Home Production and Retirement in Couples: A Panel Data Analysis[1]

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Abstract

We analyse the effects of retirement of one partner on home production by both partners in a couple. Using longitudinal data on couples in Germany, we control for fixed household specific effects to address the concern that retirement decisions are correlated with unobserved characteristics that also affect home production. We find that own retirement significantly increases the amounts of home production of both men and women. Moreover, we find significant negative cross-effects of retirement on home production done by the partner. The fall in household income at retirement of one of the partners is largely compensated by an increase in total household production.

JEL codes: J22, J29, J14

Key words: time allocation, home production, retirement, couples

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1. Introduction

Retirement is one of the main economic and social changes in the lives of most individuals and their households. Most people retire abruptly from a full-time job to a situation where they no longer take part in paid work. This not only affects their personal and household income, but also their social network and the activities on which they spend their time. For individuals in couples, retirement of the partner may have an important impact through household income, but also through the changes in the time spent by the retired partner on, for example, household production or joint leisure activities. The effects of retirement on the other partner have been used in the retirement literature to explain, for example, the stylized fact that many couples retire at almost the same point in time, in spite of an age difference (Hurd, 1990; Gustman and Steinmeier, 2000, 2009).

The economics literature has emphasized the stylized fact that household consumption expenditures drop substantially upon retirement of the main earner, known as the retirement consumption puzzle (Hamermesh, 1984; Banks et al., 1998). Several explanations for this puzzle have been given (see, e.g., Hurst, 2008, and Battistin et al., 2009), such as a reduction in work related expenses, or a fall in required consumption expenditures to achieve a given welfare level because of an increase in time spent on household production activities. For example, Aguiar and Hurst (2005, 2007) find that after retirement, individuals in the US spend more time on shopping and preparing food, leading to a lower effective price of food consumption. Hurd and Rohwedder (2008) find that after retirement, men and women in the US spend more time on house cleaning, and men also spend more time on home improvements and gardening or yard work, probably reducing the need for expenditures on outsourcing.

Stancanelli and van Soest (2012), unlike the studies mentioned above, also consider the effect of retirement of one spouse on the time spent on home production by the partner. Using cross-section data on French couples around retirement age, they find that men respond to their wives'

retirement by significantly reducing the time they allocate to home production, while there is no significant effect of men's retirement on their wives' hours of home production. Battistin et al. (2009) and Stancanelli and van Soest (2012) account for the potential endogeneity of retirement decisions exploiting a regression discontinuity approach, based upon the minimum age for receiving retirement benefits in Italy and France. Aguiar and Hurst (2005) also allow for endogeneity of retirement, but make the stronger assumption that age can be used as an instrument for retirement. None of these studies use panel data.

The current study uses longitudinal data on time use for German couples in the age group 45 - 75 that are followed over time from 1993 until 2009. The data set not only contains rich background information, but also has survey information on the time spent on various types of activities (housework, errands, household repairs/gardening, hobbies, education, child care), similar to the time use information in the HRS consumption and activities module (see Hurd and Rohwedder, 2008).

Previous research has shown that this type of retrospective survey information has certain drawbacks compared to the detailed diary information typically collected in specific time use surveys, but does lead to reliable results in multivariate analysis where the focus is not on the absolute amounts of time spent on certain activities but on the relations between time use and other variables (see Bonke, 2005, and Kitterød and Lyngstad, 2005). The potential drawbacks of the retrospective nature of the survey questions are in our view amply compensated by the unique longitudinal nature of the data, particularly since this allows for considering within household changes at retirement and for the use of household specific fixed effects. Incorporating these makes it possible to identify the causal effects of retirement while controlling for time persistent confounding factors that simultaneously affect retirement and time allocation. This provides an alternative to the identification strategy of Battistin et al. (2009) and Stancanelli and van Soest (2012) which appears to be less convincing in the German

institutional setting than in Italy or France, because there are several standard retirement ages but not one unambiguous minimum retirement benefits eligibility age.

We analyse the effect of retirement of both partners on the time spent and the value of home production activities by both partners. We compare the results of fixed effects and random effects specifications imposing and not imposing independence between error terms and the retirement status variables. We argue that the fixed effects specification in which retirement is independent of the error terms but not of the household specific effects is the preferred specification. A regression discontinuity approach where we instrument retirement of both spouses with age dummies for several institutional retirement ages in Germany gives findings of similar magnitude but much less precision.

We find that own retirement significantly increases home production of both men and women, and that this increase compensates for most of the income loss at retirement. We also find significantly negative cross-effects of retirement on home production done by the partner, which partly undo the effects of increases in own home production. This leads to the conclusion that retirement of one partner leads to important adjustments in the home production of both partners, something that deserves more attention when trying to understand the impact of retirement on the economic and non-economic well-being of older couples.

