Time Use for Consumption and Household Production of Food: Is There a Retirement-Consumption Puzzle in Germany?

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Abstract

In order to test whether a retirement-consumption puzzle does exist, we examine how food-related time use alters within the 50+ generation in Germany due to retirement. Based on the German Time-Use Survey, time-use patterns of retired and non-retired persons are compared statistically and determinants of time-use are elaborated by the use of double-hurdle and multiple regression models. There is no indication of a retirement-consumption puzzle but of a planned behavioral change in a new phase of life. Work-related food-away-from-home consumption is substituted by food production and consumption at home and associated shopping activities. Leisure-related away-from-home consumption gains importance for a portion of pensioners. These impacts are strong and highly significant for German households.

Keywords: Retirement-consumption puzzle, food-at-home consumption, food-away-from-home consumption, household production, time-use data, generation 50+

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1   Introduction

Constant or negative population growth rates in industrialized countries and a higher life expectancy have induced a demographic change in which the share of elderly persons has increased substantially. Thus, the economic behavior of the elderly has gained a rising interest over the last decade in macroeconomics, consumer economics, and agricultural and food economics. One particularly lively debate has been related to whether a retirement-consumption puzzle exists and how the empirical evidence can be explained.

Although broad empirical evidence has emerged from country studies (for surveys see Hurst 2008 and Attanasio and Weber 2010), a comprehensive study of the implications of retirement for the consumption and household production of food is lacking. We intend to provide such an analysis with time-use data for Germany.

The retirement-consumption puzzle is closely related to the life-cycle theory of income and consumption (Modigliani and Brumberg 1954). According to basic versions of this theory, rational forward-looking consumers are expected to save at younger ages and to dissave at older ages in order to keep a constant utility level over the life-cycle. Doubts have been raised in theoretical and empirical analyses against this consumption-smoothing hypothesis. Firstly, Hamermesh (1984) argued that savings of consumers are too low to keep the level of consumption constant after retirement. Secondly, it was shown that income and consumption expenditures dropped with retirement in the USA (Bernheim, Skinner and Weinberg 2001), in the United Kingdom (Banks, Blundell and Tanner 1998; Smith 2006), in Italy (Battistin et al. 2009), Japan (Wakabayashi 2008), and Germany (Lührmann 2010). The joint decline of consumption and income was not consistent with rational, forward-looking behavior in extended life-cycle models, by Banks, Blundell and Tanner (1998) and Bernheim, Skinner and Weinberg (2001) and these authors see this as an indication of a retirement-consumption puzzle. Other authors challenge the existence of a retirement-consumption puzzle. For U.S. households, Aguiar and Hurst (2005) confirm a fall of food expenditures by 17 % at retirement, but it is matched by a 53 % increase in time spent on food production at home. Moreover, the time spent shopping rises strongly and leads to a certain decline of unit values of grocery items after retirement. According to the authors, "neither the quality nor the quantity of food intake deteriorates with retirement status" (Aguiar and Hurst 2005, p. 919). For Germany, Lührmann (2010, pp. 241-242) concludes, too, that households flexibly adapt to the change in time and money resources in retirement. Whereas she finds that food expenditures fall with retirement, Burzig and Herrmann (2012) refer to an increase of food-at-home expenditures after controlling for the effects of other variables like income and age.

Implications of retirement on consumption expenditures, food expenditures, and time use for home production have been analyzed. What is lacking is a detailed analysis of changes in all food-related time-use patterns due to retirement and a comprehensive analysis of determinants affecting food-related time use. We will provide such an analysis in the following sections:

(i)   We elaborate the time-use pattern of the German generation 50+ with regard to food production in the households, food consumption at home and away from home as well as shopping. Firstly, time-use patterns of retired and non-retired persons and households are compared statistically. Secondly, the implications of retirement on time-use are elaborated under ceteris-paribus conditions within multivariate analyses.

(ii)   Like Lührmann (2010), we utilize data from the German Time Use Surveys but with a different focus. Whereas Lührmann concentrated on aggregate time use for home production, we disaggregate time use for food production and consumption in the household, for food consumption away from home and shopping.

(iii)   Apart from the influence of retirement, we intend to explain food-related time use within the generation 50+ econometrically. We derive how other household characteristics and sociodemographic variables affect time use in order to draw general lessons on food consumption behavior of the German elderly.

