retired individual is defined as someone who reports not working (i.e. no earnings) and explicitly states retirement as the reason for having no earnings, following

[4]Bernheim, Skinner, and Weinberg (2001) and Aguila, Attanasio, and Meghir (2011) both use similar age ranges of 45 to 80 and aged 50 and above, respectively.

Fisher et al. (2008) and other studies that use the CE Survey.[5] Table 2 shows the percentage of retired individuals by age group. At ages 62-64, 31.7 percent are retired, while just over half of the individuals are retired by ages 65-67, and 64.3 percent of individuals are retired at ages 68-70. This pattern is consistent with other data, such as the Health and Retirement Survey (HRS) where the average age at retirement is 62.6 (Laitner and Silverman, 2005). Table 2 also displays the median age by retirement status across the consumption distribution. Relative to the lowest percentile, the median age among the non-retired is only 0.5 years higher at the highest percentile and the median age among the retired is only 1.5 years lower.[6]

The measure of consumption must also be adequately addressed, as the literature has become increasingly aware that the measure used matters greatly for the consistency of the results and their interpretation (Hurst, 2008). Five different measures are used to define consumption in this study. These measures are total expenditures, work-related expenditures, non-work-related expenditures, total consumption flows, and non-work-related consumption flows, which are all expressed in real 2008 dollars.

Total expenditures is the sum of all outlays for goods and services, including expenditures on food, housing, transportation, apparel, medical care, entertainment, personal care services, reading, education, tobacco, alcohol, other lodging, and house furnishings and equipment.[7] Total consumption flows include all total expenditures, subtracting out the cost of home-ownership (mortgage principal and interest) and

[5]Bernheim, Skinner, and Weinberg (2001) and Aguila, Attanasio, and Meghir (2011) instead use an hours-based definition, where the retired are defined as anyone that works no more than 500 hours.

[6]These differences are too small to derive the results of this paper.

[7]Medical care expenditures are out-of-pocket expenses for health insurance premiums, medical services, prescription drugs, and medical supplies.

Table 2: Percentage Retired by Age and Median Age by Consumption Percentile

	Percentage Retired		Median Age		Difference in Age
			Non-Retired	Retired	
50-52	1.3	Avg	61.1	68.4	7.3
53-55	3.0	10th	61.3	69.3	8.0
56-58	5.0	20th	61.1	68.8	7.7
59-61	13.2	30th	61.5	68.6	7.1
62-64	31.7	40th	61.5	68.3	6.8
65-67	51.6	50th	61.3	68.6	7.3
68-70	64.3	60th	60.9	68.1	7.2
71-73	72.1	70th	60.8	68.0	7.2
74-76	76.2	80th	60.7	68.3	7.6
77-79	83.4	90th	60.8	67.8	7.0

Notes: Authors' calculations of CE Survey data from 1990 to 2007. The median retirement age is calculated as the mean age of the ten percentage point band around the relevant percentile. For example, the 10th percentile is calculated as the mean age among the individuals from the 6th to the 15th percentiles.

adding back the rental equivalence of the owned home.[8] For renters, total expenditure is therefore equal to total consumption. Over 65 percent of older Americans own their home with no mortgage (Fisher et al., 2007), meaning that any expenditure measure tends to understate the consumption of housing among home owners. Among the five measures, total consumption comes the closest to matching the actual consumption of individuals as it captures the flow of services from the owned home.

Work-related expenditures, non-work-related expenditures, and non-work-related

[8]In the CE survey, homeowners were asked "If someone were to rent this home today, how much do you think it would rent for monthly, unfurnished and without utilities?" This monthly response is multiply by twelve to reach an annual value for the rental equivalence for homeowners.

consumption flows are all constructed following Aguiar and Hurst (2009).[9] Work-related expenditures equal food away from home, plus apparel, personal care items, and non-durable transportation. As one would expect work-related expenditures to fall at retirement, this component is isolated to determine whether it is driving the overall results. Total non-work-related expenditures include food at home, alcohol, tobacco, utilities, domestic services, and entertainment.[10] The flow of housing services, using rental equivalence, is added to non-work related expenditures to obtain non-work-related consumption flows.[11]

3 Methods and Results

3.1 Changes in Mean Consumption upon Retirement

The baseline specification follows the methodology commonly used in the literature which is based around mean changes in consumption upon retirement (ex. Smith, 2006; Fisher et al., 2008; Aguiar and Hurst, 2009). Consider an ordinary least squares (OLS) regression model of the following form:

$$ln\left(C\right) = \alpha + \beta \cdot Retired + X'\gamma + \epsilon \tag{1}$$

[9]Total expenditures include items that are not in work-related expenditures or non-work-related expenditures, such as medical care expenditures and housing outlays.

[10]Aguila, Attanasio, and Meghir (2011) define non-durable consumption as the sum of food, alcohol, tobacco, clothing, footwear, personal care products, public and private transport, utilities, and services. Therefore, their measure is a combination of the work-related and non-work-related expenditures of this paper, although it is not clear whether they include entertainment.