2. Empirical approach

The aim of the empirical analysis is to analyse the impact of retirement of the husband and wife's[2] retirement (R_{it}^m and R_{it}^f , respectively) on hours of home production (h_{it}^m and h_{it}^f). The equations to be estimated are the following:

$$h_{it}^m = \beta_1^m R_{it}^m + \beta_2^m R_{it}^f + X_{it}\beta^m + \alpha_i^m + \nu_{it}^m , \qquad (1)$$

$$h_{it}^f = \beta_1^f R_{it}^f + \beta_2^f R_{it}^m + X_{it}\beta^f + \alpha_i^f + \nu_{it}^f , \qquad (2)$$

Here X_{it} is a row vector of control variables describing personal and household characteristics of husband and wife, β_1^j , β_2^j , and β^j are parameters to be estimated, α_i^j represents the time-invariant unobserved heterogeneity terms and ν_{it}^j the time-varying error terms, for *j = m, f*. Assuming that ν_{it}^j is identically and independently distributed and independent of X_{it}, R_{it}^m , and R_{it}^f and that α_i^j is normally distributed and independent of X_{it}, R_{it}^m , and R_{it}^f , the model is a standard random effects (RE) model that can be estimated with the standard estimator for linear RE models. The latter assumption may not hold if retirement (R_{it}^m , R_{it}^f) is related to time-invariant unobserved heterogeneity (α_i^j). For instance, preferences for leisure or productivity in market or non-market activities are potential drivers of both retirement and the allocation of non-working time. As a result, RE estimates of the parameters of interest are likely to be biased. The assumption of independence of explanatory variables and time-invariant heterogeneity can be relaxed using a fixed effects (FE) model and the corresponding within-group estimator.

[2] We also include cohabiting (heterosexual) couples but will often refer to the two partners in these couples as husband and wife for ease of exposition.

In order to assess the validity of our results, we also estimate the model using an identification strategy similar to Stancanelli and van Soest (2012), adjusted for the German institutional setting. Following Bonsang and Klein (2012), our instruments are indicators for reaching ages 60, 63 and 65 at which individuals can start collecting retirement benefits. Which of the three ages applies depends upon the individual's labour market history; see, e.g., Börsch-Supan and Jürges (2009). While reaching these specific ages has a direct effect on the probability of retirement, it is unlikely that the effect of age on home production is discontinuous at these (or other) ages, keeping retirement constant. In this case, we model retirement of both partners as fixed-effects models including the control variables X and six dummies that are equal to one when the individual or the partner has reached ages 60, 63 and 65. The equations for home production are then estimated using fixed-effects two-stage least squares estimators..

3. Data

3.1 Sample

The empirical analysis uses GSOEP data from 1993 to 2013. The GSOEP is a longitudinal household survey that has started in West Germany in 1984 and in East Germany in 1990.[3] We use data as of 1993 because this is the first wave where the questions about time use not only on weekdays but also during a normal Saturday and a normal Sunday are available. This is important since due to substitution of home production on weekdays and in weekends, using information on time use during weekdays only would overestimate the effect of retirement on total home production.[4] These questions are only asked once every two years and we only use

[3] The GSOEP is described in Wagner *et al.* (1993). It is sponsored by the Deutsche Forschungsgemeinschaft and administered by the German Institute for Economic Research (DIW Berlin) and the Center for Demography and Economics of Aging (Syracuse University).

[4] Preliminary analysis reveals that this is indeed the case – when individuals retire, their home production during weekends tends to fall (results are available upon request).

the waves in which they were asked.[5] This leads to an initial sample of 207,242 (person-year) observations. Among these, there are 144,954 for which the respondent reports living with a partner (married or not). This drops to 137,042 observations keeping only observations where demographic information about the partner is available (age and gender). Moreover, we drop 3,372 observations where both partners have the same sex. In the remaining sample, we only keep the 65,326 observations where both partners are both between 45 and 75 years old and then drop observations for which information on time use is either missing or unreliable,[6] leaving 51,046 observations. Finally, we drop all observations where individuals report not working but are observed going back to work in later waves, since we focus on retirement as definitive withdrawal from the labour market. The final sample includes 35,760 observations (17,880 men and 17,880 women) based on 6,277 couples who have been interviewed (biennially) on average 2.8 times between 1993 and 2013.[7]

3.2 The measure of home production

GSOEP has survey questions on the number of hours respondents spent on several activities on a normal weekday, a normal Saturday, and a normal Sunday; see Figure 1 for the exact wording of the questions. These activities include: job, apprenticeship, and/or second job (including travel time to and from work); errands (shopping, trips to government agencies, etc); housework (washing, cooking, cleaning); child care; care and support for persons in need of care; education

[5] Moreover, the question regarding time use was slightly different before 1991. Before 1991, it did not make a distinction between time devoted to housework (such as washing, cooking, or cleaning) and time devoted to errands (such as shopping, trips to government agencies…).

[6] In particular, we drop observations where the sum of hours spent on all time-use categories exceeds 126 (7x18) hours per week.

