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The Retirement-Consumption Puzzle: A Marital Bargaining Approach

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Abstract

Evidence from several countries reveals a substantial drop in household consumption around the age of retirement that is difficult to explain with life-cycle models. Using food consumption data from more than 550 households from the Panel Study of Income Dynamics for the years 1979 – 1986 & 1989 – 1992, we find that married couple households decrease their expenditures on both food consumed at home and away from home by about 9 percent following the retirement of the male household head. No significant decrease in consumption is found for single households, either in a sample of males or a pooled sample of single males and females. These results are consistent with a model of marital bargaining in which wives prefer to save more than their husbands do to support an expected longer retirement period, and relative control over household decisions is affected by control over market income. The pattern of the consumption decline, which is increasing in the age gap between husband and wife, lends further support to this interpretation. (JEL: D1, D91, E21)

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I. Introduction

Households appear to reduce their consumption expenditures substantially around the age of retirement. This pattern has been documented for the U.S. by Hamermesh [1984], Mariger [1987], and Bernheim, Skinner, and Weinberg [1997], for Canada by Robb and Burbridge [1989], and for the U.K. by Banks, Blundell, and Tanner [1998]. The consumption decline appears to be fairly widespread across consumption categories, rather than concentrated on work-related expenses, and to take the form of a discrete drop at the year of retirement.

This behavior is puzzling, since life-cycle consumption models predict that households will want to smooth consumption (or rather, the marginal utility of consumption) when they experience a predictable drop in income, as at retirement. After examining alternative explanations that are consistent with forward-looking life-cycle behavior, other researchers have attributed this consumption drop to myopic behavior or to the systematic arrival of discouraging information at retirement. Understanding the cause of the consumption drop at retirement is important both to researchers who are trying to understand how individuals make complex decisions when the future is uncertain and to policy makers who are concerned about the adequacy of retirement savings by the baby boom generation.

In this paper, we explore an empirical hypothesis suggested by a non-unitary model of household behavior. If married couple households make decisions collectively (for example, by cooperative bargaining), and their ability to make binding agreements into the future is limited, then current consumption and savings decisions may be affected by each spouse's current control over resources. Most wives expect to live several years longer than their husbands, and therefore prefer, absent perfect altruism, to consume less as the couple ages than husbands do. If the husband's bargaining power depends upon his current income or employment status, retirement from a career job will cause a relative deterioration in his influence on household decisions and a decline in the couple's consumption spending.

This story generates a testable hypothesis: we should see a consumption drop at retirement for married couple households, but not for single households who, though they also experience a drop in income, can be expected to act in a way that is consistent with life-cycle utility maximization by the unitary consumer. We also expect the consumption drop to be more pronounced for couples with more divergent interests—i.e. for couples in which the husband is substantially older than his wife. We use food consumption data from the Panel Study of Income Dynamics for the years 1979 – 1986 & 1989 – 1992 to test these hypotheses and find that expenditures drop at retirement by 8 to 10 percent for married couples, but do not decrease significantly for single households. The magnitude of the consumption drop is increasing in the relative age of the husband. These results are robust with respect to alternative specifications of the consumption equation and definitions of retirement, and lend some support to a collective rather than unitary approach to the decisions of older couples.

II. Literature Review

Household income falls substantially with retirement, and consumption expenditures fall as well. Yet standard economic models suggest that consumption should be smoothed over periods of predictably high and low income, and the permanent loss of income due to retirement is, for most, quite predictable as to both timing and magnitude. More formally, it is the marginal utility of consumption that should be held constant over the life-cycle, and changes coincident with retirement in family size, health, and work-related expenses, or interactions between leisure and goods consumption, could in principle allow the observed drop in consumption to be reconciled with the standard life-cycle model. Two recent studies have examined the retirement-consumption puzzle in the United States and the United Kingdom and assessed these alternative explanations, but conclude that a substantial proportion of the drop in consumption remains unexplained.

Banks, Blundell, and Tanner (BBT) [1998] use synthetic cohort data from the U.K. Family Expenditure Survey for households whose heads were born between 1911 and 1926. They estimate a consumption growth equation and find an unexplained dip in consumption growth that begins about age 60. Allowing for changes in mortality risk across cohorts results in little change in the predicted consumption path, and the declines in non-durable consumption are not restricted to goods likely to be work-related (transport and clothing), but also appear among "basic necessities," including food consumed at home. To examine whether the marginal utility of consumption changes with labor market status, BBT compare periods of unemployment to retirement. They find, surprisingly, that the unemployed smooth consumption to a greater extent than the retired when income falls, though unanticipated declines in wealth should be much less prevalent among the retired. Therefore, increased leisure does not appear to account for the retirement consumption decline. BBT conclude that "… the only way to reconcile fully the fall in consumption with the life-cycle hypothesis is with the systematic arrival of unexpected adverse information."

Bernheim, Skinner, and Weinberg (BSW) [2000] attempt to explain the large variations in savings and accumulated wealth among households with similar lifetime resources. Using the Panel Study of Income Dynamics and the Consumer Expenditure Survey, they compare the actual relationship between accumulated wealth and the consumption profile to those derived from simple models of life-cycle decision-making. BSW find negligible declines for the wealthiest households, but discontinuities of more than 30 percent for households in the lowest wealth quartile. They find that the observed relationships between accumulated wealth, consumption changes before and after retirement, and the consumption drop at retirement are not consistent with the predicted behavior of rational, farsighted agents. With respect to the consumption decline at retirement they find, as do BBT, that work-related expenses do not account for the drop, and that unanticipated shocks leading to early retirement do not appear to be the cause. Their conclusion is similar to that of BBT:

> These findings are difficult to interpret in the context of the life cycle model. While it may be possible to formulate some model of rational life cycle planning that would account for our findings, in our view the empirical patterns in this paper are ore easily explained if one steps outside the framework of rational, farsighted optimization. (p. 30)

The conventional approach to household decision-making about retirement and savings is to assume that the household consists of a single individual (with a well-defined "age" and "health status"). In this context, there are only three ways to explain the sharp drop in consumption in response to the anticipated event of retirement: a fall in the marginal utility of consumption due to increased leisure, the systematic arrival of unpleasant surprises, or some type of irrationality or myopia. A number of models that can explain dynamic inconsistencies in behavior have been introduced, including the hyperbolic discounting model of Laibson [1997] and Akerlof's model of procrastination [1991]. More specifically, Diamond and Koszegi [2000] suggest that the observed downward jump in consumption at retirement may be accounted for by quasi-hyperbolic discounting with naive agents, where earlier "selves" restrict savings to discourage early retirement, but later "selves" decide to retire anyway.

