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There are countless studies examining retirement timing, retirement savings behavior, and consumption expenditures after retirement. We know far less about how people alter their time allocation to activities other than market work when they retire. How they alter time use upon retirement is important for several reasons. Time is allocated to both productive activities and to consumption. Without knowing how people spend time, we have an incomplete picture of both their production and consumption. By looking only at market labor supply, earnings, or expenditures, we may miss a large portion of the production or consumption we seek to measure. The fraction of production and consumption that we may be missing by not considering time allocation to activities other than market work is likely to increase substantially upon retirement. This chapter will address this shortcoming in the retirement literature by using time-diary data to examine the time allocation of individuals who are a little younger or a little older than typical retirement ages. This will provide a descriptive picture of how time allocation changes at retirement, and will contribute to the literature on the retirement consumption puzzle.

Evidence from several countries indicates that households reduce consumption expenditures substantially around the age of retirement. This pattern has been documented for the United States by Hamermesh (1984); Mariger (1987); Bernheim, Skinner, and Weinberg (2001); and Lundberg, Startz, and Stillman (2003); for Canada by Robb and Burbridge (1989); and for the United Kingdom by Banks, Blundell, and Tanner (1998).

The consumption decline appears to be 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 when they experience a predictable drop in income, such as at retirement. In other words, since retirement is not unexpected, households should plan for it and save sufficiently over the lifetime so that their consumption need not fall upon retirement.

After examining alternative explanations that are consistent with forward-looking life-cycle behavior, most researchers have attributed this consumption drop to myopic behavior (short-sightedness, or a lack of planning for the future) or to the systematic arrival of discouraging information at retirement. In other words, individuals are not aware of the value of their retirement benefits and assets, and more often than not are negatively surprised after retirement by this information. However, a collective model of household behavior suggests an alternative explanation: Most wives expect to live several years longer than their husbands, and therefore should prefer, absent perfect altruism, for the household to consume less as the couple ages than do husbands. Given this, and assuming that the husband's bargaining power depends upon his current income or employment status, the husband's retirement from a career job should cause deterioration in his relative influence on household decisions and therefore a decline in the couple's consumption spending.

Using Panel Study of Income Dynamics (PSID) data, Lundberg, Startz, and Stillman (2003) test this hypothesis by comparing the post-retirement consumption change of married couple households to single-person households using food consumption data from the PSID for the years 1979–1986 and 1989–1992. They find that expenditures drop at retirement by 8 to 10 percent for married couples, but do not decrease significantly for single-person households. The magnitude of the consumption drop is also found to be greater for couples with a larger age difference between spouses when the husband is older than the wife. These results lend some support to a collective rather than unitary approach to the decisions of older couples, and suggest that changes in relative bargaining power may explain at least part of the commonly

observed postretirement drop in the household consumption of married couples.

Using data from several waves of the longitudinal U.S. Health and Retirement Study (HRS), Stillman and Ward-Batts (2003) find some evidence of a drop in home-prepared food expenditure after retirement in married-couple households. However, this decline in consumption is not larger in married-couple than in single-person households. Haider and Stephens (2004) show, using Retirement History Survey (RHS) and HRS data, that accounting for unexpected early retirement using subjective retirement expectations reduces the magnitude of the postretirement consumption decline by a third. They do not find evidence that the remaining decline is likely to be explained by marital bargaining. Consumption measures in PSID, RHS and HRS are, however, very crude. Nevertheless, evidence relating to this hypothesis is mixed.

A somewhat obvious alternate hypothesis is that household production may increase upon retirement, and that full consumption remains constant. Substituting time in home production for market-purchased goods and services might allow consumption to remain constant. Such a substitution would be rational at retirement when the opportunity cost of time falls, and so the price of home-produced goods falls relative to the price of market goods. Thus, actual consumption may remain constant while money expenditures fall. Findings of Stillman and Ward-Batts (2003) are not consistent with this hypothesis. However, as noted, consumption data in the HRS data are not very detailed. Further, there is a potential problem of the endogeneity of retirement, as retirement timing is endogenously chosen by the household or individual. If a household has accumulated sufficient wealth, then its members may retire earlier than they otherwise would. If members of households with higher wealth retire, while those in lower wealth households continue working until later ages, i.e., until wealth is higher, then individuals who report being retired may come from systematically better off households. Therefore, we might expect to observe that retired households eat out more, for example, than households that are not retired but are of the same age.

There are various approaches to examining the hypothesis that household production increases after retirement. One is to examine richer expenditure data, looking in particular at goods that may tell us

something about the degree to which household production plays a role in consumption. For example, detailed food expenditures would allow us to examine expenditures on staple foods that require more time to prepare relative to convenience foods and prepared meals (e.g., take-out or restaurant meals). This is the approach taken by Ward-Batts (2007). A second approach is to look at time allocation to various activities, and examine directly the question of whether home production time expenditures rise after retirement. That is the approach taken in this chapter. A finding that household production increases would not rule out that marital bargaining is playing a role. If there is a shift in bargaining power in favor of wives at retirement, the household may choose to spend less money on consumption, but make up for that reduced expenditure by increasing household production. Therefore, married or partnered individuals and single individuals will be analyzed separately to ascertain whether their change in time allocation before versus after retirement differs.