[7] In order to test the sensitivity of our results according to the sample selection, we also estimated our model without excluding individuals observed going back to work during the observation period. We have also restricted our sample to those not observed going back to work and couples where both partners are working when they were first observed. The results are presented in Table A1 and are largely consistent with the results using our preferred sample selection.

and further training (also school, university); repairs on and around the house, including car repairs or garden work; and hobbies and other free-time activities.

[Figure 1 about here]

Following Schwerdt (2005) and Frazis and Stewart (2011), our measure of home production includes errands, housework, and repairs on and around the house, including car repairs or garden work. We exclude care and support in need of care because it is mainly related to care provided to non-household members and thus should not be taken into account as an input in the home production of the household. We also exclude child care as it is mostly related to time spent with grandchildren and is thus plausibly not an input in the home production function. Anyway, including these time use categories or not should not matter much as they only represent a small fraction of the total time for the respondents in the sample we have selected. One may also question the inclusion of repairs on and around the house (including gardening), as it may be considered as a leisure activity rather than a productive activity. We will assess the robustness of our results by using a more conservative measure of home production excluding this activity from home production.

In order to construct a measure of home production done per week, we add up the reported home production on a normal Saturday and a normal Sunday and the reported home production on a normal weekday multiplied by five. Figure 2 presents the distribution of the time spent on home production per week for men and women in our estimation sample. Women spend more time on home production than men do and only very few women report zero hours of home production. Not spending any time on home production is more common among men, but still uncommon (about 3 percent). Given the low proportion of individuals reporting zero hours of home production, the use of censored regression (tobit) models instead of linear models will hardly affect the results.

[Figure 2 about here]

3.3 Retirement

There are many definitions of retirement. For the purpose of our analysis, we follow Lazear (1986) and define an individual as retired if he or she is definitively out of the labour force with the intention of staying out permanently. As in Bonsang, Adam and Perelman (2012), Bonsang and Klein (2012), Coe and Zamarro (2011), Mazzonna and Peracchi (2012), and Rohwedder and Willis (2010), individuals are defined as "Working" if they report to be currently working for pay and "Retired" if they report not working. One issue with this definition is that we may classify some individuals as retired although they are actually unemployed. Given that we drop observations for individuals who are not working but go back to work in later waves, the unemployed individuals in our sample never succeed in finding a new job and can be classified as *involuntary retired,* following the definition of Bonsang and Klein (2012).[8] Figure 3 shows the proportion of retired men and women by age.

[Figure 3 about here]

3.4. Control variables

We use household characteristics as additional explanatory variables to control for time varying factors that are likely to be related to both home production and retirement. We control for age by including a third-order polynomial in age of the individual and the age of the partner (age of the partner is not included in fixed effects models due to collinearity with age of the respondent). Household characteristics consist of the numbers of adults and children in the household. Health

[8] The distinction between "involuntarily retired" (included in the estimation sample) and "unemployed" individuals (excluded from the estimation sample) depends on how long we can follow individuals after they have stopped working. We do not expect this to be a severe problem because we observe most individuals for at least some years after they stop working.

might also be a relevant factor, as it may be correlated with both retirement behaviour and home production. However, for our main specification, we left health out of the model as it may also be endogenous. As a robustness check, we added a measure of self-assessed general health for each partner to the model, based on the question "How satisfied are you with your health?" where respondents can answer on a Likert scale from 0 (not satisfied at all) to 10 (very satisfied). The results are similar to those of our main specification.[9] Table 1 presents the means of the control variables for men and women by retirement status of both partners.

[Table 1 about here]

4. Descriptive statistics

Table 2 shows the average number of hours of home production by gender and retirement status of both partners. In dual earner couples, men on average spend about 15.9 hours per week on home production compared to 27.6 hours for women. An average retired man spends 28 hours on home production if his partner is working and 24.9 hours if she is retired. A retired woman spends 41.4 hours on average on home production if their husband is working and 36.3 hours if he is retired. Working women also spend less time on home production when their partner is retired (27.6 versus 25.2hours).

[Table 2 about here]

The longitudinal dimension of the survey allows us to observe the evolution of home production around the age of retirement of each partner. Figures 4 and 5 present average hours of home production per week in the five years before and the five years after own retirement (Figure 4) and retirement of the partner (Figure 5). In Figure 4, we observe a significant increase in home

[9] Results are presented in Table A2.

production in the year of own retirement for both men and women. In the years before retirement, home production increases slightly, much less than the substantial change in the year of retirement. In the years after retirement, there is no specific trend, suggesting that dynamics involving lagged adjustment of home production to retirement status does not play an important role. The increase is similar in magnitude for men and women (although the levels of home production are always much higher for women).

[Figures 4 and 5 about here]

Figure 5 shows no significant change in home production around the retirement age of the partner, for both men and women, suggesting that there is no cross-effect of retirement on home production of the partner. We have to keep in mind, however, that these figures are only descriptive, not controlling for other determinants of home production (such as own labour force status). The empirical analysis below will overcome this limitation.