The sharp drop in consumption at retirement appears to be inconsistent with the simple life-cycle model of the individual consumer, and with modifications of that model that take into account nonseparabilities between goods and leisure in consumption and other complications.[1] Rejecting this model in favor of single agent behavioral models that can generate dynamic inconsistencies in behavior is one possible response; an alternative would be to recognize that most households approaching retirement contain at least two members, and that decision-making with multiple agents need not conform to the simplest version of the life-cycle model.

III. Theory

In a collective model of household behavior, husbands and wives make joint decisions while attempting to maximize individual utility functions. Chiappori [1988,1992] analyzes a general framework in which household allocations are assumed to be efficient, and this implies the existence of a "sharing rule" that divides total household resources among individual members. The sharing rule itself is not determined within the model, but it is described as a function of individual incomes. The determinants of relative bargaining power are discussed more explicitly in cooperative bargaining models, which are special cases of the general

[1] Browning and Crossley [2000] argue that the average welfare loss associated with the unexplained consumption dip at retirement is small, but that more research on the distribution of these dips, and their correlation with wealth levels, is needed.

collective model. In "divorce threat" models[2], the sharing of household resources depends upon a threat point that corresponds to the husband's and wife's best options outside the marriage. The bargaining power of each spouse will be a function of the public and private resources available to divorced men and women, and on conditions in the remarriage market. In the "separate spheres" model[3], the threat point is internal to the marriage, and is determined by an inefficient noncooperative marital equilibrium. In this case, measures of control over resources within the marriage will be the determinants of relative bargaining power.

Dynamic models of marital bargaining are rare, and the determinants of bargaining power, or of changes in bargaining power, tend to be discussed rather informally. We do not present here a formal model that analyzes changes in a couple's "sharing rule" over the course of their marriage, but examine the implications for observed behavior if bargaining power changes with retirement. Retirement of the husband from a career job may affect his relative power within the marriage not only because it cuts current income (and potential future income), but also through changes in control over non-monetary resources (e.g. an office), social networks, or status.[4] A divorce threat model would emphasize the impact of retirement on the discounted stream of future income (the external option) and suggest a gradual decline in bargaining power as retirement approaches. In internal threat point models such as separate spheres, however, the current resources of husband and wife will affect bargaining in each period and a discrete change in bargaining power should occur with retirement.

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[2] See McElroy and Horney [1981] and Manser and Brown [1980].
[3] Lundberg and Pollak [1993].
[4] If retirement changes relative bargaining power, anticipation of this effect should affect the choice of retirement date. For this analysis, however, we assume the timing of retirement to be exogenous.

In the standard intertemporal consumption model, a single individual maximizes the discounted present value of period-by-period utility. Here we extend the standard life-cycle model to include bargaining between husband and wife, following the discussion in Lundberg [1999].[5] We assume that the relative bargaining power of husband and wife shifts with retirement and simplify to focus on two issues. Wives have longer life expectancies than husbands, and therefore prefer lower per period consumption in order to spread resources over their longer life. In the absence of a commitment mechanism within the family, this conflict of interest within the household can result in a discrete drop in consumption at the husband's retirement.[6]

A two-person household consisting of a husband and wife consumes a single public good, C, where flow utility is $U(\cdot)$ for each spouse. We assume that there is no altruism, discounting, interest, nor uncertainty, and that there are three periods of fixed length T_1, T_2, T_3. In the first period the husband works and the family receives annual income Y. In the second period the couple consumes by drawing down assets. In the last period only the wife is alive. The husband's lifetime utility is $T_1U(C_1)+T_2U(C_2)$; the wife's lifetime utility is $T_1U(C_1)+T_2U(C_2)+T_3U(C_3)$. We begin with the assumption that commitment is possible, and that all bargaining takes place at the beginning of the dynamic program. The efficient outcome of family bargaining can be characterized by the maximization of a weighted average of

5 Other collective models of consumption and saving include Browning [2000], who shows that the time path of household consumption should depend on the distribution of income within the household, and Mazzocco [2000], who finds that the conventional Euler equation restriction on consumption is rejected for households with two decision-makers, but not for households with a single decision-maker.

6 The importance of a commitment mechanism in generating efficient intertemporal decisions by households is discussed in Lundberg and Pollak [2001].

husband's and wife's utility. The weight $0 < \mu < 1$ on the wife's utility reflects the relative bargaining power of husband and wife.

The optimization problem is

$$\begin{aligned}
&\max (1-\mu)\left[T_1 U(C_1) + T_2 U(C_2)\right] + \mu\left[T_1 U(C_1) + T_2 U(C_2) + T_3 U(C_3)\right] \\
&s.t.\ \ T_1 C_1 + T_2 C_2 + T_3 C_3 = T_1 Y
\end{aligned}$$

and the solution is characterized by $U'(C_1) = U'(C_2) = \mu U'(C_3)$. Consumption remains unchanged on retirement, and this result is independent of the relative bargaining power of husband and wife and relative life expectancies. Because the couple places less weight on consumption in widowhood, consumption drops in the final period.