A third approach is to use data on both time use and expenditures by the same households to examine both time spent in household production and consumption, and money spent on market goods, including both input goods (e.g., groceries) and substitutes for home production (e.g., restaurant meals). This is the approach taken by Hamermesh (2008), who links ATUS and CPS Food Supplement Survey data for the same households to estimate a structural model of time and money expenditures on food. He finds that households that spend more money on food also spend more time on food, suggesting that money and time are not easily substitutable. However, time examined includes consumption time and production time aggregated together, whereas the current chapter will examine these separately. Hamermesh excludes people aged 65 and over in order to avoid changes in expenditures and time use at retirement. A follow-up study to the present chapter will use ATUS data linked to CPS FSS data in order to examine how both time and expenditures on food shift in the transition to retirement.

The analysis in this chapter is primarily descriptive in nature. American Time-Use Survey data from 2003 and 2004 are used to compare the time allocation of individuals at ages just before typical retirement ages to those just after typical retirement ages. Individuals are considered “preretirement” if they are under age 62, at which a sizeable frac-

tion of individuals retire in the United States. Individuals are considered “postretirement” if they are aged 65 or older. There are large spikes in U.S. retirement at ages 62 and 65. Gustman and Steinmier (2005) show that these spikes can be explained by incentives in the Social Security system in the presence of varying rates of time preference within the population.

Age will be used as a proxy measure of retirement status, but actual labor market status will not be included in the model due to potential endogeneity bias, as mentioned above. Individual retirement timing depends on many factors. For example, households with higher wealth may retire at earlier ages than those with lower wealth. We might find that among people of a given age, the retired group eats out more and spends less time cooking. This might be due to that group having higher wealth, rather than being attributable to their retirement status. That group may have always tended to eat out more. Using actual labor market status might result in attributing differences in behavior to retirement when those differences may really be due to different characteristics of the retired versus nonretired group. So we would in effect be comparing retired apples to nonretired oranges—not the right comparison. Simply using age as a proxy for retirement status avoids this problem.

THEORETICAL BACKGROUND

Consumption

In a simple life-cycle model of consumption, individuals maximize utility—satisfaction from consumption of goods, services, and leisure—over n periods given the present discounted value of their lifetime income and the real market rate of interest. (An example of the objective function and additional technical details related to this section can be found in Appendix 4A.) How one should optimally allocate consumption over the lifetime depends both on the real interest rate and on the extent to which one cares more about consumption in some periods of life than others. Economists often simply assume that individuals care less about consumption in the future than about consumption today, and

that the further in the future one looks, the less he cares about his consumption in that future period. In spite of this very simple assumption that is often made, there is a substantial literature on how the optimal level of consumption may change over the lifetime. Economists tend to focus on marginal utility, which is the additional satisfaction one gets from consuming a little more. Marginal utility decreases as total satisfaction from consumption increases. For example, we care less about having another bite when we have had lots to eat than when we have had little. Lillard and Weiss (1997) find evidence that the marginal utility from consumption rises in periods of poor health, which may imply increasing marginal utility of consumption with age in the general population, as health typically declines with age. This would suggest that the level of consumption should rise as we get older. On the other hand, we typically assume that there is a positive discount rate, so that consumption today is more highly valued than future consumption, implying decreasing marginal utility over time given constant consumption. This would suggest that total consumption should fall over the lifetime. Hyperbolic discounting is a special case of discounting future consumption. It implies time inconsistency in the rate of time preference, such that we make decisions in the present that we would want to change in the future if we could do so (Laibson 1998). For example, we might reach retirement age and then realize we'd saved too little, and wish we had saved more.

First, suppose that individuals care equally about consumption in each period of life. Then the optimal solution to the utility maximization problem implies that an individual will want to increase consumption gradually over the lifetime in the presence of a positive real interest rate. This is because the price of consumption is higher in earlier periods than in later periods, due to either paying or foregoing interest by consuming in earlier periods. However, if there is a positive rate of time preference equal to the market real interest rate, meaning that people care more about present than future consumption, then consumption should be the same in every period.

This does not imply that each element of consumption must remain constant—only that one remain indifferent between bundles of consumption in each period. One can make trade-offs by giving up some of one good and gaining more of another in order to maintain the

same level of utility. A predictable change in the price of a particular good should be planned for and should not result in a discrete change in overall consumption at the time of the price change. For example, when the opportunity cost of an individual's time falls predictably, due to Social Security benefits rules, the level of satisfaction from consumption should not change. Rather, one should increase leisure consumption and decrease consumption of other goods in order to maintain a constant level of satisfaction from consumption. In other words, one should shift away from consumption of money-intensive consumption toward time-intensive consumption when the price of time falls, but the overall level of consumption, or satisfaction from that consumption, should not change.