The article is organized as follows. After this introduction and literature review, we explain the data in Section 2 and provide statistical evidence on how food-related time-use alters with retirement. In Section 3, the methodology of a multivariate analysis of the determinants of time use for food production, food consumption at home and away from home, and for shopping is explained and quantitative results from double-hurdle and multiple regression models are presented. In Section 4, we discuss these results in the context of the literature on the retirement-consumption puzzle, and draw conclusions in Section 5.

2   Data and Descriptive Statistics on Consumption and Household Production of Food

The data used in this paper are drawn from the cross-sectional German 2001/02 Time-Use Survey (TUS). It is the second and most recent TUS provided by the German Federal Statistical Office; the first dates back to 1991/92. Both are regarded as "one of the most comprehensive time use studies in Germany" (Destatis 2012).

The German 2001/02 TUS was conducted as a representative quota sample of private households throughout Germany. The German microcensus formed the basis for the quotation and projection. The data were collected in written form via time-use diaries, personal questionnaires and household questionnaires. Time-use diaries were kept by all household members aged ten years or older. For a three-day period (including one weekend day), the entire 72 hours were documented in ten-minute intervals. In the diaries, the main activity, the side activity, the individuals present while performing the indicated activity, and the location or means of transportation used were recorded. Sociodemographic and socioeconomic characteristics of diary-keeping individuals and surveyed households were collected through personal and household questionnaires, respectively. Altogether, approximately 5,400 private households, 12,600 individuals and 37,700 diary days were covered (Statistisches Bundesamt 2005, pp. 1 et seq.).

Subject to the present investigation are household heads aged 50 to 80 years and, if applicable, the respective spouse or life partner (regardless of age), hereinafter collectively referred to as household. However, only households for which a complete set of information is available are included in the analytical sample. That is, households with lacking information on either of the considered household members or on certain household characteristics or with incomplete time use diaries were dropped altogether from the sample). After imposing these restrictions, an analytical sample of 2,020 private households, 3,304 male and female individuals and 9,902 diary days was obtained.

Basic information in the database refers to whether or not households participate in the activities Food Production at Home (*DFPAH*), Food Consumption At Home (*DFCAH*), Food Consumption Away From Home (*DFCAFH*) and Shopping (*DSHOP*). At the individual level, participation or non-participation is captured by a dummy variable being unity if an individual in the household participates in the activity and zero otherwise. Moreover, the amount of time

used for the activities Food Production At Home (*FPAH*), Food Consumption At Home (*FCAH*), Food Consumption Away From Home (*FCAFH*) and Shopping (*SHOP*) is measured. Later, in Section 3, these variables will be used as dependent variables in multivariate analyses. The effect of retirement on all these activities will then be analyzed. Hence, a dummy variable, i.e. *RETIRED*; is used which is equal to one if the individual is retired and zero otherwise. The definition of retirement is based on an individual's social status. It is a rather strict classification, since any pattern of labor market participation during retirement is completely ruled out. This, however, enables the identification of the maximum household production potential due to retirement. For comparison, the time use of unemployed (*UNEMPLOYED*) and non-working (*NON_WORKING*) individuals is also taken into account, captured through corresponding dummy variables which are defined according to the reported social status. An empirical overview of the nature of the relationship between the labor market status and the activities *DFPAH*, *DFCAH*, *DFCAFH* and *DSHOP* as well as *FPAH*, *FCAH*, *FCAFH* and *SHOP* is provided in Figures 1 and 2, respectively.

Figure 2 illustrates *FPAH*, *FCAH*, *FCAFH* and *SHOP*, i.e. the average amount of time devoted by working, unemployed, retired and non-working individuals to the four activities. One key message can be drawn from Figure 2: All types of non-labor market participation (i.e. unemployed, retired and non-working individuals) are associated with, on average, more time being spent on all four activities considered, compared to working individuals.

Figure 1 plots the sample's degree of participation in the activities. It reveals that participation in home-food-production-related activities (i.e. *DFPAH* and *DSHOP*) is expanded, whereas participation in activities related to out-of-home food purchases (i.e. *DFCAFH*) is reduced, as the labor market is left (i.e. for unemployed, retired and non-working individuals). On the contrary, no major difference is evident in *DFCAH* between the four types of labor market status. It is as high as 95 % or more for all groups.

Bringing together the findings of Figures 1 and 2, it can be concluded that, overall, the importance of the activities Food Production At Home and Shopping grows substantially as individuals exit the labor market, given that both the participation rates and the actual time allocated to these activities increase strongly. The absolute amount of time devoted to the activity Food Consumption At Home is also higher when no labor market participation takes place, but the difference in time use is smaller than found for *FPAH* and *SHOP*, given that all four categories of labor market status have nearly identical participation rates. For *FCAFH*, it might very well be possible that the total amount of time dedicated to this activity falls, given that its frequency drops strongly. However, when the activity occurs, the actual amount of time spent on *FCAFH* increases starkly. Consequently, these findings support the importance of home production in explaining the retirement-consumption puzzle. However, the robustness of these preliminary results to the inclusion of additional personal, household and diary-day characteristics with a conceivable effect on the activities of interest still needs to be verified.