We turn now to the problem without commitment. The problem is solved by period-by-period backward induction, which means that the weights placed on husband's and on wife's utility may change each period. In the last period, the widow consumes all remaining assets; her utility will be $T_3 U(C_3)$.[7] In the second to last (retirement) period, the husband and wife maximize a weighted average of husband and wife's utility with wife's weight $0 < \mu_2 < 1$. Denoting assets at the beginning of the second period as A_2, the optimization problem is

$$\begin{aligned}
&\max (1-\mu_2)\left[T_2 U(C_2)\right] + \mu_2\left[T_2 U(C_2) + T_3 U(C_3)\right] \\
&s.t.\ \ T_3 C_3 = A_2 - T_2 C_2
\end{aligned}$$

This implies that $U'(C_2) = \mu_2 U'(C_3)$ so, just as in the commitment case, consumption falls in widowhood.

[7] Note that a bequest motive shared by husband and wife will reduce the conflict of interest over resources remaining in the final period.

Now turn to the first period where the family bargaining problem is

$$\begin{aligned}&\max\left(1-\mu_1\right)\left[T_1U\left(C_1\right)+T_2U\left(C_2\right)\right]+\mu_1\left[T_1U\left(C_1\right)+T_2U\left(C_2\right)+T_3U\left(C_3\right)\right]\\&s.t.\;\; U'\left(C_2\right)=\mu_2U'\left(C_3\right)\\&\quad\;\; T_3C_3=A_2-T_2C_2\\&\quad\;\; A_2=\left(Y-C_1\right)T_1\end{aligned}$$

It is straightforward to show that $C_2 < C_1$ iff $\mu_2 > \mu_1$.[8] Therefore, if relative bargaining power shifts in favor of the wife when the husband retires, consumption will fall at retirement. Altruism or a bequest motive will tend to mitigate the extent of the disagreement between husband and wife, while an increase in the age gap will exacerbate it.[9]

How large will the drop in consumption be? To construct an example, it is useful to make the common assumption that the flow utility function takes the iso-elastic form:

$$U\left(C_t\right)\equiv\frac{C_t^{1-\theta}-1}{1-\theta}$$

where $\theta=1$ is the special case of log utility .

This gives us $U'\left(C_t\right)=C_t^{-\theta}$ and a little algebra shows

$$C_3=\mu_2^{\frac{1}{\theta}}C_2 \qquad (1)$$

$$C_2=\left[\frac{T_2+\mu_1\mu_2^{\frac{1}{\theta}-1}T_3}{T_2+\mu_2^{\frac{1}{\theta}}T_3}\right]^{\frac{1}{\theta}}C_1 \qquad (2)$$

8 The proof is presented in an appendix available from the authors.

9 There are some isolated pieces of evidence of a lack of consensus between husband and wife concerning saving for retirement. Euwals et al. [2000] find that, among Dutch couples, wives report saving for old age to be a more important priority than do their husbands. More dramatically, Aura [2000] documents the substantial effect of the Retirement Equity Act, which gave spouses of pension plan participants the right to survivor benefits unless they explicitly waived this right, on the likelihood that survivor benefits are rejected and on life insurance coverage.

$$C_1 = \frac{T_1}{T_1 + \left[T_2 + \mu_2^{\frac{1}{\theta}} T_3\right]\left[\frac{T_2 + \mu_1 \mu_2^{\frac{1}{\theta}-1} T_3}{T_2 + \mu_2^{\frac{1}{\theta}} T_3}\right]^{\frac{1}{\theta}}} Y \tag{3}$$

Note that the extent of the change in consumption depends on the wife's relative preference for spreading out consumption--as $T_3 \rightarrow 0$ the consumption decline disappears. The length of the final period will depend upon the difference in life expectancy between the husband and wife, and on their relative ages.

A utility function with a constant intertemporal elasticity of substitution is an approximation, but this example lets us place an order of magnitude on the predicted drop in consumption. Note that a man retiring at age 62 has a life expectancy of about 18 years ($T_2 = 18$). In our sample the average gender age gap is approximately 3 years, and a woman's life expectancy at age 59 is 24 years ($T_3 = 6$). If the wife's utility has a weight of $\mu_1 = .40$ before her husband's retirement and $\mu_2 = .60$ afterwards, then for log utility we predict a 5.7 percent drop in consumption at the husband's retirement; for $\theta = 2.5$ we predict a 3 percent drop. A change in bargaining power from $\mu_1 = .25$ to $\mu_2 = .75$ implies a 14 percent drop for log utility and 6.4 percent drop for $\theta = 2.5$.

This theoretical model combined with the additional assumption that the husband's retirement reduces his relative bargaining power provides an explanation for why married couples experience a discrete drop in consumption after the husband retires. Since the results in this model are driven by the lack of a commitment mechanism within the family, and not by any sort of myopic or time-inconsistent behavior, households with a single member should not experience a drop in consumption after retirement. Thus, the bargaining model can be tested by comparing the behavior of married couples at retirement to that of singles.

IV. Empirical Model

Suppose now that couples differ only in their income. We can write the right hand side of equation (3) for the i^{th} couple as $\alpha_i = \ln \dfrac{T_1}{T_1 + \left[T_2 + \mu_2^{\frac{1}{\theta}} T_3\right]\left[\dfrac{T_2 + \mu_1 \mu_2^{\frac{1}{\theta}-1} T_3}{T_2 + \mu_2^{\frac{1}{\theta}} T_3}\right]^{\frac{1}{\theta}}} Y_i$. If we define

$\gamma = \ln\left(\left[\dfrac{T_2 + \mu_1 \mu_2^{\frac{1}{\theta}-1} T_3}{T_2 + \mu_2^{\frac{1}{\theta}} T_3}\right]^{\frac{1}{\theta}}\right)$ then we have the following fixed effects equation for married couples:

$$\ln C_{it} = \alpha_i + \gamma * AFTER_{it} \tag{4}$$

where t indexes time, $\ln C_{it}$ equals either i) the log of total food expenditure; ii) the log of expenditure on food at home; or iii) the log of expenditure on food away from home, $AFTER_{it}$ = 1 in all years after a couple retires and = 0 otherwise, and γ equals the approximate percentage change in consumption after retirement. This change is negative if $\mu_2 > \mu_1$ and is decreasing in T_3.