[11]Food consumption was the lone definition of consumption in much of the early research examining the retirement consumption puzzle. In this study, food consumption is itself divided into food away from home, as a component of work-related expenditures, and food at home, as a part of non-work-related expenditures and non-work-related consumption.

where $ln(C)$ represents the natural log of the equivalent consumption measure as the dependent variable, *Retired* is a binary variable which equals one if the individual is not working and provides retirement as the reason for not working while it is zero if they are working, and X represents the set of control variables.[12] In all of the specifications, vectors of cohort and year binaries are included in X, in order to control for cohort-specific factors which are consistent over time as well as year-specific factors.[13] Sets of demographic binaries for gender, race, and marital status are additionally included in X.

The coefficient of interest for this OLS estimation, β, represents the difference in the conditional mean of consumption between the non-retired and the retired. Table 3 presents the estimates for this coefficient using each of the consumption measures. Mean consumption is lower among the retired across all of the consumption measures. The mean difference in total expenditure is estimated to be 6.2 percent lower among the retired, which is statistically significant, while the mean difference in total consumption flows is four percent lower among the retired. Work-related expenditures exhibit the largest mean difference between the non-retired and the retired at 9.1 percent, while non-work-related expenditures and non-work-related consumption flows both exhibit much smaller mean differences of three percent.

[12]The retirement status may be simultaneously determined with changes in consumption. This is possible, for example, if individuals retire unexpectedly due to a negative health shock which then causes unexpected declines in both income and consumption. Blau (2008) simulated data to match the life-cycle/permanent income hypothesis and found a retirement consumption puzzle in the baseline OLS results. Using the same data along with a valid instrument failed to eliminate this puzzle, indicating that the instrumental variable technique is unable to offer a solution to potential endogeneity concerns.

[13]Cohort, year, and age effects cannot be separately identified as the three are perfectly correlated. The results are robust to the inclusion of a cubic in age instead of the cohort binaries.

Table 3: OLS Regression Estimates

	Coefficient on Retired (std. error)
Total Expenditures (TE)	-0.062 (0.008)
Work-Related Expenditures (WRE)	-0.091 (0.011)
Non-Work-Related Expenditures (NWE)	-0.030 (0.007)
Total Consumption Flows (TC)	-0.043 (0.008)
Non-Work-Related Consumption Flows (NWC)	-0.029 (0.006)

Notes: Authors' calculations of CE Survey data from 1990 to 2007. All regressions control for cohort and year binaries and demographic variables. Total number of observations equals 23,031.

These results are generally consistent with some of the previous findings in the literature. First, Fisher et al. (2008) found that the retirement consumption puzzle diminishes as the definition of consumption is broadened to include flows. This paper also finds that the magnitudes of the mean differences between the non-retired and retired are smaller once non-work related consumption flows are examined. Second, this paper finds that a substantial portion of this mean difference is due to the expected decrease in work-related expenditures upon retirement, as shown in Aguiar and Hurst (2009). This item is specific to the differences in activities across the pre- and post-retirement periods rather than consumption smoothing or the borrowing

and savings behavior of individuals.

3.2 Changes in the Distribution of Consumption upon Retirement

Within the previous subsection, mean consumption was shown to decrease upon retirement. Although the estimates varied in magnitude across the different consumption measures, and a large part of the reduction was found for work-related expenditures, the evidence appears to be in support of a retirement consumption puzzle. However, there may be substantial heterogeneity across individuals and this effect could be driven by individuals who are in a certain part of the distribution. This leads to the main contribution of this study, which is to analyze the change in consumption upon retirement across the entire consumption distribution using quantile regression. While the OLS regression provided the difference in the conditional mean of consumption upon retirement, the quantile regression allows for the recognition that the relationship between consumption and retirement may not be uniform across the distribution.

This introduces an important difference between the panel data approach used in the previous studies and the pseudo-cohort approach with cross-sectional data used in the current study. With panel data, the comparison of interest would be made between the unconditional distributions of consumption for a cohort, pre- and post- retirement. If the cohort in the panel data was large enough to represent the entire distribution, this may be the ideal approach, as it is the closest fit to the research question at hand. In practice, however, the limited number of individual

observations available in panel data does not allow for a proper representation of the full distribution of consumption, either before or after retirement, making the measurement of the changes upon retirement problematic. Also, given that the panel data follow the same individuals over time, controls are not necessary to include, so these distributions can be compared unconditionally.

The analysis of the current study instead compares the conditional distribution of consumption among the retired to the conditional distribution of consumption among the non-retired to arrive at an answer to the research question. In order to consistently estimate these coefficients with quantile regressions, a large number of observations are required for each cohort and percentile, which makes the CE Survey the most suitable database for this analysis. By using multiple pseudo-cohorts constructed from cross-sectional data, however, the same individuals are no longer being compared before and after retirement. Therefore, it is necessary to condition on a variety of factors, such as cohort, year, and demographic variables, in order to isolate the effect of retirement on the distribution of consumption. This conditioning factor also allows for a better comparison to the previous estimates derived at the mean.[14]

The conditional quantile regression coefficients of Koenker and Bassett (1978) are used for this analysis, which are comparable to the estimated OLS coefficients on *Retired*, as they are the conditional differences in the natural log of equivalized consumption between the non-retired and the retired at the qth quantile of their

[14] Actually, even the previous distribution research using panel data conditions on the same type of demographic characteristics as those included in the current study. For example, Aguila, Attanasio, and Meghir (2011) condition on age, family size, year, month, and marital status.