Consumption vs. Expenditure

The above discussion is about consumption. However, what we typically measure in empirical data is expenditures. Expenditures may differ from consumption in a particular time period for several reasons. For example, durable goods are purchased in a single period but render a stream of services (consumption) over many periods. Another reason for consumption and expenditure to differ at a point in time is home production. Households use market goods and time to produce consumption goods (see Becker 1973, 1988). When the price of time allocated to household production is lower, all else constant, one should spend more time in household production. For most, the opportunity cost of time drops discretely upon retirement from a career job. Thus the price of a home-cooked meal falls at retirement relative to the price of a restaurant meal, take-out food, or a microwave dinner.

We have historically had fairly good data on expenditures on market goods purchased by households, but until recently have not had very good data on their allocation of time other than to market work. By examining only money expenditures, we miss a potentially large component of what is available to households to consume. Frazis and Stewart (2006) and Zick and Bryant (2008) show that adding the value of home production to households' income substantially reduces income inequality in the general population.

If we focus solely on income or expenditures, the missing component of consumption is arguably even more substantial after versus before retirement. By looking only at money expenditures, we therefore make biased inferences about consumption, and this bias is particularly problematic when making comparisons before versus after retirement.

DATA AND METHODS

I use the American Time Use Survey (ATUS) data described in the introduction to this volume. Pooled data from 2003 and 2004 survey years are used. Survey weights are used for all summary statistics and analyses. Men and women aged 55–61 inclusive and aged 65–71 inclusive are included in the sample. Those aged 61 and younger represent the preretirement years while those aged 65 and older represent the postretirement years. Thus, individuals up to seven years prior to age 62 and up to 7 years at and after age 65 are included. Those in the preretirement ages are compared to those after retirement ages. Labor force status and time use are jointly determined, and so labor force status will not be used as a control variable, i.e., as an explanatory variable in the regressions, as discussed at length in the first section. Examining behavior at various ages at which there are very different incentives to retire versus continue in market work that are exogenous to the individual is a less problematic approach. Time spent in market work is one of the time-use categories analyzed.

The seven-year age range encompasses a wide range of ages. We might be concerned that individuals at the younger end of this range are not comparable to those toward the end of it for several reasons. First, younger individuals may be more capable than those who are older, and thus may allocate time differently to home production and other activities for reasons unrelated to retirement. Second, younger individuals in the sample are from substantially different birth cohorts than the oldest in the sample. If there are cohort effects (i.e., generational effects) in time allocation, then this may also generate differences between the groups that are unrelated to retirement.

To address these concerns, I do two things. First, I use linear and quadratic age terms in regression analyses to pick up gradual trends in time use as people age, in addition to the postretirement-age dummy variable, which will pick up changes of a more discrete nature. Second, while the primary analysis uses seven years before and after typical retirement ages, I have also repeated these analyses using a sample that includes only three years before and after the standard retirement ages, i.e., those aged 59–61 inclusive and 65–67 inclusive. The rationale for this is that the average postretirement person in the 3-year age range is only 6 years older than the average preretirement person (66 compared to 60), while the average postretirement person in the 7-year age range sample is 10 years older than the average preretirement person (68 compared to 58). If there are systematic changes of a discrete nature as we age in how we spend time, due to changes in health, for example, then those changes may be erroneously attributed to retirement, since age is used as a proxy for retirement here. The possibility of this error may be larger in a wider sample of ages. However, when repeating the analyses with a sample including a three-year age range on either side of retirement, I find very similar patterns to those presented here.

RESULTS

Mean Difference Tests

Table 4.1 presents mean times in several types of activities for men and women in the before and after retirement groups separately. A mean difference test is performed for each activity category, and asterisks indicate statistically significant differences. Results are shown using the seven-year pre- and postretirement age sample. Results based on the seven- and three-year age ranges generally are similar in terms of means, mean differences, and levels of statistical significance.

The first five categories are household production and some of its subcategories. Housework, food preparation, maintenance and repair, and lawn and garden care are all included in aggregate home production time. Some tasks of home production are not included in these subcat-

Table 4.1 Mean Time Spent in Activities before versus after Retirement Ages

	Minutes per day			
	Women before	Women after	Men before	Men after
Home production	165.3***	207.3	103.8**	121.6
Housework	61.7***	86.9	10.7	13.5
Food prep.	58.0***	70.1	15.9**	21.5
Maintenance & repair	7.8	9.3	26.0	22.8
Lawn & garden	13.6	12.1	23.7***	36.8
Purchases & shopping	31.9	28.1	17.8***	23.9
Volunteer work	9.1	10.7	6.6**	10.9
Giving care or help	36.0	29.2	16.9	23.2
Market work	176.6***	49.5	286.2***	103.6
Travel	75.9***	60.0	71.6	67.8
Eating & drinking	70.3***	78.9	76.7***	87.3
Social & leisure	268.5***	340.7	284.5***	388.4
Sport, exercise, recreation	10.2	12.8	21.8	20.3
Religious activities	10.3	12.3	7.2***	11.9
Personal care	555.1***	578.0	530.6***	553.1