Equation (4) can be generalized to allow for single individuals as well as married couples; to allow the age, health status, and composition of each household to affect the marginal utility of consumption; and to allow households to make optimization errors. In the next section we report the results of estimating an equation of the following form:

$$\ln C_{it} = \alpha_i + \delta * RETIRE_{it} + \gamma * AFTER_{it} + X_{it}\beta + u_{it}, \tag{5}$$

where i indexes the individual (or couple), $RETIRE_{it}$ = 1 in the year an individual (or couple) retires and = 0 otherwise, X_{it} includes other control variables, and u_{it} is normally distributed with mean zero and variance σ_u^2.[10] In all specifications X_{it} includes a series of age dummy variables to allow for a non-linear estimated age-consumption profile in each sample, and a series of household size dummy variables to allow for non-linear scale effects in household consumption per capita in each sample. Health status is also included as a control variable in some specifications.

V. Data

We examine the relationship between consumption behavior and retirement using food expenditure data reported by the representative SRC sample of the Panel Study of Income Dynamics (PSID). Our sub-samples include unmarried individuals who are between the age of 45 and 70 on July 1st, 1979, and matched husband/wife pairs in which at least one member is in this age range. The sample period for the analysis is 1979-1986 and 1989-1992, and is determined by the availability of consumption data for the household and retirement status for both husbands and wives.

The main dependent variable of our analysis is annual household food expenditure in 1985 dollars. Expenditure on food is used as a proxy for total consumption, since panel data on total consumption is not available.[11] This variable is the sum of two components: (1) Annual food expenditure for food used at home (excluding food purchased with food stamps); and (2)

[10] We allow for a separate effect in the year of retirement because this may be a year of partial work and partial retirement.

[11] See the discussion in Attanasio and Weber [1995] of the disadvantages of using food expenditures as a consumption proxy.

Annual food expenditure for meals away from home (excluding the amount spent on meals at work or at school). These two components are also analyzed separately. Observations in which either total food consumption or food consumption at home is reported to be zero and top-coded observations are excluded from the analysis.[12] Annual expenditure is calculated from a question of the form "How much do you spend on food in an average week?" and the timing of the consumption data relative to the dating of retirement presents some problems. The consumption question is likely to elicit information about current expenditures (around the time of the interview in March or April), while all other variables refer to the preceding year. This dating convention insures that consumption is measured after retirement.

Specifying the date at which retirement occurs also involves some measurement issues. Our main retirement definition is based on a retrospective question asked of all household heads and spouses: "In what year did you retire?" This question is asked each year a head or spouse is surveyed and the respondent is able to alter his or her answer from year to year. In our preferred specification, an individual's year of retirement is calculated as the latest reported year of retirement during our sample period. We considered alternative definitions of retirement based on reports of current work status and on actual hours worked, but our results are not materially affected by our choice of a retirement date.[13]

We compare the consumption response of married couples to the retirement of the husband to the behavior of a sample of single men. Since the latter is a rather small sample, we

[12] A few individuals report zero consumption in both food consumption categories. A larger number of individuals report zero food consumption away from home. To avoid biasing the sample by dropping these observations all zero values in this category are recoded to equal the log of consumption at the 1st percentile in the appropriate group defined by household size. The results are qualitatively similar when these observations are dropped instead.

[13] Our basic results are reported for five different retirement definitions in an appendix available from the authors.

also estimate all models on a pooled sub-sample of single men and women. Only individuals or married couples that retire during the sample period (including the years 1987, 1988, & 1993) are included in the analysis.[14] In the case of married couples, all variables refer to the male household head, unless otherwise specified. Marriages, divorces, and deaths cause changes in the marital status of individuals during our sample period; households are allocated to a particular sub-sample on the basis of their retirement year marital status. In some specifications, we drop observations in which marital status differs from that at retirement.

Table 1 presents summary statistics for each sub-sample. In total, 553 households are included in the analysis of which 391 are married couples, 36 are single males, and 126 are single females. On average, 11 years of data are available for each household, providing a total of 6143 annual observations. The average age in each sub-sample is about one year less than the average retirement age, which is 62 for husbands, 61 for single men, and 64 for single women. Annual food expenditures are 34% higher for married couples than for single men and 37% higher for single men than for single women. Conforming to stereotype, single men spend more than twice as much on food away from home than single women and even more than married couples.

VI. Results

We first estimate equation (5) for the log of total food expenditures. Table 2 reports γ, the coefficient on $AFTER_{it,}$ for three alternative specifications. The control variables in all specifications include age dummy variables for the household head and household size dummy

[14] All multivariate analysis is done using fixed effects regressions and thus excluding all individuals / couples who do not retire reduces the efficiency of the regressions but does not affect the consistency of the results.

variables.[15] Specification (2) also includes dummy variables for the household head's self-reported health status on a five-grade scale. The health status variable is available for household heads and spouses beginning in 1984 and thus the number of observations in each sub-sample, but not the number of households, is greatly reduced when it is included. Specification (3) adds, for married couples, dummy variables for the wife's age and self-reported health status and includes only the sample years in which the couple is married.

The results in Table 2 are strikingly consistent. Married couple households reduce food expenditures after the husband's retirement by about 9 percent. This drop is statistically significant at the 1 percent level. Single households, however, show no significant decline in consumption and the pooled sample may increase food consumption following retirement. The null hypothesis that the post-retirement changes in consumption for married couples and single households are equal is decisively rejected for the basic specification. When health status is added, equality between married couples and pooled singles can still be rejected, but the difference between the consumption drop for married couples and the small sample of single men is no longer significant.