5. Results

Table 3 presents the results of the effects of own and spouse's retirement on time devoted to home production for men and women. We present the results of the standard random-effects model, the standard fixed effects model, and the fixed-effects two-stage least squares estimator. The results are qualitatively quite similar for all these models. Still, for both men and women, a Hausman test rejects the hypothesis that individual unobserved effects and the explanatory variables are uncorrelated. In other words, the fixed effects model is preferred to the random effects specification. The estimated effect of retirement on home production is slightly lower in the fixed effects model than for the random effects model for women. For men, retirement increases the number of hours devoted to home production by approximately 11 hours per week.

For women, this increase is about 10 hours per week. Table 3 also reveals significantly negative cross-effects of retirement on home production of the partner. The partner's retirement decreases the time devoted to home production by about 2.7 hours per week for men and 2.9 hours for women.[10]

[Table 3 about here]

While exhibiting larger standard errors, the point estimates of the instrumental variable models are close to those from the fixed effects model (although the cross-effect for men is larger). The endogeneity test does not reject the hypothesis that own retirement and retirement of the spouse are exogenous, suggesting that endogeneity due to reverse causality or time-variant unobserved confounding factors are not driving our main results.[11] Overall, the test results thus make the fixed effects model is the preferred specification.

Our estimated effects of retirement on home production are remarkably similar in magnitude to those obtained by Van Soest and Stancanelli (2012) who found that, at retirement, own home production increases by about 11.3 hours per week for men and 8.8 hours for women in France. However, our estimated effects of partner's retirement on own home production differ from those of Van Soest and Stancanelli (2012), who found a large effect of partner's retirement on home production of men (-8.6 hours per week) but a small and insignificant effect for women. While the cross-effects we found for men as well as women are significant, the magnitudes of these effects are modest compared to the direct effects of retirement on own home production.

[10] We have also estimated models in which the retirement dummies are replaced by the number of hours of paid work. Results are presented in Table A3 in the Appendix.

[11] The full results of the fixed effects two-stage least squares estimators are presented in Tables A4 and A5 in the Appendix. The first-stage equations show that our instruments are relevant for predicting retirement: the age-specific dummies (the instruments) are all significant in the retirement model for men and the dummies for reaching 60 and 63 years of age are highly significant for women.

As a result, total home production of couples still increases when both partners retire, even when taking the cross-effects into account. This is also different from the result for France in Van Soest and Stancanelli (2012), where total home production increases for men but the negative cross-effect annihilates the positive direct effect of retirement on home production for women. Our results imply that ignoring the effect of retirement on partner's home production leads to biased estimates of the effect of retirement of couples on home production at the household level: the estimated effect of retirement of both partners on total home production would be overestimated by about 25 percent when the cross-effects are ignored.[12]

There are notable differences between men and women in the way their home production changes with household composition. While (in the fixed effects model), the numbers of adults and children in the household are unrelated to home production of men, they are positively related to home production of women.

Table 4 presents the results of fixed effects models for each component of home production separately (housework, errands, and repairs/gardening).[13] Men increase time devoted to housework by about 4.1 hours per week, compared to 5.9 hours for women. Time devoted to errands increases by 2.8 hours per week for men and 2.1 hours for women. The increase in repairs/gardening is larger for men than for women (4.4 versus 2.4). More importantly, the results show that the main source of the negative cross-effect of retirement on total home production is the negative effect on housework. For men (women), about 50% (36%) of the increase in housework due to own retirement is annihilated once the partner retires.

[Table 4 about here]

[12] In addition, there can be an omitted variable bias if in a model for individuals, retirement of the partner is not included as an explanatory variable (since own retirement and partner's retirement are positively correlated). This bias is negligible in our case: if we omit partner's retirement status from the fixed effects model, the estimated direct effect of retirement is 10.992 (Standard error: 0.358) for men and 9.999 (Standard error: 0.426) for women.

[13] The results of the IV models are presented in Table A6. The endogeneity test does not reject the hypothesis that retirement and spouse's retirement are exogenous, except for housework for men.

6. Does home production compensate for the income loss due to retirement?

The fundamental question in relation to the retirement-consumption puzzle is whether home production is able to compensate for the income loss due to retirement. Figure 6 presents the evolution of monthly net household income around retirement of men and women. As expected, we observe a drop in income once the individual retires from the labour force. For male retirement the drop is substantial: from about 3600 Euros per month two years before retirement to about 2800 Euros after retirement. We observe a similar pattern for retirement of women but the size of the drop is smaller.