NOTE: Survey weights used. *significant at the 0.10 level; **significant at the 0.05 level; ***significant at the 0.01 level.

egories, so the aggregate category, home production, will in general be larger than their sum. Much of the time spent in purchases and shopping may also be thought of as home production of a sort but are not included in the aggregate home production time here. In postretirement relative to preretirement years, both men and women spend significantly more time in housework and food preparation, and in home production overall. Men spend more time in lawn and garden care and more time shopping and making purchases after retirement ages. Surprisingly, women spend less time shopping postretirement, but the difference is not statistically significant.

The next four categories are activities that are production of a sort other than household production, or in the case of travel, that likely are closely related to production activities. Somewhat surprisingly, men's time in volunteer work increases significantly in their postretirement years. Women's time in these activities is already fairly high in the pre-

retirement years, relative to men, and does not appear to change when they enter postretirement ages. Women decrease time spent giving care or help to others in postretirement ages, while men increase time in such activities, although the difference is not quite significant for either. Giving care or help includes assisting both household members and nonhousehold members, and is exclusive of market work or formal volunteer work activities. Not surprisingly, both men and women decrease their time in market work activities in postretirement years. The level of time in market work is higher for men than for women in both pre- and postretirement ages, and the drop in time devoted to market work is also larger for men than for women.

Both women and men reduce travel time in postretirement-age years, but the difference is statistically significant only for women. Travel is likely to be related largely to production activities. Commute time to work, for example, should fall at retirement. Other travel time includes time spent traveling to and from shopping places, time spent taking children places, and time spent traveling to and from places where one does volunteer work. Travel time is coded according to the origination and destination of each trip, where a trip is defined as traveling between two points. If one travels from home to Starbucks, and then on from there to work, two trips are recorded. The first trip is coded as going to get coffee, and the second is coded as commuting to work. We might want to count both portions as commuting to work in this case, but it is somewhat ambiguous when we would want to recode a trip and when not. A more extensive examination of travel time is beyond the scope of this chapter.

The last five categories of activities might be thought of as largely consumption. Time spent eating and drinking and in social and leisure activities increases significantly in postretirement-age years for both men and women. Time spent in sports, exercise, and recreation increases for women, but the difference is not statistically significant. Time spent in religious activities for women does not change significantly after retirement, while men significantly increase religious activities time.¹ Both men and women increase time spent on personal care, and the difference is significant in all but the three-year age-range sample for women.

To summarize findings from mean difference tests, it appears that men and women spend more time doing almost everything except market work and travel in postretirement-age years. Interestingly, men spend more time shopping after retirement, while women decrease shopping time.

Regression Analysis

We might be concerned that the samples of individuals representing the pre- versus postretirement ages are systematically different. In other words, there may be differences between these groups in characteristics other than age, such as in education or household composition. This may result in finding differences in how they spend time that are unrelated to retirement. We can address this concern by performing multivariate regression analysis, which allows us to control for demographic factors, such as education and household composition. I do not control for income in these models, as income will be determined in part by retirement status, which I have already argued is endogenous. Educational attainment should serve as a proxy for lifetime income or earning potential.

Tables 4.2–4.5 present results from such regression models for four different samples: partnered women, single women, partnered men, and single men.² In all cases the broader sample of age ranges is used. Results using the narrower sample including only three years before and after retirement ages are similar and are available from the author.

For each activity category, three models are presented. First, only a constant term, a dummy variable for the year surveyed, and a dummy variable for postretirement age are included in the model. Second, controls for spouse's age and its square, own educational attainment, spouse's educational attainment, and presence of children in the household are added. Finally, own age and its square are added to the model. The latter is reserved for last since we may not expect to be able to reliably distinguish separately an age effect from a postretirement-age effect in a short age series. In interpreting results here, I generally focus on the second model for each outcome.

Partnered women (see Table 4.2) significantly increase time spent in home production in postretirement-age years, including significant in-

creases in both housework and food preparation time. They significantly decrease time spent in market work. Time spent traveling decreases, but the difference is not significant when controls are included. Time spent socializing, relaxing, and in leisure increase, as does time spent in sport, exercise, and recreation, and time spent in personal care. This suggests that partnered women are indeed reallocating their time after retirement in ways that economic theory would predict. They are spending more time in leisure activities, and more time producing household consumption goods that are substitutes for money-intensive substitutes, such as convenience foods, restaurant meals, and maid services.