3   The Determinants of Time Use for Food Production, Food Consumption and Shopping: Methodology and Empirical Results

3.1   *Methodology*

The methodology used to quantify the factors influencing food production at home, food consumption at home and away from home and shopping differs between these activities. The distinctive feature of *FPAH*, *FCAFH* and *SHOP* lies in their considerable number of zero-value observations. This is a plausible finding, though, since *FPAH* is a rather gender-specific

activity, and *FCAFH* and *SHOP* are activities not necessarily performed on a daily basis. The substantial presence of zero observations, however, renders the use of a regular OLS invalid, as biased estimates would be obtained. Thus, a double-hurdle approach is applied to take into account the restriction associated with these activities.
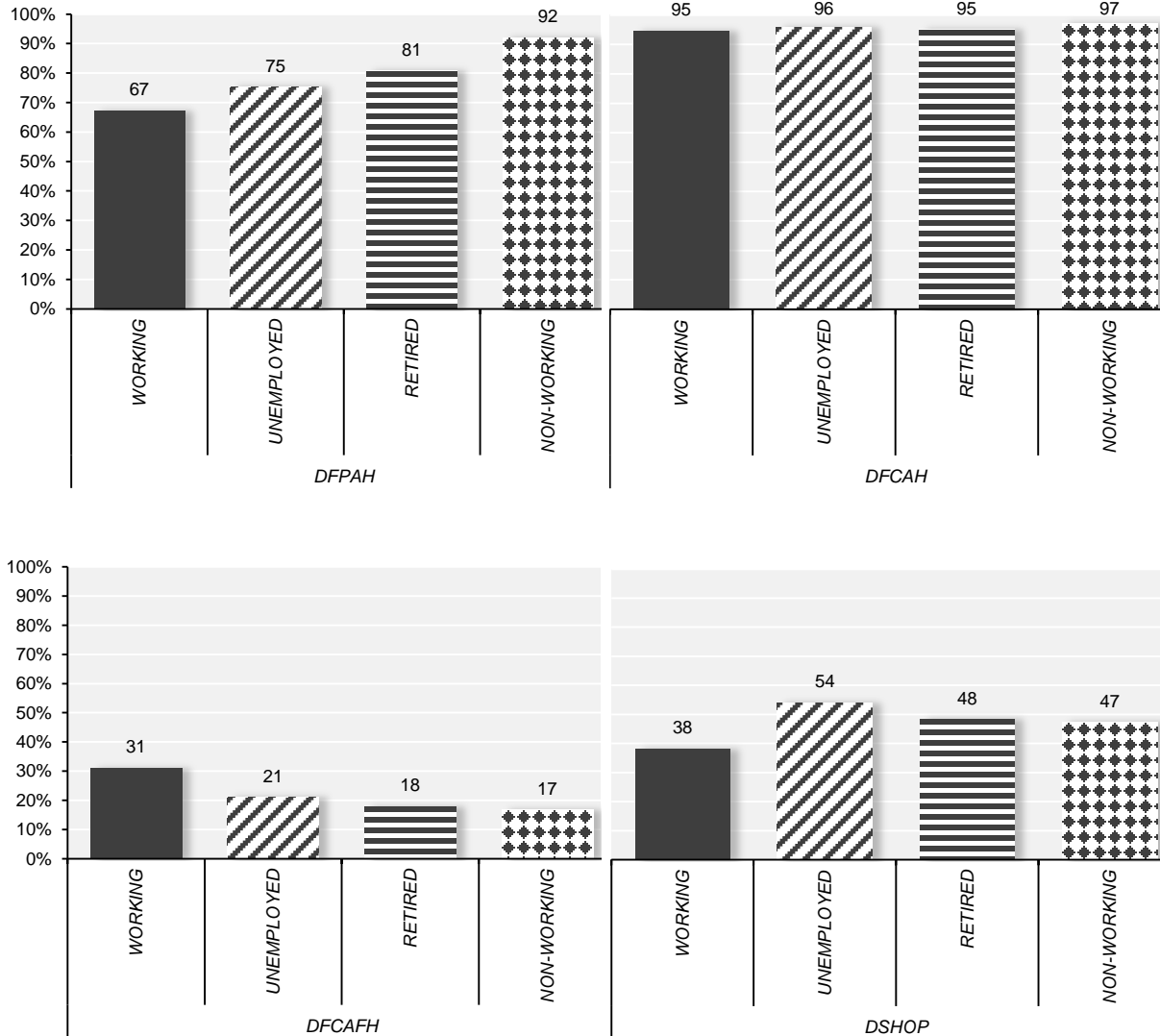
Source: Own computations based on the German 2001/02 Time Use Survey.