distributions.[15] Though the linear specification from equation (1) remains the same, the new coefficient of interest, β_q, is now estimated at every decile using:

$$\beta_q = arg\min_{\beta} \sum \rho_q \cdot [ln\,(C) - \beta \cdot Retired - X'\gamma] \tag{2}$$

where $\rho_q(\epsilon) = \epsilon \cdot [q - 1 \cdot (\epsilon < 0)]$.[16] The results presented within this subsection are specifically based upon simultaneous quantile regressions, which estimate multiple quantile regressions for each percentile simultaneously and obtain an estimate of the variance-covariance matrix through bootstrapping.[17] This simultaneous quantile regression returns the same coefficients as those for the independent quantile regression at each percentile, but it also produces the correct standard errors. This method additionally allows for the explicit hypothesis testing of whether the estimates are statistically different across the percentiles. The results of these simultaneous quantile regressions are presented at the 10th through 90th percentiles, using the five measures of consumption and controlling for cohort and year binaries, as well as the demographic variables, throughout.

Table 4 shows that the changes in consumption differ across the consumption distribution between the non-retired and retired using several different measures. In addition, the changes in consumption are generally progressive, become more negative when moving up the consumption distribution, with the largest changes

[15] For a general discussion of quantile regression techniques and their usage, see Buchinsky (1998) or Koenker and Hallock (2001).

[16] The notation for this convex linear programming approach follows from Frolich and Melly (2010).

[17] The simultaneous quantile regression is estimated using the *sqreg* command in Stata. One hundred bootstrap replications are used with replacement, and the results are stable above 100 replications.

occurring at the upper end of the distribution. Total expenditures, for example, display a drop of 3.0 percent at the 10th percentile, a drop of 6.6 percent at the median, and the largest drop of 9.2 percent at the 90th percentile. The changes in work-related expenditures, on the other hand, are almost completely uniform across the distribution. The estimates reflect a 7.7 percent drop at the 10th percentile, a 7.5 percent drop at the median, and a 8.7 percent drop at the 90th percentile.[18] The fact that these results for work-related expenses, constructed of food away from home, clothing and apparel, and transportation, are basically identical across the distribution is as expected. Given that work-related expenses are tied to an individual's labor supply, a drop in these expenditures upon retirement should occur, as labor is no longer supplied. This result shows that work-related expenditure is not the source behind the variation in the consumption changes across the distribution.

According to the third row of Table 4, the general pattern of monotonically increasing magnitudes and increasing statistical significance is also found in the changes across the distribution of non-work-related expenditures. However, the magnitudes of the point estimates are lower than that of total expenditures, with a decrease of 1.6 percent at the 10th percentile, 2.2 percent at the median, and 6.9 percent at the 90th percentile. Because work-related expenditures are included within the definition of total expenditures in the first row, it is expected that the drop in non-work-related expenditures upon retirement should be lower in magnitude in their absence. Further, most of the changes occurring at the low end of the distribution are found to be statistically insignificant at the five percent level, while the estimates

[18]The levels of the reductions will still vary, however, and are discussed in a later subsection.

Table 4: Simultaneous Conditional Quantile Regression Estimates

	Coefficient on Retired (std. error)								
	P10	P20	P30	P40	P50	P60	P70	P80	P90
TE	-0.030	-0.034	-0.042	-0.057	-0.066	-0.072	-0.072	-0.071	-0.092
	(0.013)	(0.011)	(0.009)	(0.011)	(0.010)	(0.011)	(0.013)	(0.015)	(0.019)
WRE	-0.077	-0.067	-0.085	-0.085	-0.075	-0.078	-0.087	-0.095	-0.087
	(0.022)	(0.016)	(0.014)	(0.014)	(0.013)	(0.012)	(0.011)	(0.014)	(0.016)
NWE	-0.016	-0.008	-0.009	-0.023	-0.022	-0.028	-0.032	-0.034	-0.069
	(0.011)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.010)	(0.013)
TC	-0.019	-0.011	-0.023	-0.039	-0.051	-0.053	-0.057	-0.058	-0.070
	(0.012)	(0.010)	(0.010)	(0.011)	(0.009)	(0.009)	(0.010)	(0.012)	(0.015)
NWC	0.008	-0.002	-0.006	-0.019	-0.026	-0.031	-0.038	-0.053	-0.068
	(0.011)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)	(0.009)	(0.011)	(0.014)

Notes: Authors' calculations of CE Survey data from 1990 to 2007. P10 represents the 10th percentile, and P90 is the 90th percentile. All regressions control for cohort and year binaries and demographic variables. Total number of observations equals 23,031. TE = total expenditures; WRE = work-related expenditures; NWE = non-work-related expenditures; TC = total consumption flows; NWC = non-work-related consumption flows.

become more significant when moving from the 10th to the 90th percentile. In fact, all of the changes in non-work expenditures are statistically insignificant below the 40th percentile, while they are significant at the 40th percentile and above. Therefore, consumption at the lower percentiles is not statistically different between the non-retired and the retired, whereas consumption at the higher percentiles is lower among the retired.