In Table 3 the models in Table 2 are re-estimated using two-year first-differences[16] rather than a fixed-effect specification. A two-year period is chosen because our inability to perfectly line up the retirement date and the consumption measure causes the consumption response to be spread out over two interview periods, and the estimate of γ in this case is the percentage change

[15] The husband's age is used for married couples in most specifications. The age dummies range from age 46 to 80+ with individuals <46 serving as the default group. The household size dummies range from 1 member to 7+ members.
[16] See Hausman and Paquette [1987].

in food expenditure from the year before retirement to the year after retirement. The first-differenced estimates are consistent with the fixed-effects estimates, though fewer observations are available and the standard errors are higher. The basic model yields, once again, an estimated 9 percent drop in food consumption for married couples, and no significant decreases for the single samples.

Tables 4 and 5 report the results of specification (1) estimated separately for the two components of food expenditure, food consumed at home and food away from home. Changes in the price of time following retirement could lead to a change in the household's food consumption pattern. For example, more time for at-home meal preparation could result in a substitution away from expenditures on food away from home. Alternatively, married couples may substitute restaurant meals for meals at home as they increase joint leisure consumption. We find no support for substitution effects, in fact, the estimated declines in food at home and away from home are remarkably similar for married couples, though the coefficients are more precisely estimated for the food at home category. There are no significant declines in either consumption category for the two single samples; the point estimates are small and often positive, and the coefficients are not precisely estimated. The differences between the $\gamma's$ in the basic specification for married couples and pooled singles are significant for both expenditure categories; the difference between married couples and single men is significant only for food at home.

The theoretical model in section III implies that the consumption decline at retirement will be greater when the wife's expected period of widowhood is longer. Taking as given the difference in life expectancy between men and women, the length of this period will be positively related to the age difference between husband and wife. Table 6 presents the results from estimating equation (5) allowing for different age profiles and retirement effects for sub-samples defined by the husband-wife age difference. The coefficient in the first column is the estimated change in consumption (7 percent) for married couples in which husbands are less than 5 years older than their spouse. The second column reports the consumption decline for households in which the husband is more than 5 years older than the wife. The 20 percent decline for this group is significantly different from the consumption decline for couples that are closer in age.

In general, the estimated food consumption equations are consistent with our hypothesis that the retirement consumption drop is associated with changes in the relative bargaining power of husbands and wives. There is no evidence of a consumption decline for single households, either for single men or for a pooled sample of men and women. The consumption decline for married couples is robust to changes in specification and is common to both food consumed at home and food away from home. For married couples, the consumption decline is larger when the husband is substantially older than the wife, and has a desired consumption path that differs more sharply from that of his wife.

VII. Alternative Specifications

If increases in leisure reduce the marginal utility of consumption, then retirement may cause a reduction in food consumption through a simple substitution mechanism. Other researchers have used non-retirement reductions in hours worked to investigate this mechanism and have argued that it cannot explain the entire consumption drop. In this paper, we are concerned with the differential responses of married couples and single households, and so must consider whether leisure-food substitution would accompany the retirement of husbands but not single men and women. Substitution of time for goods in meal production is a plausible response to the increase in leisure that accompanies retirement, but should be more pronounced when wives retire, rather than husbands, since retired women in our sample cohorts are much more likely to shoulder most of the domestic work of the households.

All previous results for married couples focus on the husband's retirement status. In this section we examine the effects on consumption of the retirement status of both husband and wife. Equation (5) is estimated replacing $RETIRE_{it}$ and $AFTER_{it}$ with the following dummy variables: $RETIREH_{it}$ = 1 if the husband retires this year; $RETIREW_{it}$ = 1 if the wife retires; $RETIREB_{it}$ = 1 in a year that both spouses retire; $AFTERH_{it}$ = 1 in all years after the husband is retired, but the wife is not retired; $AFTERW_{it}$ = 1 in all year after only the wife is retired; and $AFTERB_{it}$ = 1 in all years after both spouses are retired. The sample for this analysis is restricted to married couples in which both husband and wife are at risk of retirement: i.e. the wife retires during the sample period or has at least 13 years of work experience.

Table 7 presents the coefficients on each of the *AFTER* variables in the sequential retirement model. Each coefficient measures the change in household consumption relative to the default category of no one in the household is retired. The wife's retirement does not significantly affect any component of food consumption. After only the husband is retired, there are significant decreases in both total food consumption and food consumed at home. The years in which both spouses are retired are characterized by smaller and insignificant consumption shortfalls. The p-values in brackets indicate that the effects of wife's retirement and the retirement of both spouses are significantly different from the effect of husband's retirement. This pattern is consistent with a bargaining story in which individual bargaining power is affected by retirement, and husbands wish to consume more than wives.

Table 8 shows how the post-retirement consumption change varies with selected individual and household characteristics. Specifications (1) and (2) split each sub-sample by the household head's retirement age; and (3), (4) and (5) by the value of annual food expenditures per capita, averaged over the entire sample period, as a rough proxy for income.[17] The post-retirement consumption decline for married couples is larger for households in which the male head retires before the age of 62. Early retirement may be associated with adverse information about health or employment prospects, and so this result lends some credence to the argument that the consumption decline is caused by the arrival of retirement-related bad news.[18] However, the consumption decline is large and significant for later retirees as well. Specifications (3) - (5) show that the post-retirement consumption decline for married couples is strongest in the low-income portion of the sample,[19] and that the consumption increase for singles is substantial and significant for the middle-income group.

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[17] We also split the sample by the husband's birth cohort, and by the marital status of some singles. The results are quite similar for the two birth cohorts: born before 1925 and born in or after 1925. One possible explanation for the absence of a consumption decline among the pooled singles subsample is that the single female group includes widows, whose consumption profile may have been shifted down by the earlier retirement of a now-deceased spouse. However, we find that the continuity of the consumption profile for singles holds for both the widowed and non-widowed groups.

[18] Hausman and Paquette find that most men who retire before age 60 do so involuntarily, and that involuntary retirement is associated with larger decreases in food consumption.