Figure 1: Participation in Food Production at Home (*DFPAH*), Participation in Food Consumption At Home (*DFCAH*), Participation in Food Consumption Away From Home (*DFCAFH*) and Participation in Shopping (*DSHOP*) by Labor Market Status [in %]
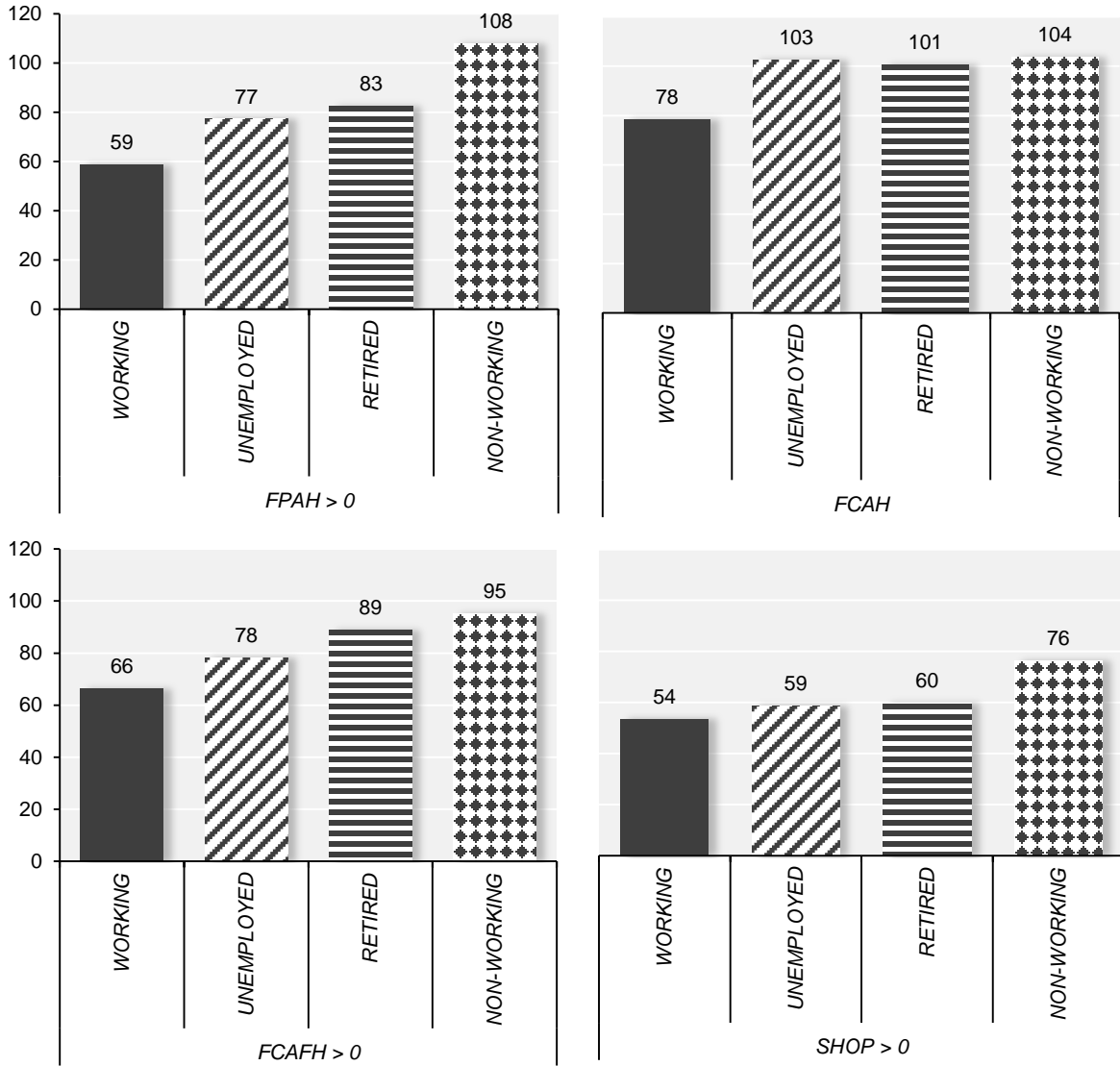
Figure 2: Average Intensity of Participation in the Activities Food Production At Home (*FPAH*), Food Consumption At Home (*FCAH*), Food Consumption Away From Home (*FCAFH*) and Shopping (*SHOP*) by Labor Market Status [in minutes/day]a)