In order to better understand the general pattern of these reductions in consump-

tion across the expenditure spectrum, the coefficients are also estimated for every single percentile, rather than just for every tenth percentile. Overall, ninety-one estimates were generated from the 5th percentile to the 95th percentile, for total expenditures, work-related expenditures, and non-work-related expenditures, which are shown in Figure 1.[19] Total expenditures follow the general progressive pattern of gradually larger decreases in consumption between the non-retired and retired towards the high end of the distribution. This pattern is similarly followed by non-work-related expenditures, but with smaller magnitudes. Work-related expenditures display larger drops in consumption which are relatively uniform across the distribution.

The median expenditure changes of the current paper are very similar to the median results of Aguila, Attanasio, and Meghir (2011) in terms of their magnitude and direction. Their measure of non-durable consumption is close in definition to the sum of the measures of work-related expenditures and non-work-related expenditures used here, and their result of a 3.5 percent drop at the median lies between the current median result for work-related expenditures of a 7.5 percent drop and the median non-work-related expenditure result of a 2.3 percent drop. However, their paper also found that non-durable expenditures are 71 percent lower in retirement at the 10th percentile and 62 percent higher in retirement at the 90th percentile, implying a large and regressive distributional effect of retirement versus the relatively small and progressive distributional effect of the current study. These large changes they found

[19] As previously noted in the paper, total expenditures are not the sum of work-related expenditures and non-work-related expenditures because total expenditures includes spending on durable goods while the work-related and non-work-related expenditures do not include durables.

at both ends of the distribution seem implausible, however, and may be a product of their small sample size and their use of quarterly data.[20]

Figure 1: Retirement Coefficients for Three Expenditure Measures Across the Distribution

Notes: Authors' calculations of CE Survey data from 1990 to 2007. Figured based on the expenditure results from Table 4.

The results for consumption flows appear in the last two rows of Table 4. Although the magnitudes of the drops in total consumption are somewhat lower in magnitude than for total expenditures, the pattern of rising magnitudes in the changes still holds when moving from the low-end to the high-end of the distribution.[21] Con-

[20]The quarterly consumption data used by Aguila, Attanasio, and Meghir (2011) have a higher coefficient of variation than the annual consumption data used in the current paper. The coefficient of variation in quarterly consumption data is 0.98, while the coefficient of variation in the annual data is 0.77 based on calculations using the current sample of this paper. It may be that the higher variance in the quarterly observations explains some of the differences in the results.

[21]Note that the standard errors presented in Table 4 are higher in the tails of the distribution and smaller in the middle of the distribution, highlighting the importance of a large sample size in estimating quantile regressions. With the smaller sample sizes of the PSID, HRS, and the

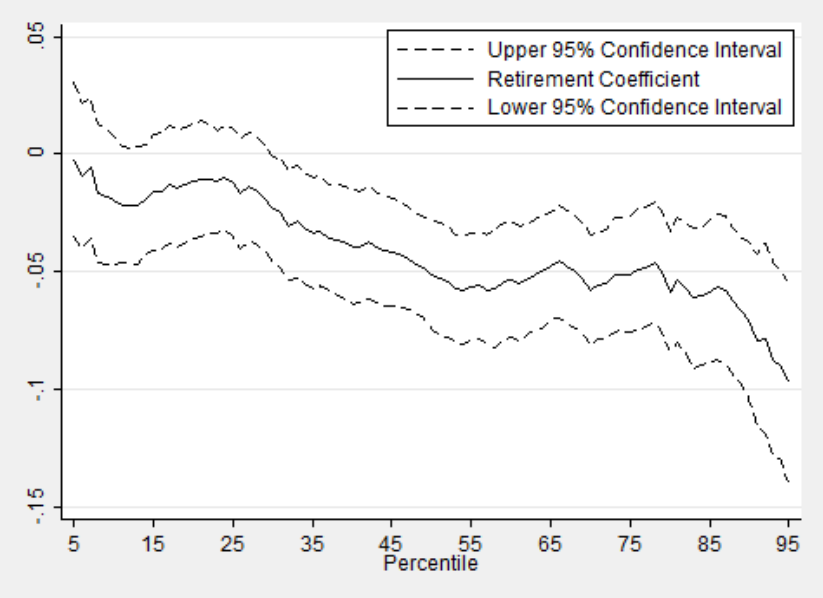
sumption flows drop by 1.9 percent at the 10th, 5.1 percent at the median, and 7.0 percent at the 90th percentile. The coefficients at the lower percentiles remain insignificant, as found with the other non-work measures. The changes to non-work-related consumption flows in the last row of Table 4 follow a very similar pattern to those of total consumption, but are closer in magnitude to the pattern of non-work-related expenditures.

Repeating the same exercise as for the previous figure, Figure 2 displays the results over the entire total consumption distribution with a 95 percent confidence interval. When comparing the changes across the distribution between the non-retired and the retired, there is a clearly visible overall pattern of small and statistically insignificant drops in consumption in the first quarter of the distribution. Moving to the higher percentiles, the magnitudes of the drops increase from the 25th percentile to the highest drop at the 95th percentile, with a relatively flat portion in the middle of the distribution between the 55th and the 75th percentiles.

While the pattern in the magnitudes of the changes across the consumption measures is visible, and the difference with pre-retirement consumption is significant in most cases, the differences across the consumption distribution may still not be statistically significant when comparing between the percentiles. Using the bootstrapped standard errors of the simultaneous quantile regression, hypothesis tests are performed to determine whether or not each pair of coefficients across the entire distribution are statistically different from one another, which is done separately for each consumption measure. Table 5 presents the p-values of these tests which

panel element of the CE, it may not be possible to obtain precise estimates throughout the entire distribution.