[Figure 6 about here]

It is not straightforward to estimate the value of home production. There exist different ways to estimate this and each method has its advantages and drawbacks. Following Frazis and Steward (2011) and Frick et al. (2012), we value home production using the *replacement cost approach* (and not the *opportunity cost approach*), which defines the value of the time spent on home production as the cost of purchasing home production services in the market. This method uses either the generalist or the specialist wage. For this paper, we decided to use the former, which is simple and transparent: we impute a value of home production with a uniform imputed wage for home production. Following Frick et al. (2012), we impute a net hourly wage of 4 Euros to approximate the wage of informal employment in the private sector, or a wage of 8.50 Euros of 2014 that approximates the minimum wage that has recently been approved by the German Parliament. As our data cover a relatively long period, we adjust these amounts for inflation transforming them to 2013 prices. We then compute the total resources of the household as its

net monthly household income plus the amount of time spent on home production per month by the couple multiplied with the imputed wage rate (either 4 or 8.5 Euros/hour).

Table 5 presents the fixed effects results, similar to the fixed effects model of hours of home production in the previous section, but with the log of total resources of the household as the dependent variable. Three assumptions are made: no value for home production, home production valued at €4 per hour, and home production valued at €8.5 per hour. The results help to quantify to which extent home production is able to cover for the income loss due to retirement.

[Table 5 about here]

The difference between the first column and the other columns shows that taking account of home production has an important effect on the loss of resources due to retirement of the couple. While household income drops by 21 percent when the man retires and 11 percent when the woman retires (first column), the drop in total resources of the household is only 10 percent for the man's retirement and 4 percent for the woman's retirement when imputing the most conservative value of home production (€4 per hour). If we use the minimum wage of €8.5 per hour to value home production, the drop completely disappears for woman's retirement (final column) and amounts to only 4% of total resources for men.

Using the narrower definition of home production by excluding repairs/gardening (See Section 3) gives similar results. The drop in total resources of the household is 13% if the man retires and 5% if the women retires if we impute the low value of home production (€4 per hour). If we use the minimum wage of €8.5 per hour, the drop in resources remains statistically

significant for both partners' retirement, but its size is 9% when the man retires and only 1.8% when the woman retires.[14]

7. Concluding remarks

In this paper we have analysed the effect of retirement of couples on home production of both partners. We have used longitudinal German data from 1993 to 2009 with information on the time spent on several types of home production activities, and models taking account of the endogeneity of retirement in a model of home production. We have shown that fixed effects models provide results that are similar to the results using instrumental variable models in the spirit of Van Soest and Stancanelli (2012). Own retirement substantially increases the time devoted to home production for both men and women. Furthermore, we have identified significant spill-over effects of retirement on home production by the partner: Both men and women decrease the time spent on home production when their partner retires from the labour force: Not taking into account those spill-over effects results in an over-estimation of the effect of retirement of the couple on home production by about 20 percent.

Since the data provide information on the time spent on home production activities but not the value of home produced goods, the value per hour had to be imputed. Imputing the value of each hour of home production in several ways, we have shown that, accounting for the spill-over effects on the other partner, changes in home production largely compensate for the loss of financial resources of the household when its members retire from the labour force. This paper therefore contributes to the literature on the retirement-consumption puzzle, lending support to the fact that taking home production of couples into account makes the retirement-

[14] See Table A8 in Appendix. Table A7 shows the results of the models used for the results obtained in Table 3 but where we exclude repairs/gardening from home production.

consumption puzzle much less of a puzzle, even when accounting for the opposite effects on the two partners in a couple.

Our study is not without limitations. First, our measure of home production is based on time-use measured with recall survey questions. This kind of measure has been criticized in the time-use literature. On the other hand, the main advantage of our measure is that it is available for a large and long panel, something which is crucially not the case for the typical time use data based upon diaries. A large effort in collecting longitudinal data based on diary data would be needed in order to investigate whether diary data would really make a difference, not only for the estimated levels of home production but also for the estimated changes in home production due to retirement.

References

Aguiar, Mark, and Eric Hurst. 2005. Consumption versus expenditure. *Journal of Political Economy*, 113(5): 919-948.

Aguiar, Mark, and Eric Hurst. 2007. Life-cycle prices and production. *American Economic Review*, 97(5): 1533-1559.

Banks, James, Richard Blundell and Sarah Tanner (1998), Is there a retirement savings puzzle? *American Economic Review*, 88(4), 769-788.

Battistin, Erich, Agar Brugiavini, Enrico Rettore and Guglielmo Weber. 2009. The retirement consumption puzzle: Evidence from a regression discontinuity approach. *American Economic Review*, 99(5): 2209-2226.

Bonke, Jens. 2005. Paid work and unpaid work: Diary information versus questionnaire information. *Social Indicators Research*, 70: 349-368.

Bonsang, Eric, Stéphane Adam, and Sergio Perelman. 2012. Does retirement affect cognitive functioning? *Journal of Health Economics*, 31(3): 490-501.

Bonsang, Eric, and Tobias Klein. 2012. Retirement and subjective well-being. *Journal of Economic Behavior and Organization*, 83(3): 311-329.

Börsch-Supan, Axel, and Hendrik Jürges. 2009. Early retirement, social security and well-being in Germany. in: David Wise (ed.), *Developments in the Economics of Aging*, 173-199. The University of Chicago Press, Chicago.