[19] This pattern is consistent with the results of Bernheim, Skinner, and Weinberg

VII. Conclusion

In this paper, we re-examine the consumption decline at retirement using food expenditure data from the Panel Study of Income Dynamics. We find that the discrete drop in consumption at the retirement of the household head noted by other researchers is restricted to married couple households, and to the retirement of the husband. Single households exhibit either no significant change in their food expenditures at retirement, or a significant increase. These results are robust to alternative specifications of the consumption equation. The contrast between the behavior of single and married households is not consistent with previous explanations of the consumption drop that are based on irrational behavior by individuals, or on the systematic arrival of adverse information at retirement. However, it is consistent with a model of marital bargaining in which wives prefer to save more than their husbands do to support an expected longer retirement period, and relative control over household decisions is affected by control over market income. The pattern of the consumption decline, which is increasing in the age gap between husband and wife, lends further support to this interpretation.

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Table 1: Means (Standard Deviations) Of Sub-Sample Characteristics[a]

	Married Couples	Single Men	Single Women	Pooled Singles
Household Head's Age	60.7 (7.1)	59.9 (6.4)	62.5 (7.7)	62.0 (7.5)
Household Head's Age At Retirement	62.0 (5.3)	61.2 (4.6)	64.0 (6.0)	63.4 (5.8)
Average Hours Worked In 5 Years After Retirement by the Household Head	289 (551)	292 (544)	168 (434)	197 (463)
Health Status: Excellent Very Good Good Fair Poor Missing	8% 16% 19% 10% 4% 44%	5% 17% 18% 12% 3% 45%	6% 16% 18% 11% 5% 44%	6% 17% 18% 11% 5% 44%
Total Food Expenditures	$4608 (2265)	$3453 (1870)	$2526 (1781)	$2733 (1842)
Expenditures on Food At Home	$3615 (1878)	$2293 (1431)	$2050 (1542)	$2104 (1521)
Expenditures on Food Away From Home	$1001 (1021)	$1161 (1066)	$477 (688)	$629 (838)
Household Size = 1 = 2 = 3 ≥ 4	2% 62% 21% 15%	53% 32% 11% 4%	66% 25% 5% 4%	63% 26% 7% 4%
Observations	4348	401	1394	1795
Households	391	36	126	162

[a] The husband is the household head for all married couples. Sub-samples are defined by the household head's marital status at retirement using the highest reported retrospective retirement year. All samples include only the observations used in the regression analysis (i.e. total food consumption is greater than zero).

Table 2: Fixed Effects Estimates Of The Post-Retirement Change In The Log Of Total Food Consumption For Married and Single Households[a]

(Standard errors are in parentheses)

Log Of Total Food Consumption	**Married Couples**	**Single Men**	**Pooled Singles**
(1) Controls: Head's Age & Household Size P(Married = Single)	-0.085 (0.021)**	0.100 (0.093) [0.011]	0.092 (0.046)* [0.000]
Observations Households	4348 391	401 36	1795 162
(2) Adds Head's Health Status P(Married = Single)	-0.073 (0.028)*	-0.028 (0.126) [0.675]	0.108 (0.067) [0.003]
Observations Households	2440 383	221 35	1003 159
(3) Adds Wife's Age & Health Status. Includes Only Years When Married	-0.081 (0.028)**		
Observations Households	2373 381		

* Significant at the 5% level; ** Significant at the 1% level.

[a] The husband is the household head for all married couples. Retirement is defined as all years after the head's highest reported year of retirement (retrospective). Sub-samples are defined by the household head's marital status at retirement. The bracketed number is the p-value for the null hypothesis that the post-retirement change in consumption is equal for married couples and the relevant group of singles. This test is estimated by pooling the two groups and interacting all variables with marital status.

Table 3: Two Year Differenced Estimates Of The Post-Retirement Change In The Log Of Total Food Consumption For Married and Single Households[a]

(Standard errors are in parentheses)

Log Of Total Food Consumption	Married Couples	Single Men	Pooled Singles
(1) Controls: Head's Age and Household Size P(Married = Single)	-0.091 (0.032)**	-0.018 (0.139) [0.526]	0.061 (0.067) [0.022]
Observations Households	1438 388	132 36	584 162
(2) Adds Head's Health Status P(Married = Single)	-0.058 (0.052)	-0.584 (0.422) [0.140]	0.068 (0.109) [0.249]
Observations Households	515 348	46 33	201 142
(3) Adds Wife's Age and Health Status. Includes Only Years When Married	-0.075 (0.053)		
Observations Households	498 340		

* Significant at the 5% level; ** Significant at the 1% level.

[a] See Table 2.

Table 4: Fixed Effects Estimates Of The Post-Retirement Change In The Log Of Food Consumed At Home For Married and Single Households[a]

(Standard errors are in parentheses)

Log Of Food Consumed At Home	Married Couples	Single Men	Pooled Singles
(1) Controls: Head's Age and Household Size P(Married = Single)	-0.077 (0.022)**	0.094 (0.095) [0.026]	0.048 (0.047) [0.006]
Observations Households	4331 391	398 36	1781 162
(2) Adds Head's Health Status P(Married = Single)	-0.075 (0.031)*	-0.065 (0.138) [0.931]	0.017 (0.067) [0.150]
Observations Households	2436 383	220 35	994 159
(3) Adds Wife's Age and Health Status. Includes Only Years When Married	-0.084 (0.030)**		
Observations Households	2369 381		

* Significant at the 5% level; ** Significant at the 1% level.

[a] See Table 2.