Figure 2: Retirement Coefficients with 95% Confidence for Total Consumption Flows Across the Distribution



Notes: Authors' calculations of CE Survey data from 1990 to 2007. Figured based on the total consumption results from Table 4.

compare the estimates in Table 4.[22] Although more than three hundred tests can be performed, only the comparisons between the tail ends of the distribution and each of the other percentiles are presented.

Table 5 confirms the patterns seen in Table 4. For total expenditures, the 10th percentile estimate in the first row is shown to be statistically different from the 40th percentile estimate at the ten percent level and from the median to the 90th percentile estimates at the five percent level. Moving to the other end of the distribution in the second row, the 90th percentile estimate for total expenditures is statistically different from all of the percentile estimates below the 40th percentile. The uniformity of

[22]The test statistic is a simple Wald test for the equality of two coefficients.

Table 5: Hypothesis Tests Between Coefficients on Retired by Percentile

		P-Values from Two-Sided Tests								
		P10	P20	P30	P40	P50	P60	P70	P80	P90
TE	P10	.	0.770	0.343	0.083	0.022	0.016	0.019	0.045	0.011
	P90	0.011	0.012	0.013	0.074	0.168	0.274	0.241	0.135	.
WRE	P10	.	0.527	0.665	0.679	0.928	0.960	0.652	0.447	0.709
	P90	0.709	0.383	0.938	0.936	0.542	0.621	0.980	0.587	.
NWE	P10	.	0.417	0.502	0.517	0.557	0.298	0.233	0.238	0.003
	P90	0.003	0.000	0.000	0.001	0.001	0.003	0.002	0.000	.
TC	P10	.	0.428	0.760	0.159	0.019	0.022	0.007	0.023	0.008
	P90	0.008	0.000	0.003	0.056	0.207	0.251	0.330	0.335	.
NWC	P10	.	0.175	0.131	0.009	0.003	0.001	0.000	0.000	0.000
	P90	0.000	0.000	0.000	0.000	0.002	0.003	0.012	0.154	.

Notes: Authors' calculations of CE Survey data from 1990 to 2007. See Table 4 for the coefficients on retired and their standard errors. Total number of observations equals 23,031. TE = total expenditures; WRE = work-related expenditures; NWE = non-work-related expenditures; TC = total consumption flows; NWC = non-work-related consumption flows.

the percentage reduction in work-related expenditures across the distribution is also confirmed, as the hypothesis that any pair of these coefficients are different from one another is rejected.

For non-work related expenditures, the 10th percentile is not statistically different from any of the other percentiles with the exception of the 90th. In fact, the 90th percentile is shown to be statistically different from all other percentile estimates at the one percent level. As shown in Table 4, the point estimates for non-work expenditures at the 80th percentile and below are from 1.6 to 3.4 percent, while the

90th percentile is more than twice as high as the next highest coefficient. The results generally show that there is very little response in non-work-expenditures among the retired at the 80th percentile and below, but a relatively large decrease at the 90th percentile. Therefore, while a large portion of the difference in consumption between the non-retired and the retired is present for work-related expenditures, the distributional effect is largely driven by non-work related expenditures at the highest percentile. This argues against the existence of a retirement consumption puzzle below the 80th percentile for this sub-category of expenditures.

Moving on to the flow measures, the test results in Table 5 suggest that the total consumption flows estimates are statistically different from one another. The estimated reduction in consumption at the 10th percentile is statistically significantly different from the median and above at the five percent level, while the 90th percentile is statistically different from the lower third of the distribution. The results for non-work-related consumption flows are similar in the sense that the 10th percentile estimate is statistically different from that of the 40th percentile and above at the five percent level. However, the 90th percentile is statistically different from all of the percentiles at the one percent level, with the exceptions of the 70th and 80th percentiles.

3.3 Further Investigation and Interpretation

The main results of this study, presented in Table 4, were produced using a simultaneous conditional quantile regression technique based upon the work of Koenker and Bassett (1978). The conditional aspect of this technique refers to the fact that a list

of factors were controlled for during the estimation, which is important given that it is used on pseudo-cohorts constructed from cross-sectional data that do not contain the same individuals over time as in panel data. One potential weakness of this approach, however, is that it relies on identifying the changes in the conditional distribution of consumption, that is in the distribution of the residual of consumption, rather than the changes in the actual distribution of consumption. The unconditional quantile regression technique of Firpo, Fortin, and Lemiuex (2009) can additionally be used to check if this is an important factor deriving the main results. This technique allows for the estimation of the marginal effect of retirement on the *qth* quantile of the actual distribution of consumption, while still controlling for these same factors through a recentered influence function.