The double-hurdle model, originally attributable to Cragg (1971), assumes that an individual's decision process is made up of two components which may be influenced by different factors. First, the person decides on whether or not to participate in the considered activity. Second, after having decided to participate, the individual determines the intensity of participation, i.e. the amount of time devoted to the activity. The utility derived from the participation decision is given by the latent variable D_i, whereas the utility related to the decision of participation intensity is represented by the latent variable y_i^*. Both hurdles must be overcome to observe a positive amount of time spent on the considered activity y_i (Cragg, 1971, pp. 829 et seq.; Blundell and Meghir, 1987, pp. 179 et seq.). Following Blundell and Meghir (1987), the double-hurdle model can be written as:

$$y_i = y_i^* \qquad \text{if } y_i^* > 0 \text{ and } D_i > 0 ; \tag{1}$$

$$y_i = 0 \qquad \qquad \text{otherwise.}$$

The dependent variable, y_i, is the time devoted to one of the following activities: Food Production At Home (*FPAH*), Food Consumption Away From Home (*FCAH*), and Shopping (*SHOP*). The latent variable, D_i, is the decision to participate in food production at home, food consumption away from home, and shopping, respectively. We estimate

$$y_i = f \{RETIRED_i; \ Z_i^1\} \quad \text{and} \tag{2}$$

$$D_i = f \{RETIRED_i; \ Z_i^2\} \tag{3}$$

for all three activities. The latent variables y_i^* and D_i are explained by the status of being retired or not (*RETIRED*) and personal characteristics (Z^1 and Z^2 respectively). In the double-hurdle model, different from a Tobit model, the vectors Z^1 and Z^2 do not necessarily have to include the same variables. In our estimates, however, we decided to include the same covariates in both stages of the double-hurdle model to show that some determinants affect only the participation decision or the intensity of participation. The first hurdle, equation (2), is estimated with a probit regression. The second hurdle, equation (3), is estimated with a truncated regression.

Food consumption at home, as opposed to the activities previously discussed, exhibits only a negligible number of zero-value observations. Thus, a linear multiple regression model is specified and estimated using OLS:

$$y_i = FCAH = f \{RETIRED_i; \ Z_i^3\}. \tag{4}$$

RETIRED is defined as above and Z_i^3 is again a vector of personal characteristics. In order to allow a comparison between activities, we decided to introduce the same set of independent variables in the estimations for the four different activities.

The dependent variables in the econometric analysis, i.e. *FPAH*, *FCAH*, *FCAFH* and *SHOP*, are all metric-scaled and measured in minutes per day. In the case of shopping time, it has to be borne in mind that *SHOP* captures total shopping time. A further disaggregation into grocery and non-grocery shopping was not possible. Metrically-scaled independent variables are *AGE* and *HHSIZE*, whereas all other explanatory variables are nominal-scaled, including *RETIRED*. Some of these dummy variables are based on subjective assessments such as a person's health status (*POOR_HEALTH*) and the characterization of the diary day (*UNUSUAL_DAY*).

3.2   Empirical Results

In Table 1, the estimates of the models specified in Section 3.1 are reported. The regressions confirm the preceding descriptive findings related to the impact of retirement on *DFPAH*, *DFCAH*, *DSHOP*, *FPAH*, *FCAH*, *FCAFH* and *SHOP*, even after the inclusion of other control variables for personal, household and diary day characteristics. Results point to a significant increase in food production at home with transition from labor market participation to retirement. On the one hand, retirees are significantly more likely to participate in food production at home and, on the other hand, allocate significantly more time to it. Specifically, among those involved in food production at home (*DFPAH* = 1), retired individuals spend on average additional 46 minutes per day on this activity compared to working individuals. Consistently, the time devoted to food consumption at home by retirees significantly exceeds