Coe, Norma B., and Gema Zamarro. 2008. Retirement Effects on Health in Europe. *Journal of Health Economics*, 30(1): 77-86.

Frazis, Harley, and Jay Stewart. 2011. How Does Household Production Affect Measured Income Inequality? *Journal of Population Economics*, 24 (1): 3-22.

Frick, Joachim R., Markus M. Grabka and Olaf Groh-Samberg. 2012. The impact of home production on economic inequality in Germany. *Empirical Economics*, 43: 1143-1169.

Gustman, Alan L., and Thomas L. Steinmeier. 2000. Retirement in dual-career families: A structural model. *Journal of Labor Economics*, 18: 503-545.

Gustman, Alan L. and Thomas L. Steinmeier. 2009, Integrating retirement models. NBER Working Paper 15607.

Hamermesh, Daniel S. 1984. Consumption during retirement: The missing link in the life-cycle. *Review of Economics and Statistics*, 66(1): 1-7.

Hurd, Michael A. 1990. The joint retirement decision of husbands and wives, in: *Issues in the Economics of Aging*, ed. David A. Wise, 231-258. Cambridge MA: NBER.

Hurd, Michael A., and Susann Rohwedder. 2008. The retirement consumption puzzle: Actual spending change in panel data. NBER Working Paper 13929.

Hurst, Eric. 2008. The retirement of a consumption puzzle. NBER Working Paper 13789.

Kitterød, Ragni H., and Torkild H. Lyngstand. 2005. Diary versus questionnaire information on time spent on housework – The case of Norway. *International Journal of Time Use Research*, 2(1): 13-32.

Lazear, Edward P. 1986. Retirement from the Labor Force. In *Handbook of Labor Economics*, Vol. 1, ed. Orley Ashenfelter and Richard Layard, 305-55. London: Elsevier.

Mazzonna, Fabrizio, and Franco Peracchi, 2012. Aging, cognitive abilities, and retirement. *European Economic Review*, 56(4): 691-710.

Rohwedder, Susann and Robert J. Willis. 2010. Mental Retirement. *Journal of Economic Perspectives*, 24(1): 1-20.

Roodman, David. 2007. CMP: Stata Module to Implement Conditional (Recursive) Mixed Process Estimator. Boston College Department of Economics Statistical Software Component S456882.

Roodman, David. 2009. Estimating Fully Observed Recursive Mixed-Process Models with CMP. Center for Global Development Working Paper 168.

Schwerdt, Guido. 2005. Why does consumption fall at retirement? Evidence from Germany. *Economic Letters*, 89(3): 300-305.

Stancanelli, Elena, and Arthur van Soest. 2012. Retirement and home production: A regression discontinuity approach. *American Economic Review*, 102(3): 600-605.

Wagner, Gert, Richard V. Burkhauser, and Frederike Behringer 1993. The English language public use file of the German Socio-Economic Panel Study, *Journal of Human Resources*, 28(2), 429-433.

Figure 1. Questions on time use in GSOEP.

2. What is a typical day like for you?
How many hours do you spend on the following acitivities on a typical weekday, Saturday, and Sunday?

☞ *Please give only whole hours.*
Use zero if the activity does not apply!

	Typical **weekday** Number of hours	Typical **Saturday** Number of hours	Typical **Sunday** Number of hours
Job, apprenticeship, second job (including travel time to and from work)	☐☐	☐☐	☐☐
Errands (shopping, trips to government agencies, etc.)	☐☐	☐☐	☐☐
Housework (washing, cooking, cleaning)	☐☐	☐☐	☐☐
Child care	☐☐	☐☐	☐☐
Care and support for persons in need of care	☐☐	☐☐	☐☐
Education or further training (also school, university)	☐☐	☐☐	☐☐
Repairs on and around the house, car repairs, garden work	☐☐	☐☐	☐☐
Hobbies and other free-time activities	☐☐	☐☐	☐☐

Figure 2. Distribution of the number of hours of home production per week.