Table 6 shows the results of this unconditional quantile regression technique, which are very similar to those presented for the conditional technique shown in Table 4.[23] When total expenditures or total consumption is used as the dependent variable, the coefficient on retirement is insignificant at lower deciles and becomes significant and more negative at higher deciles. The coefficient on retirement is also flat across the work-related expenditures distribution, again matching the pattern from Table 4. The comparison of the results between Tables 4 and 6 also suggests that there is no between-group change in inequality in retirement. That is, these results indicate that retirement reduces within-group dispersion, where groups are defined by cohort, year, gender, race, and marital status. A major disadvantage of the unconditional quantile regression approach, however, is that the coefficients across the distribution are not

[23]The *rifreg* Stata command provided by Firpo, Fortin, and Lemiuex (2009) is used to produce all of the results in Table 6. The standard errors are bootstrapped using 100 replications.

Table 6: Unconditional Quantile Regression Estimates

	Coefficient on Retired (std. error)								
	P10	P20	P30	P40	P50	P60	P70	P80	P90
TE	-0.025	-0.034	-0.038	-0.052	-0.075	-0.072	-0.074	-0.075	-0.088
	(0.012)	(0.012)	(0.012)	(0.010)	(0.012)	(0.012)	(0.012)	(0.015)	(0.017)
WRE	-0.085	-0.103	-0.085	-0.083	-0.068	-0.062	-0.092	-0.092	-0.080
	(0.027)	(0.019)	(0.016)	(0.014)	(0.015)	(0.014)	(0.013)	(0.014)	(0.017)
NWE	-0.002	-0.015	-0.007	-0.011	-0.029	-0.034	-0.040	-0.039	-0.081
	(0.013)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.009)	(0.012)	(0.016)
TC	-0.009	-0.014	-0.016	-0.035	-0.049	-0.055	-0.047	-0.056	-0.074
	(0.015)	(0.012)	(0.012)	(0.010)	(0.011)	(0.011)	(0.013)	(0.014)	(0.016)
NWC	0.010	-0.001	-0.008	-0.021	-0.028	-0.038	-0.044	-0.048	-0.075
	(0.011)	(0.009)	(0.008)	(0.008)	(0.009)	(0.008)	(0.010)	(0.010)	(0.014)

Notes: Authors' calculations of CE Survey data from 1990 to 2007. P10 represents the 10th percentile, and P90 is the 90th percentile. All regressions control for cohort and year binaries and demographic variables. Total number of observations equals 23,031. TE = total expenditures; WRE = work-related expenditures; NWE = non-work-related expenditures; TC = total consumption flows; NWC = non-work-related consumption flows.

simultaneously determined. For this reason and because of the nearly identical results across the conditional and unconditional quantile regressions, only the simultaneous conditional quantile regression results are presented in the main analysis.

With regards to the interpretation of the main results of this paper, some potential mechanisms which may be driving the monotonic reduction across the consumption distribution should also be investigated. A good place to begin seeking an explanation is with income, as Bernheim, Skinner, and Weinberg (2001) found that those

with a lower income replacement rate experience a larger decline in expenditures in retirement. The CE Survey used in the current study includes before-tax income of the household, and this information is used to analyze whether the patterns are consistent with the consumption response.[24] Although income in the CE data had previously been found to be under-reported in comparison with other surveys, this issue only seems to be pronounced at the top of the income distribution which is not unique to this data set (Sabelhaus et al., 2011).

The first two columns of Table 7 report the median before-tax income by retirement status across the total consumption distribution, and the third column displays the ratio of the two, which is meant to proxy for the income replacement rate in retirement. The 10th percentile exhibits the highest replacement ratio of before-tax income in retirement, while the 90th percentile has the lowest income replacement ratio. This finding is consistent with Bernheim, Skinner, and Weinberg (2001), as the income replacement ratio is shown in Table 6 to be the lowest at the top of the consumption distribution, and it was previously shown in Table 4 that the largest consumption drop occurs at the top of the consumption distribution. Although it is not shown in the table, the income differences in absolute terms reveal an even larger gap across the distribution, with the 10th percentile experiencing a $4,300 decrease in income and the income of the 90th percentile decreasing by over $24,600.

The last two columns of Table 7 present the median consumption to income ratio across the total consumption flow distribution. Among the non-retired, there are only small differences in the consumption rate at the tails of the distribution, ranging

[24]Ideally, after-tax income would be used for this purpose, but income taxes are not well reported in the CE Survey.

Table 7: Income and Total Consumption Flows Rate Differences Between Non-Retired and Retired over the Total Consumption Flow Distribution

	Median Before-Tax Income			Median Consumption / Income	
	Non-Retired	Retired	Ratio	Non-Retired	Retired
P10	18,864	14,528	0.770	0.720	0.922
P20	22,928	16,708	0.728	0.695	0.947
P30	28,360	19,309	0.680	0.670	0.936
P40	31,424	23,020	0.732	0.691	0.970
P50	37,189	25,523	0.686	0.631	0.953
P60	41,054	26,693	0.650	0.682	1.051
P70	44,592	31,917	0.715	0.693	1.001
P80	51,098	33,767	0.660	0.744	1.141
P90	65,851	41,186	0.625	0.752	1.229

Notes: Authors' calculations of CE Survey data from 1990 to 2007. Total number of observations equals 23,031. Income is before-tax. Median before-tax income is calculated as the mean income of the ten percentage point band around the relevant percentile. For example, the 10th percentile is calculated as the mean income among the individuals from the 6th to the 15th percentiles. Equivalent income is used in this table as well as equivalent total consumption flows.