There are no statistically significant changes in home production time for single women, but they do decrease time spent in market work and travel. They increase time spent eating and drinking; socializing, relaxing, and taking leisure; doing religious activities; and in personal care. Single women (see Table 4.3) have fewer significant changes in time allocation in pre- versus postretirement years. This may be attributable in part to the substantially smaller sample size, which makes it difficult to establish statistically significant differences. At postretirement ages they spend more time eating and drinking; socializing, relaxing and taking leisure; and in personal care.

Partnered men (see Table 4.4) spend more time in home production, including time in housework and food preparation. They also spend more time shopping and less time in market work. Point estimates indicate that they spend slightly more time in volunteer work and caring for or helping others, but these increases are not statistically significant. They spend significantly more time eating and drinking; socializing, relaxing, and taking leisure; and in personal care.

There are relatively few significant results for single men (see Table 4.5). There are no statistically significant results among the various activities when using the second specification, which includes all controls except for own age. There are substantial differences in point estimates between the three specifications. This sample is quite small, and the effects are very imprecisely estimated. In the first two specifications, it appears that single men spend less time in home production at postretirement ages than at younger ages. However, when we control for his age, the point estimate becomes positive and fairly large, but not statistically significant. When age is controlled for, estimates indicate that

Table 4.2 Regression Analysis for Partnered Females (minutes per day)

A. Home production and related activities																		
	Home production			Housework			Food prep.			Maintenance, repair			Lawn & garden			Purchases, shopping		
Postre-	46.8***	33.7***	29.3	26.1***	14.3*	9.5	13.6***	11.1*	12.8	2.2	-3.2	-3.6	-2.6	-2.6	-2.9	-3.5	-1.1	-10.3
tirement	(9.1)	(12.4)	(23.1)	(6.0)	(8.2)	(17.0)	(4.4)	(6.1)	(11.2)	(2.5)	(2.9)	(7.8)	(2.4)	(2.9)	(5.4)	(3.1)	(4.2)	(7.6)
Age			-24.1			-12.2			4.4			5.8			-10.5			-1.6
			(29.1)			(19.5)			(12.3)			(8.8)			(8.1)			(8.9)
Age ²			0.2			0.1			-0.0			-0.0			0.1			0.0
			(0.2)			(0.2)			(0.1)			(0.1)			(0.1)			(0.1)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
<i>N</i>	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833
<i>R</i> ²	0.02	0.03	0.03	0.02	0.03	0.03	0.01	0.03	0.03	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01
B. Other production																		
	Volunteer work			Care for/help others			Market work			Travel								
Postretirement	2.2	4.7	4.6	-7.7	-12.6	-14.2	-124.3***	-102.3***	-11.7	-15.8***	-9.8	-8.7						
	(2.5)	(3.7)	(6.8)	(5.1)	(8.3)	(14.0)	(10.9)	(16.0)	(27.3)	(4.1)	(6.0)	(10.2)						
Age			5.7			8.8			-63.2*			-11.7						
			(8.6)			(15.6)			(34.4)			(13.1)						
Age ²			-0.0			-0.1			0.4			0.1						
			(0.1)			(0.1)			(0.3)			(0.1)						
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes						
<i>N</i>	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833						
<i>R</i> ²	0.00	0.02	0.02	0.00	0.03	0.03	0.08	0.10	0.11	0.01	0.03	0.03						

C. Consumption

	Eating & drinking			Socialize, relax, leisure			Sports, exercise, recreation			Religious			Personal care		
Post-retirement	7.8*** (2.9)	3.3 (3.9)	7.2 (8.1)	67.3*** (10.6)	57.2*** (14.2)	29.0 (27.2)	2.7 (2.3)	7.0** (3.4)	3.9 (6.0)	1.4 (1.9)	-2.8 (2.6)	-13.1** (5.5)	18.9*** (6.8)	17.8** (9.0)	-18.0 (17.1)
Age			16.2* (8.8)			8.2 (32.7)			5.9 (7.0)			2.4 (5.9)			44.8** (21.5)
Age ²			-0.1* (0.1)			-0.0 (0.3)			-0.0 (0.1)			-0.0 (0.0)			-0.3* (0.2)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833	1,836	1,833	1,833
R ²	0.01	0.03	0.03	0.03	0.06	0.06	0.00	0.02	0.02	0.00	0.01	0.01	0.01	0.03	0.04

NOTE: Survey weights used. Standard errors in parentheses. * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$. All models include control for survey year and a constant. Other controls are educational attainment, spouse age and its square, spouse educational attainment, and an indicator for presence of children in the household.