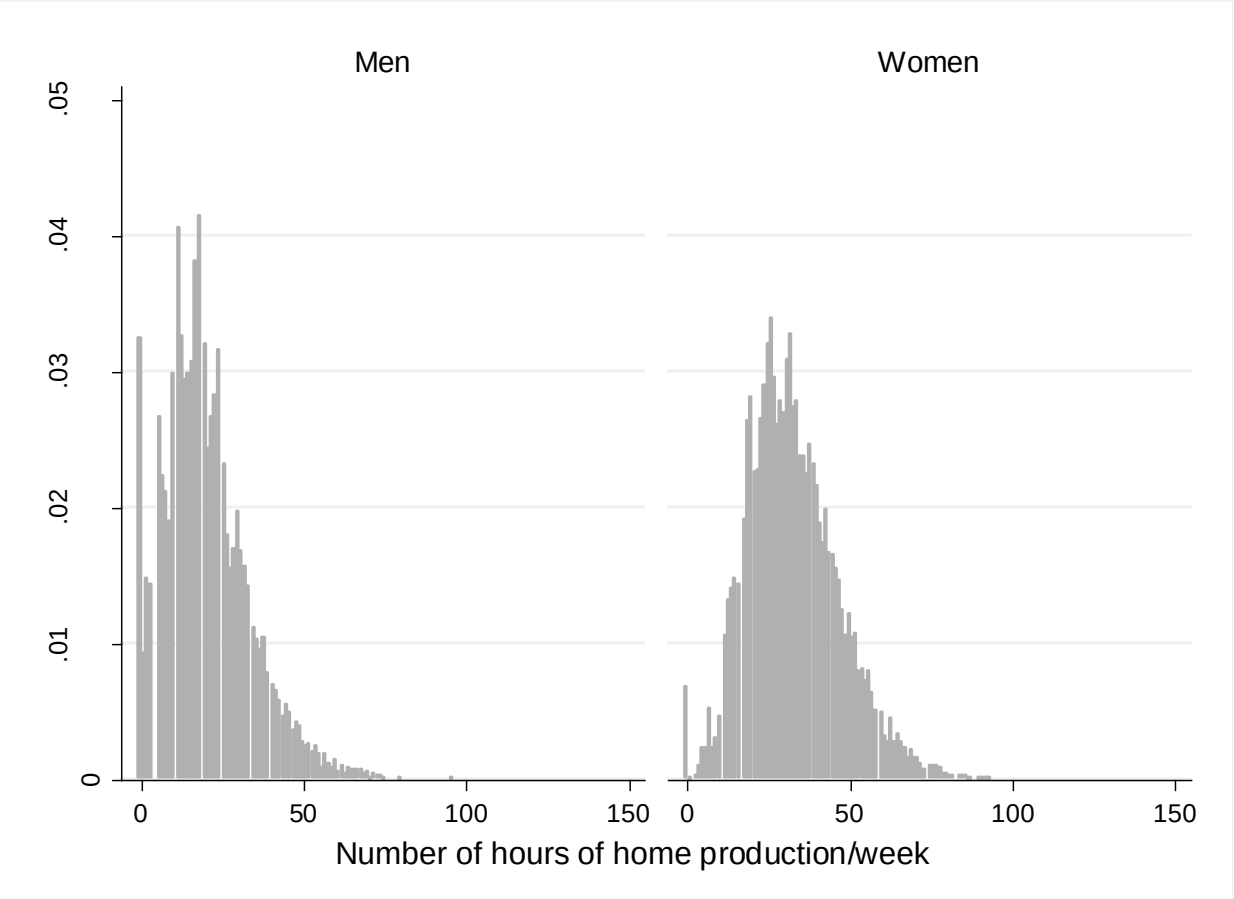


Figure 3. Proportion of individuals being retired by age.