that of employees by, on average, 17 minutes per day. Reverse patterns are observed for participation in and intensity of food consumption away from home. While the likelihood ($DFCAFH = 1$) falls significantly as individuals retire, each visit paid to the out-of-home food market by pensioners lasts on average 34 minutes per day longer than an employee's one, though only at a significance level of 10 %. This suggests a shift from frequent, work-related and short-lasting towards infrequent, leisure-related and time-intensive out-of-home food consumption, arising from the higher availability of time during retirement years. Essentially, a substitution of processed goods purchased on markets and of away-from-home food consumption and hence of work-related expenditures by home production of food takes place. The substitution process seems consistent with rational-choice decisions after retirement and those conscious decisions may be associated with a drop in food expenditures. There is no indication of a retirement-consumption puzzle. The cost-reduction potential is further supported by the findings for the activity shopping. With retirement, the purchase likelihood increases significantly, as the actual time spent on shopping does. More precisely, retirees spend on average 40 minutes longer on purchasing compared to employees. This gives rise to the presumption that, again, given the higher availability of time during retirement years, a great effort is undertaken to come upon bargains, resulting in lower consumption expenditures.

By and large, unemployed and non-working individuals display similar patterns in *DFPAH*, *DFCAH*, *DSHOP*, *FPAH*, *FCAH*, *FCAFH* and *SHOP* as retired individuals. Each form of non-participation in the labor market leads, ceteris paribus, to a significant increase in the time devoted to food production and food consumption at home as well as shopping. Although the additional time use for food production at home and shopping is clearly highest for the category *NON-WORKING*, the higher point estimates of the coefficients in the truncated regressions are not significantly different from those for the categories *RETIRED* and *UNEMPLOYED*. It seems that non-participation in the labor market in general, be it unemployment, retirement or non-working itself, is associated with a decline in the relative price of time, leading to a replacement of market-purchased by home-made goods and services.

There are other independent variables apart from *RETIRED* that affect food production, food consumption and shopping significantly. The effect of *AGE* is to reduce out-of-home activities in favor of home-related activities, as individuals grow old. This is, evidently, a consequence of the natural ageing process, as with advancing age mobility decreases and limits daily activities. The presence of *POOR_HEALTH*, as one might expect, gives rise to comparable patterns. The variable *MALE* is statistically significant in different estimations. A gender-specific division of labor commonly encountered in older generations, which make up a large share of the present sample, is apparent. Typical housekeeping activities, such as food production at home and shopping, are shown to be less likely performed by males than by females. On the contrary, *FCAH*, a non-gender-specific activity, is, expectedly, not significantly different between men and women. *HIGH_SCHOOL* stands for a higher educational attainment and is predominantly associated with a lower participation intensity across all four activities considered. Several explanations can be proposed.

Table 1: Estimation Results for the Activities Food Production At Home (*FPAH*), Food Consumption At Home (*FCAH*), Food Consumption Away From Home (*FCAFH*) and Shopping (*SHOP*)