between 63 percent and 75 percent. The story changes among the retired, as the 10th percentile is consuming about 92 percent of before-tax income in retirement, while the 90th percentile is consuming almost 123 percent of income. The highest consumption flow percentiles experience the largest decrease in income and the largest increase in the consumption rate upon retirement, and therefore, their spending now exceeds their income in retirement. Those at the top of the consumption flow distribution appear to be spending more before retirement than they can afford to spend in retirement, as evidenced by the last column in Table 7. Again, these findings are

based on before-tax income, thereby understating the consumption rate based on after-tax income, presuming that higher income individuals have a higher marginal tax rate and pay more in taxes overall.[25]

Lastly, the magnitudes of the reductions in consumption between the non-retired and the retired have been analyzed in this paper in log changes across the consumption distribution, rather than in absolute terms. For the purposes of the interpretation of the log change results, the level results are now presented in Table 8, in order to see how large the level changes in consumption are between the bottom, middle, and top of the distribution. To do this, the simultaneous conditional quantile regression coefficients from Table 4 are used along with the mean consumption level for three different percentiles of the distribution: the 10th, 50th, and 90th.

At the median, total expenditures were 6.6 percent lower among the retired, which translates to a drop of $2,351. At the 90th percentile, however, the percentage drop was greater at 9.2 percent, which is more than three times as high in level terms with a drop of $7,159. The results for total consumption flows follow a similar pattern, with substantial differences in the level drops in consumption between the 10th and 90th percentiles. Work-related expenditures, with the level drop at the median being a third of what it is at the 90th percentile, are also quite different in levels, even though its percentage change is uniform across the distribution. There are even greater differences for non-work-related expenditures and non-work-related consumption flows. The absolute reduction at the 90th percentile is 4 to 6 times

[25]The median consumption to income ratio was also calculated by income decile. These results are consistent with the expectations of the life-cycle theory, as higher income households are found to save more than lower income households, and are available upon request.

higher in dollars than at the median, though there were also larger differences in percentage terms for these measures.

Table 8: Changes in the Level of Consumption

		Value in Dollars		
		P10	P50	P90
TE	Pre-Retirement Value	$16,169	$35,622	$77,818
	Retirement Coefficient	-0.030	-0.066	-0.092
	Estimated Change	-$485	-$2,351	-$7,159
WRE	Pre-Retirement Value	$2,956	$7,933	$18,748
	Retirement Coefficient	-0.077	-0.075	-0.087
	Estimated Change	-$227	-$594	-$1,631
NWE	Pre-Retirement Value	$5,178	$10,518	$21,361
	Retirement Coefficient	-0.016	-0.022	-0.069
	Estimated Change	-$82	-$231	-$1,473
TC	Pre-Retirement Value	$16,283	$34,228	$73,280
	Retirement Coefficient	-0.019	-0.051	-0.070
	Estimated Change	-$309	-$1,745	-$5,129
NWC	Pre-Retirement Value	$8,547	$15,387	$28,514
	Retirement Coefficient	0.008	-0.026	-0.068
	Estimated Change	+$68	-$400	-$1,938

Notes: Authors' calculations of CE Survey data from 1990 to 2007. The results use the coefficients from Table 4. Total number of observations equals 23,031. TE = total expenditures; WRE = work-related expenditures; NWE = non-work-related expenditures; TC = total consumption flows; NWC = non-work-related consumption flows. The dollar values are the mean of the consumption measure using the individuals five percentiles above and five percentiles below the stated percentile. For example, the 10th percentile values represent mean expenditures for all working individuals between the 6th and 15th percentiles.

4 Discussion

The previous literature had focused on changes in consumption upon retirement at the mean or median and did not exclusively investigate whether the retirement consumption puzzle differed across the consumption distribution. This study fills this gap in the literature by applying quantile regression techniques to multiple pseudo-cohorts containing large numbers of individuals using cross-sectional data from the 1990-2007 Consumer Expenditure Survey. The evidence reveals that there is a progressive distributional component to the retirement consumption puzzle. The decreases in consumption are small and statistically insignificant in the bottom portion of the consumption distribution between the non-retired and the retired, while the decreases in the top portion are statistically significant and range from 5 to 9 percent. Work-related expenditures, which are expected to decrease at retirement unlike the other consumption measures, are shown to drop uniformly across the distribution. These main results are robust to using the simultaneous conditional quantile regression or the unconditional quantile regression technique.

The results of the current paper also confirm the finding in the literature that the retirement consumption puzzle begins to disappear as the consumption measure is broadened, even within the distributional setting. Additionally, it confirms the finding of Bernheim, Skinner, and Weinberg (2001) that those with lower income replacement ratios exhibit higher percentage drops in consumption. In comparing the current pseudo-cohort evidence to that of the panel evidence in Aguila, Attanasio, and Meghir (2011), however, there is only agreement that there are differences in the changes between the non-retired and the retired across the consumption distribution.

How these drops differ in magnitude, significance, and overall pattern have yet to be rectified between the two studies. While the differences in sample sizes and in empirical approach are of obvious importance, there could also be less obvious concerns, such as differences in the consumption measures, the time periods of analysis, or the frequency of the data.