Table 5: Fixed Effects Estimates Of The Post-Retirement Change In The Log Of Food Consumed Away From Home For Married and Single Households[a]

(Standard errors are in parentheses)

Log Of Food Consumed Away From Home	Married Couples	Single Men	Pooled Singles
(1) Controls: Head's Age and Household Size P(Married = Single)	-0.102 (0.049)*	0.145 (0.178) [0.147]	0.126 (0.094) [0.019]
Observations Households	4351 391	402 36	1819 162
(2) Adds Head's Health Status P(Married = Single)	-0.072 (0.069)	0.325 (0.292) [0.130]	0.261 (0.137) [0.016]
Observations Households	2441 383	221 35	1015 159
(3) Adds Wife's Age and Health Status. Includes Only Years When Married	-0.098 (0.070)		
Observations Households	2374 381		

* Significant at the 5% level; ** Significant at the 1% level.

[a] See Table 2.

Table 6: Fixed Effects Estimates Of The Post-Retirement Change In The Log Of Total Food Consumption For Married Couples By Difference in Age[a]

(Standard errors are in parentheses)

Log Of Total Food Consumption	**The Husband Is ≤ 5 Years Older Than The Wife**	**The Husband Is > 5 Years Older Than The Wife**
Controls For Husband's Age, Wife's Age, and Household Size. Includes Only Years When Married		
The Husband Is Retired	-0.071 (0.023)**	-0.196 (0.052)** [0.020]
Observations Couples	3333 305	860 84

* Significant at the 5% level; ** Significant at the 1% level.

[a] Retirement is defined as all years after the husband's highest reported year of retirement (retrospective). The bracketed number is the p-value for the null hypothesis that the post-retirement change in consumption is equal for both groups of married couples. This test is estimated by pooling the two groups and interacting all variables with a group indicator. Only the marital spell that includes the husband's retirement is used for men with multiple marriages during the sample period.

Table 7: Fixed Effects Model Of The Post-Retirement Change In The Log Of Total Food Consumption, Food Consumed At Home, and Food Consumed Away From Home For Husbands and Wives[a]

(Standard errors are in parentheses)

	Log Of Total Food Consumption	**Log of Food Consumed At Home**	**Log of Food Consumed Away From Home**
Controls For Husband's Age, Wife's Age, and Household Size. Includes Only Years When Married			
Only The Husband Is Retired	-0.094 (0.026)**	-0.105 (0.027)**	-0.104 (0.065)
Only The Wife Is Retired	-0.019 (0.028) [0.039]	-0.012 (0.029) [0.013]	0.087 (0.070) [0.032]
Both Spouses Are Retired	-0.043 (0.030) [0.086]	-0.052 (0.031) [0.085]	0.092 (0.075) [0.008]
Observations Couples	3447 335	3441 335	3449 335

* Significant at the 5% level; ** Significant at the 1% level.

[a] Retirement is defined separately for husbands and wives as all years after the highest reported year of retirement (retrospective). Each coefficient measures the change in household consumption relative to the default category of no one in the household is retired. The bracketed number is the p-value for the null hypothesis that the post-retirement change in consumption is equal for the retirement of husbands only and either the retirement of wives only or of both spouses. Only the marital spell that includes the husband's retirement is used for men with multiple marriages during the sample period. Only observations where the wife is at risk of retirement are included in the sample (wife's work experience ≥ 13 years or she ever retires).

Table 8: Fixed Effects Estimates Of The Post-Retirement Change In The Log Of Total Food Consumption By Retirement Age and By Average Household Consumption[a]

(Standard errors are in parentheses)

Log Of Total Food Consumption	Married Couples	Single Men	Pooled Singles
Control For Head's Age and Household Size			
(1) Retirement Age < 62	-0.184 (0.036)**	0.055 (0.157) [0.049]	0.178 (0.091) [0.000]
Observations Individuals	1806 161	206 19	592 54
(2) Retirement Age ≥ 62	-0.062 (0.031)*	0.239 (0.151) [0.011]	0.124 (0.061)* [0.002]
Observations Individuals	2542 230	195 17	1203 108
(3) Households With Average Annual Food Consumption Per Capita < $1400	-0.155 (0.046)**	-2.016 (1.444) [0.001]	0.164 (0.119) [0.002]
Observations Individuals	1129 104	41 4	468 44
(4) Households With Average Annual Food Consumption Per Capita ≥ $1400 & ≤ $2300	-0.048 (0.025)	0.258 (0.114)* [0.001]	0.127 (0.063)* [0.002]
Observations Individuals	2151 189	205 18	851 76
(5) Households With Average Annual Food Consumption Per Capita > $2300	-0.086 (0.047)	-0.084 (0.139) [0.988]	-0.022 (0.074) [0.444]
Observations Individuals	1068 98	155 14	476 42

* Significant at the 5% level; ** Significant at the 1% level.

[a] See Table 2.

Appendix A: Proof that consumption falls with retirement (Not for publication)

Re-write the problem without commitment

$$\begin{aligned}
&\max \left(1-\mu_1\right)\left[T_1U\left(C_1\right)+T_2U\left(C_2\right)\right]+\mu_1\left[T_1U\left(C_1\right)+T_2U\left(C_2\right)+T_3U\left(C_3\right)\right] \\
&s.t.\ \ U'\left(C_2\right)=\mu_2U'\left(C_3\right) \\
&\qquad T_3C_3=A_2-T_2C_2 \\
&\qquad A_2=\left(Y-C_1\right)T_1
\end{aligned}$$

as

$$\begin{aligned}
£ = &\left[T_1U\left(C_1\right)+T_2U\left(C_2\right)\right]+\mu_1T_3U\left(\frac{\left(Y-C_1\right)T_1-T_2C_2}{T_3}\right) \\
&-\lambda\left[U'\left(C_2\right)-\mu_2U'\left(\frac{\left(Y-C_1\right)T_1-T_2C_2}{T_3}\right)\right]
\end{aligned}$$

The first-order conditions are:

$$\begin{aligned}
\frac{\partial £}{\partial C_1} &= T_1U_1'+\mu_1T_3U_3'\frac{-T_1}{T_3}+\lambda\mu_2U_3''\frac{-T_1}{T_3}=0 \\
\frac{\partial £}{\partial C_2} &= T_2U_2'+\mu_1T_3U_3'\frac{-T_2}{T_3}-\lambda\left(U_2''-\mu_2U_3''\frac{-T_2}{T_3}\right)=0
\end{aligned}$$