Independent variables	Double-Hurdle Model[a] Food Production At Home		Linear Model Food Consumption At Home	Double-Hurdle Model[a] Food Consumption Away From Home		Double-Hurdle Model[a] Shopping	
	DFPAH[b]	*FPAH > 0*[c]	*FCAH*	*DFCAFH*[b]	*FCAFH > 0*[c]	*DSHOP*[b]	*SHOP > 0*[c]
AGE	0.0021 (0.50)	1.3681 *** (4.12)	0.6894 *** (4.53)	-0.0109 ** (-2.94)	1.4620 (1.45)	-0.0054 (*) (-1.88)	-1.0939 * (-2.14)
MALE	-0.9504 *** (-19.27)	-95.4007 *** (-13.02)	1.3894 (0.99)	0.1750 *** (4.74)	-2.3213 (-0.25)	-0.1389 *** (-4.07)	0.5760 (0.11)
RETIRED	0.3045 *** (4.56)	46.1357 *** (6.85)	16.9733 *** (6.79)	-0.3129 *** (-5.25)	33.7713 (*) (1.66)	0.3010 *** (6.48)	40.2038 *** (3.87)
UNEMPLOYED	0.2730 * (2.17)	60.9982 *** (5.44)	23.8039 *** (5.38)	-0.2599 * (-2.37)	56.7862 (1.62)	0.4167 *** (5.00)	25.8324 * (2.08)
NON_WORKING	0.5949 *** (5.09)	71.7992 *** (7.87)	23.5414 *** (7.17)	-0.3708 *** (-4.32)	43.6745 (*) (1.81)	0.2021 ** (3.09)	64.5521 *** (5.19)
POOR_HEALTH	0.0211 (0.39)	10.8385 * (2.43)	3.9267 * (2.07)	-0.0938 * (-2.10)	-10.5117 (-0.85)	-0.0617 (*) (-1.79)	-7.4834 (-1.24)
HIGH_SCHOOL	0.0695 (1.21)	-23.6003 *** (-4.14)	-4.3956 * (-2.04)	-0.0010 (-0.02)	-31.2455 * (-2.05)	0.0961 * (2.36)	-11.9005 (*) (-1.65)
HHSIZE	-0.0706 * (-2.55)	18.3461 *** (7.43)	10.4259 *** (9.21)	-0.1243 *** (-4.50)	2.9859 (0.50)	-0.0652 *** (-3.20)	10.7966 ** (2.97)
MONETARY_POOR	-0.0191 (-0.16)	-14.3002 (*) (-1.77)	-3.1175 (-0.80)	-0.2164 * (-2.19)	-62.9720 (*) (-1.71)	0.0441 (0.58)	-9.1717 (-0.82)
WEST	-0.1757 * (-2.52)	-12.0857 * (-2.08)	-4.0079 (-1.35)	-0.0363 (-0.56)	61.9556 ** (3.03)	-0.0097 (-0.21)	1.6071 (0.19)
WEEKEND	0.1078 *** (3.30)	13.1074 *** (4.25)	10.6915 *** (7.54)	-0.0452 (-1.11)	14.0909 (1.38)	-0.7525 *** -21.11	-14.2699 (*) (-1.93)
UNUSUAL_DAY	-0.6276 *** (-10.93)	-10.9310 (*) (-1.88)	-26.8418 *** (-9.79)	0.7575 *** (13.39)	153.5607 *** (7.01)	-0.0665 (-1.52)	-6.5159 (-0.81)
Constant	1.3103 *** (4.77)	-91.9269 *** (-4.02)	22.6602 * (2.31)	0.1629 (0.68)	-249.7878 *** (-3.81)	0.4607 * (2.49)	4.5254 (0.14)
R²	0.333 [d]	- [e]	0.108	0.178 [d]	- [e]	0.165 [d]	- [e]
F	64.08 ***	24.12 ***	36.55 ***	27.79 ***	7.46 ***	45.63 ***	3.46 ***
No. of observations	9,902	7,467	9,902	9,902	2,295	9,902	4,378
Population size	12,878	9,978	12,878	12,878	2,835	12,878	5,836

[a] The first hurdle, i.e. the participation decision, involves a probit regression and the 2nd hurdle, i.e. the decision of participation intensity, is modelled with a truncated regression. – [b] The first hurdle is a dummy variable equal one if more than zero minutes were spent on the given activity and zero otherwise. – [c] The second hurdle is a metric variable which includes observations only if more than zero minutes were spent on the considered activity. – [d] McKelvey and Zavoina's pseudo-R^2 for probit regressions. – [e] No goodness-of-fit measure is available for truncated regressions using Stata. – ***, **, *, (*) Statistically significant at the 0.1 %-, 1 %-, 5 %- and 10 %-level. – Heteroscedasticity-robust t-statistics clustered at the household level are provided in parentheses. – Sampling weights are used. – Variables are defined in Table 1.

Source: Own computations based on the German 2001/02 Time Use Survey.

A higher educational attainment gives reason to expect a higher household income which, in turn, enables households to improve the state of household technology. Lower values of *FCAH*, *FCAFH* and *SHOP* with higher educational attainment might stem from the lower availability of time due to higher occupational positions. A larger *HHSIZE* results in a falling participation in and a growing intensity of activities. This, however, is rather seen as a regulated daily routine in large families. Poverty as measured by *MONETARY_POOR* essentially affects food consumption away from home in a restricting manner, given the low availability of financial resources. Region- and time-specific differences are indicated by the coefficients of *WEST*, *WEEKEND* and *UNUSUAL_DAY*. Western Germans distinguish themselves from Eastern Germans mainly in their lower propensity to produce food at home. Though individuals from both regions are equally likely to consume food away from home, Western Germans devote approximately 60 minutes longer to this consumption activity than Eastern Germans. On weekends, the performance of household-related activities is intensified significantly compared to work-days, due to the greater availability of time. Whereas consumption away from home is unaffected by the weekday, shopping activities are shown to be predominantly postponed to workdays. Finally, unusual days are characterized by a sharp fall in home-related activities and, respectively, a very strong increase in the activity of food consumption away from home. On unusual days, approximately 150 minutes on average are spent additionally consuming food away from home compared to ordinary days.