Table 4.3 Regression Analysis for Single Females (minutes per day)**A. Home production and related activities**

	Home production			Housework			Food prep.			Maintenance, repair			Lawn & garden			Purchases, shopping		
Postre-	16.8	14.5	37.1	20.7	19.8	44.8	4.3	5.0	10.1	-2.0	-2.2	-0.9	3.5	3.6	1.9	-5.4	-5.9	-20.8
irement	(18.9)	(18.8)	(50.8)	(14.1)	(13.8)	(36.7)	(7.0)	(6.7)	(17.0)	(5.2)	(5.8)	(15.3)	(5.9)	(5.6)	(15.6)	(5.9)	(7.0)	(16.8)
Age			79.6			16.5			60.8***			28.2**			-17.7			12.4
			(60.0)			(41.9)			(16.7)			(13.1)			(20.8)			(17.8)
Age ²			-0.6			-0.2			-0.5***			-0.2**			0.1			-0.1
			(0.5)			(0.3)			(0.1)			(0.1)			(0.2)			(0.1)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456
R ²	0.00	0.04	0.05	0.01	0.08	0.08	0.00	0.04	0.07	0.00	0.02	0.02	0.01	0.03	0.04	0.01	0.01	0.02

B. Other production

	Volunteer work			Care for/help others			Market work			Travel		
Postretirement	-1.8	-2.4	-15.3	-2.8	4.2	40.3	-141.2***	-135.4***	-82.1	-16.7**	-14.2*	9.7
	(3.8)	(4.2)	(14.2)	(10.1)	(9.2)	(37.9)	(24.9)	(24.7)	(60.8)	(7.8)	(8.6)	(19.4)
Age			22.4*			6.3			21.7			-1.0
			(12.1)			(37.2)			(66.0)			(24.0)
Age ²			-0.2*			-0.1			-0.2			-0.0
			(0.1)			(0.3)			(0.5)			(0.2)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	456	456	456	456	456	456	456	456	456	456	456	456
R ²	0.01	0.05	0.07	0.00	0.06	0.07	0.09	0.14	0.14	0.01	0.07	0.07

C. Consumption

	Eating & drinking			Socialize, relax, leisure			Sports, exercise, recreation			Religious			Personal care		
Post-retirement	12.4** (5.1)	13.9*** (5.2)	18.4 (13.4)	97.2*** (24.3)	93.0*** (23.8)	-15.1 (62.9)	1.8 (2.8)	1.3 (2.5)	8.9 (9.6)	4.8 (3.2)	5.5* (3.2)	0.7 (8.1)	43.6** (18.9)	35.7** (17.1)	28.1 (42.4)
Age			2.1 (14.6)			-135.3* (71.5)			9.5 (8.9)			-9.8 (10.4)			-37.8 (46.5)
Age ²			-0.0 (0.1)			1.2** (0.6)			-0.1 (0.1)			0.1 (0.1)			0.3 (0.4)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	456	456	456	456	456	456	456	456	456	456	456	456	456	456	456
R ²	0.03	0.06	0.06	0.05	0.07	0.08	0.02	0.06	0.07	0.01	0.02	0.02	0.02	0.08	0.08

NOTE: Survey weights used. Standard errors in parentheses. * $p \leq .10$; ** $p \leq .05$; *** $p \leq .01$. All models include control for survey year and a constant. Other controls are educational attainment, spouse age and its square, spouse educational attainment, and an indicator for presence of children in the household.

Table 4.4 Regression Analysis for Partnered Males (minutes per day)**A. Home production and related activities**

	Home production			Housework			Food prep.			Maintenance, repair			Lawn & garden			Purchases, shopping		
Postretirement	19.2** (8.3)	23.0** (11.6)	32.3 (20.5)	3.2 (2.4)	6.6* (3.6)	11.6** (5.4)	5.8** (2.5)	10.0*** (3.3)	4.9 (5.2)	-4.9 (4.9)	2.2 (8.2)	13.8 (12.0)	13.9*** (4.9)	6.4 (5.8)	2.1 (11.8)	6.6*** (2.2)	7.9*** (2.9)	4.5 (5.5)
Age			9.3 (24.0)			-5.3 (6.1)			-9.6 (6.6)			11.9 (14.1)			13.1 (13.2)			-0.2 (6.4)
Age ²			-0.1 (0.2)			0.0 (0.0)			0.1 (0.1)			-0.1 (0.1)			-0.1 (0.1)			0.0 (0.1)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
<i>N</i>	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908
<i>R</i> ²	0.00	0.02	0.02	0.00	0.01	0.01	0.01	0.02	0.02	0.00	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02

B. Other production

	Volunteer work			Care for/help others			Market work			Travel		
Postretirement	4.7** (2.2)	2.1 (2.6)	2.0 (5.2)	7.0* (4.2)	5.9 (5.5)	17.7 (14.1)	-193.7*** (14.3)	-155.4*** (18.7)	-120.2*** (37.1)	-3.6 (3.9)	0.4 (5.0)	-2.5 (10.4)
Age			-5.8 (7.1)			28.2** (12.8)			-6.1 (44.5)			4.0 (12.0)
Age ²			0.0 (0.1)			-0.2** (0.1)			0.0 (0.3)			-0.0 (0.1)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
<i>N</i>	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908
<i>R</i> ²	0.00	0.03	0.03	0.00	0.01	0.01	0.12	0.16	0.16	0.00	0.01	0.01