These can be re-written as

$$\begin{aligned}
U_1' &= \mu_1U_3'+\lambda\mu_2U_3''\frac{1}{T_3} \\
U_2' &= \mu_1U_3'+\lambda\mu_2U_3''\frac{1}{T_3}+\lambda U_2''\frac{1}{T_2}
\end{aligned}$$

Combine these to get

$$U_2' = U_1'+\lambda U_2''\frac{1}{T_2}$$

Since $U'' < 0$, $U_2' > U_1'$ iff $\lambda < 0$. Thus to show that $U_2' > U_1'$, and therefore $C_2 < C_1$, we need to show that $\lambda < 0$. We can rewrite the second f.o.c. as

$$U_2' = \mu_1 U_3' + \lambda\left(\mu_2 U_3'' \frac{1}{T_3} + U_2'' \frac{1}{T_2}\right)$$

Substituting the first constraint, $U'(C_2) = \mu_2 U'(C_3)$, into the f.o.c. we get

$$\mu_2 U_3' = \mu_1 U_3' + \lambda\left(\mu_2 U_3'' \frac{1}{T_3} + U_2'' \frac{1}{T_2}\right)$$

Since $\mu_2 > \mu_1$ and the last parenthetical term is negative, then $\lambda < 0$ and $C_2 < C_1$.

Appendix B: Alternative Measures of Retirement (Not for publication)

Four alternative measures of retirement are also used in the analysis. The first alternative measure (Measure 2) uses the retrospective retirement question described above, but defines an individual's year of retirement as the earliest year in which they report retiring. Individuals are also asked each year the following question about their current employment status: "We would like to know about what you do – are you working now, looking for work, retired, a student, a housewife, or what?" The second alternative measure (Measure 3) defines an individual's year of retirement as the first year in which he or she answers "retired" to this question. Many non-employed female respondents report their current work status as "retired" in some years and "housewife" in other years. The third alternative measure (Measure 4) applies only to female respondents and defines their retirement year as the first year in which they answer either "retired" or "housewife" to the current employment status question following a period of employment. The final alternative definition (Measure 5) is based on the pattern of work hours reported over the sample period, and is similar to that used by BSW. The household is considered to be retired if neither the individual nor their spouse (if married) work more than 500 hours in any future years. We also define (for this measure only) a transitional period that includes all years in which the household is not retired by the above definition but neither the individual nor their spouse (if married) work more than 1500 hours.[20]

[20] Bernheim, Skinner, & Weinberg use this definition but limit this transitional period to a maximum of five years for each individual.

Table B1: Characteristics Using Alternative Measures Of Retirement[a]

	Measure 1	Measure 2	Measure 3	Measure 4	Measure 5
Retirement Age					
Married Couples	62.0	61.7	62.2		65.3
Single Men	61.2	61.2	62.7		64.4
Single Women	64.0	63.3	64.7	62.5	64.2
Pooled Singles	63.4	62.9	64.4	62.5	64.3
Years Of Full-Time Work Before Retirement					
Married Couples	39.5	39.5	39.5		40.8
Single Men	36.6	36.6	37.7		36.0
Single Women	22.5	23.3	18.3	22.5	23.7
Pooled Singles	25.6	26.4	21.3	25.6	26.7
Average Hours Worked In 5 Years After Retirement					
Married Couples	289	300	339		15
Single Men	292	307	154		20
Single Women	162	163	167	291	23
Pooled Singles	197	196	165	266	22
Maximum Hours Worked After Retirement					
Married Couples	558	575	583		38
Single Men	551	568	357		56
Single Women	407	421	376	587	46
Pooled Singles	441	456	373	542	49
Households					
Married Couples	391	379	421		357
Single Men	36	34	35		40
Single Women	126	117	191	136	128
Pooled Singles	162	151	226	171	168

[a] Sub-samples are defined by marital status at retirement and only households which retire during the sample period are included. Each household is counted only once when calculating summary statistics in this table.
Measure 1: After highest reported year of retirement (retrospective)
Measure 2: After lowest reported year of retirement (retrospective)
Measure 3: After first reported employment status = retired
Measure 4: After first reported employed status = retired or housewife (if ever employed)
Measure 5: Neither head nor spouse ever work >500 hours again

Table B2: Fixed Effects Estimates Of The Post-Retirement Change In Log Of Total Food Consumption For Alternative Measures Of Retirement[a]

(Absolute value of t-statistics in parentheses)

	Single Men	**Pooled Singles**	**Married Couples**
Measure 1: Highest Reported Retirement Year (Retrospective)	0.100 (1.07)	0.092 (1.97)*	-0.085 (4.27)**
Observations Individuals	401 36	1795 162	4348 391
Measure 2: Earliest Reported Retirement Year (Retrospective)	0.148 (1.51)	0.074 (1.56)	-0.065 (3.24)**
Observations Individuals	383 34	1691 151	4236 379
Measure 3: After First Reported Employment Status = Retired	0.031 (0.28)	0.047 (1.15)	-0.036 (1.82)
Observations Individuals	383 35	2438 226	4586 421
Measure 4: After First Reported Employed Status = Retired or Housewife (If Ever Employed)		0.069 (1.46)	
Observations Individuals		1781 171	
Measure 5: Neither Head Nor Spouse Work >500 Hours Again	-0.206 (1.82)	-0.057 (1.10)	-0.059 (2.33)*
Observations Individuals	423 40	1815 168	3773 357

* Significant at the 5% level; ** Significant at the 1% level.

[a] All specifications control for age, household size & year of retirement. Sub-samples are defined by marital status at retirement. All variables for married couples refer to the husband. When using measure 5, an additional control variable is added for all transition years where neither the head nor spouse work >1500 hours.