4   Discussion

The empirical findings allow some important conclusions on how retirement affects (i) home production of food and food consumption in general and (ii) the validity of a retirement-consumption puzzle in Germany. In general, the results indicate that elderly people alter their food-related behavior substantially after retirement. Changes appear consistent with a household-production-function approach in which basic decision parameters change. In their new life situation, as they gain flexibility and considerably more time for leisure-related activities, a strongly revised time-use pattern occurs. All empirical findings can be rationalized and, thus, we see no support for a retirement-consumption puzzle on the basis of time-use data.

It is very clearly shown by the results in Table 1 that a substitution of market-related activities by home-oriented activities emerges in the context of food consumption. After retirement, the probability of consuming food away from home declines whereas the probability of engaging in food production at home rises as does the average time of doing so. These impacts are further strengthened by the significant influence of other sociodemographic characteristics of households that may – to a certain extent – be associated with retirement. An increasing *AGE* and the variable *POOR_HEALTH* additionally raise the dependent variable *FPAH* and diminish the likelihood that participation in food-away-from-home consumption occurs, i.e. that *DFCAFH* is unity. The important role of home production after retirement is confirmed by the fact that the probability of shopping and the time used for shopping is significantly raised by the variable *RETIRED*. Although *SHOP* measures the aggregate shopping time of individuals, it is very likely that the same effect would hold if a more disaggregate measure of time use for grocery shopping was available.

In a methodological sense, it is the strength of the data basis and the model used that the pure effect of retirement can be distinguished from the effects of age and the perceived health status. In earlier studies, such as Aguiar and Hurst (2005), retirement had to be approximated by the age of individuals since no retirement variable was available. Given the separate

impacts of the individual determinants in Table 1, it seems important to model the time use for different food-related activities each with the retirement, age and health variables.

The strong substitution effects after retirement in our analysis suggest to reconsider the impact of retirement on food expenditures, too. As the time use for home production and consumption of food rises with retirement as does the time use for shopping, this might theoretically be associated with either increasing or decreasing food-at-home expenditures. When work-related out-of-home consumption declines and is substituted at least partially by at-home production of food, more foods have to be purchased as inputs for cooking and household production. Ceteris paribus, this will raise food expenditures for at-home consumption. However, time use grows not only for household production, but also for shopping. It is plausible that more use can be made of bargains and that food expenditures fall with a lower unit value. For Germany, recent studies by Burzig and Herrmann (2012) and DRESCHER and Roosen (2013) showed the uniform result that the pure retirement effect – apart from income and age effects – is an increase of per-capita food expenditures for at-home consumption. This seems very consistent with our findings suggesting that growing food expenditures are driven by the higher demand for food inputs which clearly overcompensate a potential, opposite effect of cheaper purchases.

Interesting questions arise from our analysis of time use for food consumption away from home. Within *FCAFH*, there seems to be a strong substitution of work-related by leisure-related away-from-home consumption. Apparently, *DFCAFH* falls with retirement. This is very plausible as many occasions of work-related food consumption away from home disappear. On the other hand, it is striking that the time per visit rises with retirement in the context of leisure-related *FCAFH*. This effect is statistically significant, but only at the 10 %-level of statistical significance. There is a large standard deviation of time use for *FCAFH*. The empirical findings suggest that more detailed analyses are needed as a very positive impact of retirement on *FCAFH* seems to exist for some segments of retirees. It is likely that very active segments of retirees may play a crucial role for the food service and hotel sectors, particularly in some touristic regions.

5   Implications

Our analysis has some immediate implications with regard to policy and research. The findings do not call for direct responses with social policy measures. As the changing time-use patterns are generally consistent with a forward-looking rational behavior around retirement, compensatory measures for unexpected income drops are not necessary. But it has to be borne in mind that our results refer to time use and not to changes in the level or quality of food consumption and, thus, not to utility directly. It may still occur that some of the adjustment of pensioners' time use is driven by an unexpected income loss due to retirement. More research on changes in food quality and quantity is required to elaborate a comprehensive view for Germany on how retirement affects food expenditures, food-related time use as well as food quality and utility.

With regard to market and consumer research, we see strong advantages of structural modeling of decisions in different phases of life as suggested in Section 4. A much richer explanation of the role retirement, age, income and health play for time use and demand is possible. Demand models in which, for example, changing food consumption in older age is captured superficially by an age variable alone are clearly inappropriate.

Many challenges for marketing and consumer research do remain. The time-use patterns within the 50+ generation show large standard deviations. Most likely, major drivers of

growth in certain market segments such as food-away-from-home consumption could be identified by an analysis of those retired persons who strongly increase their time used for those activities after retirement.

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