C. Consumption

	Eating & drinking			Socialize, relax, leisure			Sports, exercise, recreation			Religious			Personal care		
Post-retirement	11.1*** (2.8)	12.8*** (4.0)	7.8 (7.7)	108.6*** (11.6)	76.6*** (15.6)	49.1* (29.3)	-1.9 (3.3)	-5.5 (4.5)	-9.6 (8.8)	4.0** (1.9)	3.4 (2.3)	-3.8 (4.3)	26.1*** (6.9)	19.6** (9.9)	12.8 (19.1)
Age			.01 (8.9)			-8.7 (35.8)			7.3 (10.6)			-6.5 (5.4)			-30.3 (22.2)
Age ²			0.0 (0.1)			0.1 (0.3)			-0.1 (0.1)			.01 (0.0)			0.2 (0.2)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
<i>N</i>	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908	1,911	1,908	1,908
<i>R</i> ²	0.01	0.03	0.03	0.06	0.13	0.13	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.03	0.03

NOTE: Survey weights used. Standard errors in parentheses. * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$. All models include control for survey year and a constant. Other controls are educational attainment, spouse age and its square, spouse educational attainment, and an indicator for presence of children in the household.

Table 4.5 Regression Analysis for Single Males (minutes per day)**A. Home production and related activities**

	Home production			Housework			Food prep.			Maintenance, repair			Lawn & garden			Purchases, shopping		
Postre- tirement	-10.1 (32.7)	-20.4 (37.5)	42.3 (62.5)	-4.5 (7.2)	-6.8 (8.2)	7.8 (21.7)	3.9 (7.6)	0.4 (7.8)	18.9 (16.7)	14.3 (13.0)	15.3 (13.4)	-8.2 (22.2)	1.0 (13.8)	2.6 (14.1)	-1.1 (31.0)	-0.2 (8.8)	-1.4 (9.7)	-22.1 (25.6)
Age			-43.1 (90.8)			34.2 (22.5)			38.1** (16.4)			-35.2 (40.7)			3.9 (41.0)			28.6 (21.6)
Age ²			0.03 (0.7)			-0.3 (0.2)			-0.3** (0.1)			0.3 (0.4)			-0.0 (0.3)			-0.2 (0.2)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
<i>N</i>	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152
<i>R</i> ²	0.01	0.14	0.15	0.01	0.06	0.07	0.02	0.13	0.16	0.03	0.05	0.07	0.01	0.09	0.09	0.00	0.04	0.06

B. Other production

	Volunteer work			Care for/help others			Market work			Travel		
Postretirement	-4.9* (2.6)	-4.1 (2.7)	5.3 (4.9)	-9.0 (6.7)	-7.8 (7.9)	-44.2* (26.5)	-48.7 (58.8)	-16.9 (49.2)	-222.6* (119.1)	-9.6 (13.4)	3.3 (11.4)	-77.8* (45.0)
Age			5.9 (6.9)			57.0** (23.7)			-211.8 (161.3)			35.9 (43.9)
Age ²			-0.1 (0.1)			-0.4** (0.2)			1.9 (1.3)			-0.2 (0.3)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
<i>N</i>	152	152	152	152	152	152	152	152	152	152	152	152
<i>R</i> ²	0.05	0.10	0.11	0.00	0.04	0.10	0.04	0.19	0.22	0.00	0.11	0.17

C. Consumption

	Eating & drinking			Socialize, relax, leisure			Sports, exercise, recreation			Religious			Personal care		
Postretirement	0.1	6.1	4.5	69.0	31.3	248.6**	0.9	2.4	3.4	15.8	14.1	5.0	-25.2	-34.4	32.2
	(10.4)	(9.9)	(21.4)	(51.4)	(51.1)	(117.4)	(8.1)	(7.8)	(22.8)	(10.7)	(9.8)	(14.0)	(31.5)	(33.4)	(82.6)
Age			34.6			-42.9			19.2			-24.1			36.2
			(23.3)			(150.6)			(20.6)			(23.5)			(99.6)
Age ²			-0.3			0.2			-0.2			0.2			-0.3
			(0.2)			(1.2)			(0.2)			(0.2)			(0.8)
Controls?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152
R ²	0.00	0.08	0.10	0.04	0.14	0.18	0.00	0.11	0.12	0.03	0.05	0.06	0.01	0.05	0.06

NOTE: Survey weights used. Standard errors in parentheses. * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$. All models include control for survey year and a constant. Other controls are educational attainment, spouse age and its square, spouse educational attainment, and an indicator for presence of children in the household.

single men spend less time in market work and travel and more time socializing, relaxing, and taking leisure at postretirement ages relative to younger ages.