The implications of the current results can be considered within the context of the life-cycle model. At the bottom of the distribution, the evidence suggests that the puzzle does not exist, which would be consistent with a standard life-cycle model. At the middle and high consumption percentiles, however, there is a significant discontinuous drop in consumption. This suggests that the mechanism behind this distributional finding is that larger income shocks induce larger consumption responses. This is consistent with the modified life-cycle model of Blau (2008), which incorporates uncertainty in the timing of retirement and predicts discontinuous drops in consumption for households that retire unexpectedly. This prediction is driven by large negative income shocks that can occur due to unexpected retirement, which are presumably larger among high income, high consumption individuals. On the other hand, inadequate savings are unlikely to be unique to those in the top of the income distribution.

It is also important to make a distinction between the changes in consumption for low and high consumption individuals from a welfare perspective, as these results also have implications regrading the suitability of consumption to measure the well-being of older adults. A relatively large decline in consumption upon retirement among low consumption individuals may imply that their savings and social safety net resources

are inadequate. On the other hand, a relatively large decline in consumption upon retirement among high consumption individuals may imply that retirement has an equalizing effect across the consumption distribution. The insignificant reduction in consumption found between the non-retired and the retired for the lower end of the distribution shows that the combination of the retirement social safety net and personal savings appears to serve as protection from a negative retirement shock for those who already have a relatively low level of consumption. While these findings for the lower end of the distribution have no bearing on whether retirement consumption is adequate in a normative sense, they do suggest that retirement does not appear to negatively affect the well-being of those individuals in the bottom of the consumption distribution.

References

Aguiar, M. and E. Hurst, "Consumption vs. Expenditure," *Journal of Political Economy*, 113(5), 919-948, 2005.

Aguiar, M. and E. Hurst, "Deconstructing Lifecycle Expenditure," Working Paper, 53 pages, 2009.

Aguila, E., Attanasio, O., and C. Meghir, "Changes in Consumption at Retirement: Evidence from Panel Data," *Review of Economics and Statistics*, 93(3), 1094-1099, 2011.

Attanasio, O. P. and G. Weber, "Consumption and Saving: Models of Intertemporal Allocation and Their Implications for Public Policy," *Journal of Economic Literature*, 48(3), 693-751, 2010.

Banks, J., Blundell, R., and S. Tanner, "Is There a Retirement-Savings Puzzle?," *American Economic Review*, 88(4), 769-788, 1998.

Battistin, E., Brugiavini, A., Rettore, E., and G. Weber, "The Retirement Consumption Puzzle: Evidence from a Regression Discontinuity Approach," *American Economic Review*, 99(5), 2209-2226, 2009.

Bernheim, B. D., Skinner, J., and S. Weinberg, "What Accounts for the Variation in Retirement Wealth Among U.S. Households?," *American Economic Review*, 91(4), 832-857, 2001.

Blau, D. M., "Retirement and Consumption in a Life Cycle Model" *Journal of Labor Economics*, 26(1), 35-71, 2008.

Buchinsky, M., "Recent Advances in Quantile Regression Models: A Practical Guideline for Empirical Research," *Journal of Human Resources*, 33(1), 88-126, 1998.

Firpo, S., Fortin, N. M., and T. Lemieux, "Unconditional Quantile Regressions," *Econometrica*, 77(3), 953-973, 2009.

Fisher, J. D., Johnson, D. S., Marchand, J., Smeeding, T. M., and B. B. Torrey, "No Place Like Home: Older Adults and their Housing," *Journal of Gerontology: Social Sciences*, 62B(2), S120-S128, 2007.

Fisher, J. D., Johnson, D. S., Marchand, J., Smeeding, T. M., and B. B. Torrey, "The Retirement Consumption Conundrum: Evidence from a Consumption Survey," *Economics Letters*, 99(3), 482-485, 2008.

Frolich, M., and B. Melly, "Estimation of Quantile Treatment Effects with Stata," *Stata Journal*, 10(3), 423-457, 2010.

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

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

Hurst, E., "The Retirement of a Consumption Puzzle," NBER Working Paper 13789, 32 pages, 2008.

Koenker, R. and G. Bassett, Jr., "Regression Quantiles," *Econometrica*, 46(1), 33-50, 1978.

Koenker, R. and K. F. Hallock, "Quantile Regression," *Journal of Economic Perspectives*, 15(4), 143-156, 2001.

Laitner, J. and D. Silverman, "Estimating Life-Cycle Parameters From Consumption Behavior at Retirement," NBER Working Paper 11163, 50 pages, 2005.

Modigliani, F. and R. Brumberg, "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data," in K. Kurihara, ed., *Post-Keynesian Economics*, Rutgers University Press, New Brunswick, 1954.

Sabelhaus, J., Johnson, D., Ash, S., Swanson, D., Garner, T., Greenless, J., and S. Henderson, "Is the Consumer Expenditure Survey Representative by Income?," working paper, 2011.

Schwerdt, G., "Why Does Consumption Fall at Retirement? Evidence from Germany," *Economics Letters*, 89(3), 300-305, 2005.

Smith, S., "The Retirement-Consumption Puzzle and Involuntary Early Retirement: Evidence from the British Household Panel Survey," *The Economic Journal*, 166(510), C130-C148, 2006.

Wakabayashi, M., "The Retirement Consumption Puzzle in Japan," *Journal of Population Economics*, 21(4), 983-1005, 2008.

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