Partnered versus Single Comparisons

Differences between partnered and single persons are not formally tested here, so comparisons noted are based solely on point estimates. As previously mentioned, there are few significant results in the single-person samples. This is likely due in large part to the small size of these samples. It does appear from these results, however, that partnered individuals increase home production time in postretirement ages, while single persons may not, at least in specifications that do not control for age trends. However, if linear and quadratic age controls are included, then it appears that single women increase home production and housework time and decrease market work time even more than partnered women. Single women also appear to increase time spent eating and drinking; socializing, relaxing, and taking leisure; in sport, exercise, and recreation; and in personal care more so than partnered women.

Comparing partnered men to single men, after controlling for age trends, single men appear to increase food preparation time and overall home production time more than partnered men after retirement, and to decrease market work time more than partnered men in postretirement ages.

These comparisons do not provide strong evidence that partnered individuals are making larger adjustments in home production time than singles. Thus, there is not strong evidence here that marital bargaining is playing a large role in the shifts in time allocation after versus before retirement.

DISCUSSION AND CONCLUSION

This chapter presents some descriptive evidence that home production time increases after retirement. This is consistent with economic theory on the allocation of time: as the opportunity cost of time falls

at retirement, the implied price of home produced goods falls relative to market-produced substitutes. Therefore, we should expect that time allocated to home production will rise while money expenditures fall. Both partnered men and women increase home production time. The absolute increase is larger for women—33.7 minutes per day relative to men’s 23 minutes per day—but the percentage increase for men is larger—22 percent relative to 20 percent.³ This implies about a 21 percent increase in home production time at the household level when both partners move into retirement ages. This is a substantial change, and could plausibly explain the decreases in money expenditures after retirement that have been found in various studies.

These findings are consistent with an increase in the substitution of home production time for money expenditures on goods and services after retirement. Zick and Bryant (2008) find that home production time serves to decrease income inequality among households in 1975 and in 2003. By adding the value of household production to money income, Zick and Bryant find that home-production time increases the total consumption possibilities of households with lower incomes relatively more than households with higher money incomes. To the contrary, Hamermesh (2008) finds that households that spend more money on food also spend more time on food, suggesting that time and money are not easily substituted, at least with regard to food. However, Hamermesh does not include postretirement-age individuals in his sample, and the model used may not accommodate well the large discrete shift that we might expect to occur in home production at retirement.

I find here that consumption time also increases in postretirement ages. Time spent in social and leisure activities, and time spent eating and drinking also increases. This implies additional substitution in consumption, adding to the argument that the overall level of well-being, and thus marginal utility of consumption, may not change discretely at retirement, unlike the conclusion drawn in studies based on expenditure data.

We cannot necessarily interpret the “effects” reported here as causal. For example, an increase in home production time may not be “caused by” retirement, but rather jointly chosen with retirement timing. If we were to impose retirement on individuals unexpectedly, then responses may be very different from changes that are found here. The

interpretation offered here is that individuals may voluntarily decrease money expenditures and make up for that decrease by increasing home production time and more time-intensive forms of consumption, such as leisure. Thus, there may not be a discrete drop in welfare at retirement, as expenditure-based studies suggest. However, it is also plausible that individuals may increase home production out of need rather than choice if they have undersaved and are surprised by this realization at retirement age. These data cannot distinguish between those two interpretations.

While these estimates are primarily descriptive, they present strong suggestive evidence that time spent in both production and consumption increases after retirement. Future research planned by this author will explore these changes in greater detail.

Appendix 4A

Economic Theory of the Life Cycle

In a simple life-cycle model of consumption, individuals maximize utility over n periods given W , the present discounted value of lifetime income, and the real market rate of interest, r :

$$\begin{aligned} \max U &= U(c_1, c_2, \dots, c_n) = u(c_1) + u(c_2) + \dots + u(c_n) ; \\ \text{s.t. } W &= c_1 + \frac{c_2}{1+r} + \dots + \frac{c_n}{(1+r)^{n-1}} . \end{aligned}$$

If the sub-utility function $u(c_i)$, is invariant to time, so that future consumption is not discounted an individual will optimize by smoothing his or her marginal utility of consumption over time:

$$MU_{c_i} = (1+r)^{j-i} MU_{c_j} \quad \forall i < j .$$

In the presence of a positive real interest rate, consumption would increase in a smooth gradual fashion over the lifetime. However, the period-specific utility function may change as one ages so that, holding consumption constant, one's marginal utility may either rise or fall with age.

Notes

1. There is a difference in this category when using the three-year age range on either side of retirement ages. In that sample, women significantly decrease time in religious activities and men's time in this activity does not change.
2. I classify those living with a spouse or partner as "partnered" and those not living with a spouse or partner as "single," regardless of marital status.
3. These percentages are calculated based on mean times for men or women from Table 4.1 and from the second specification in Tables 4.2 and 4.4.

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