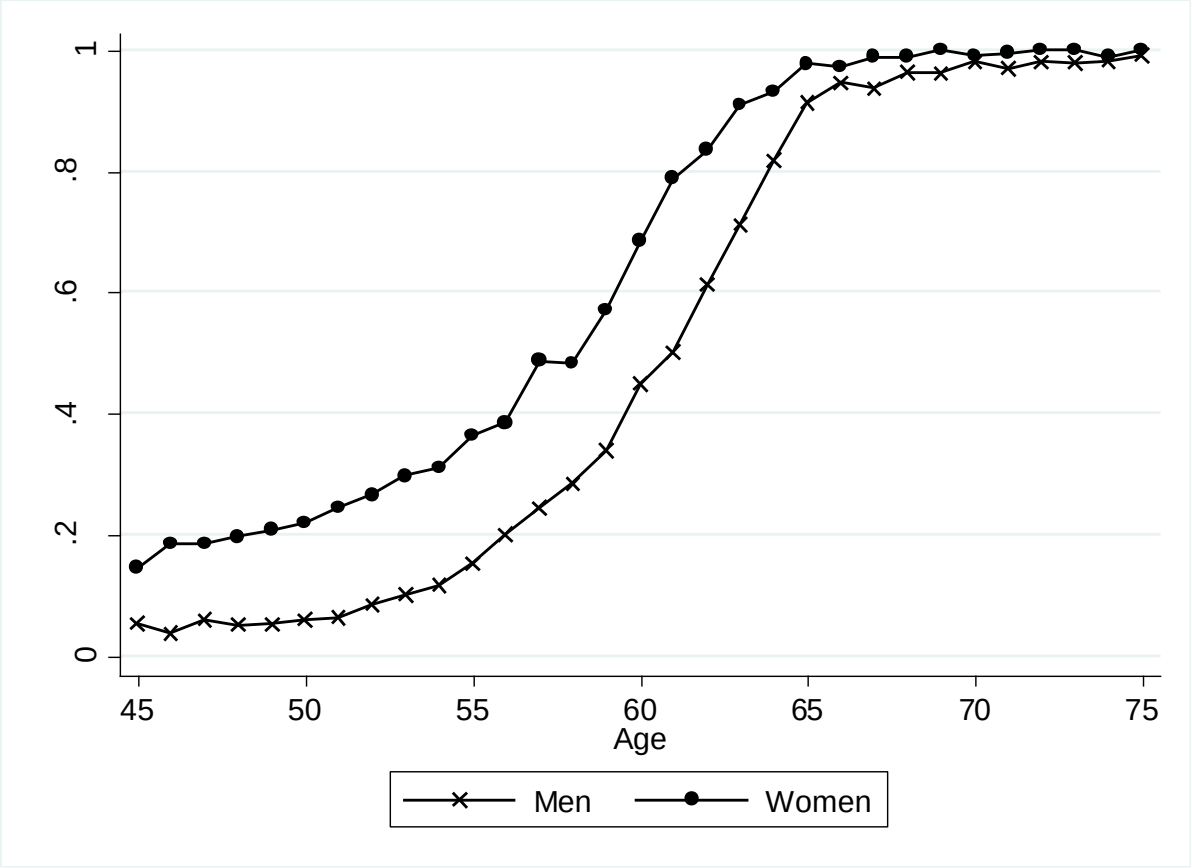
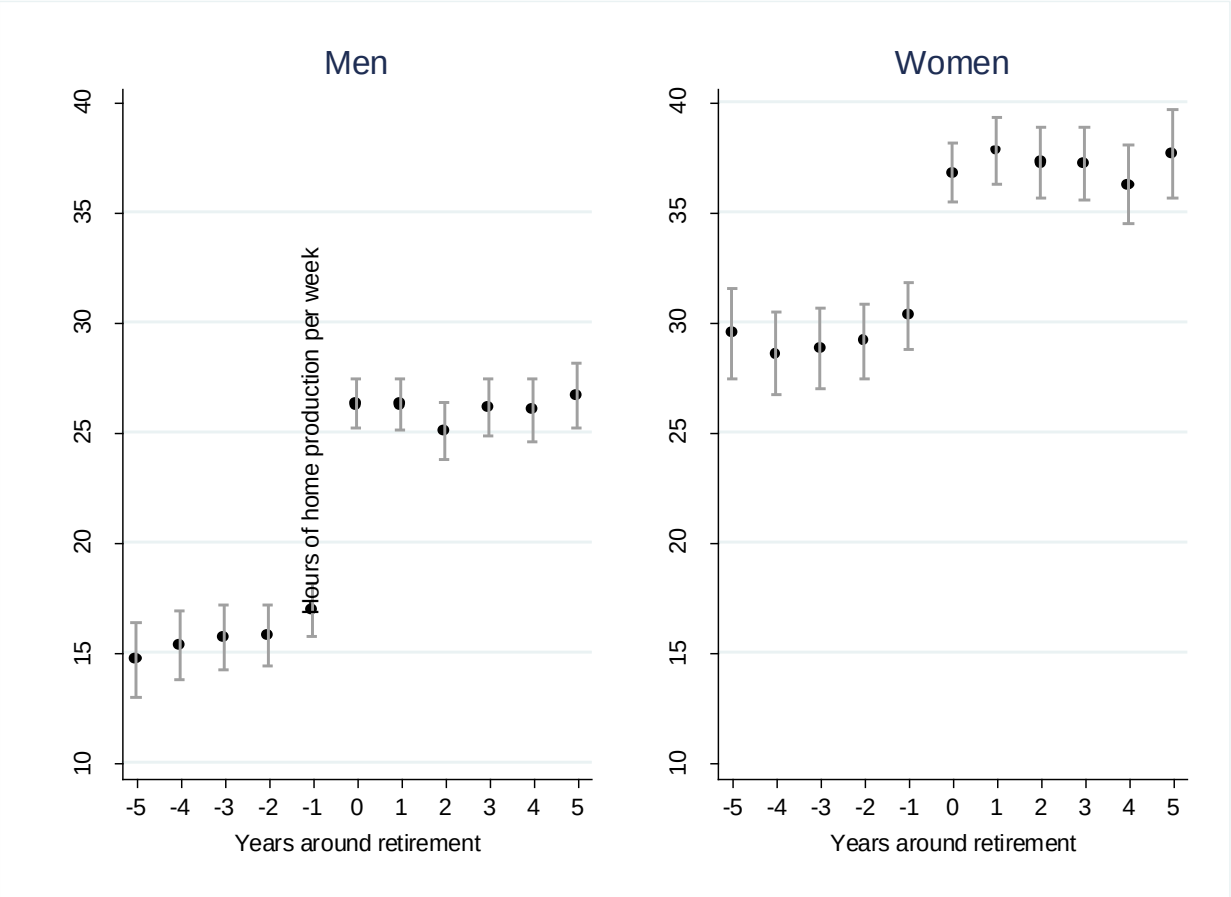
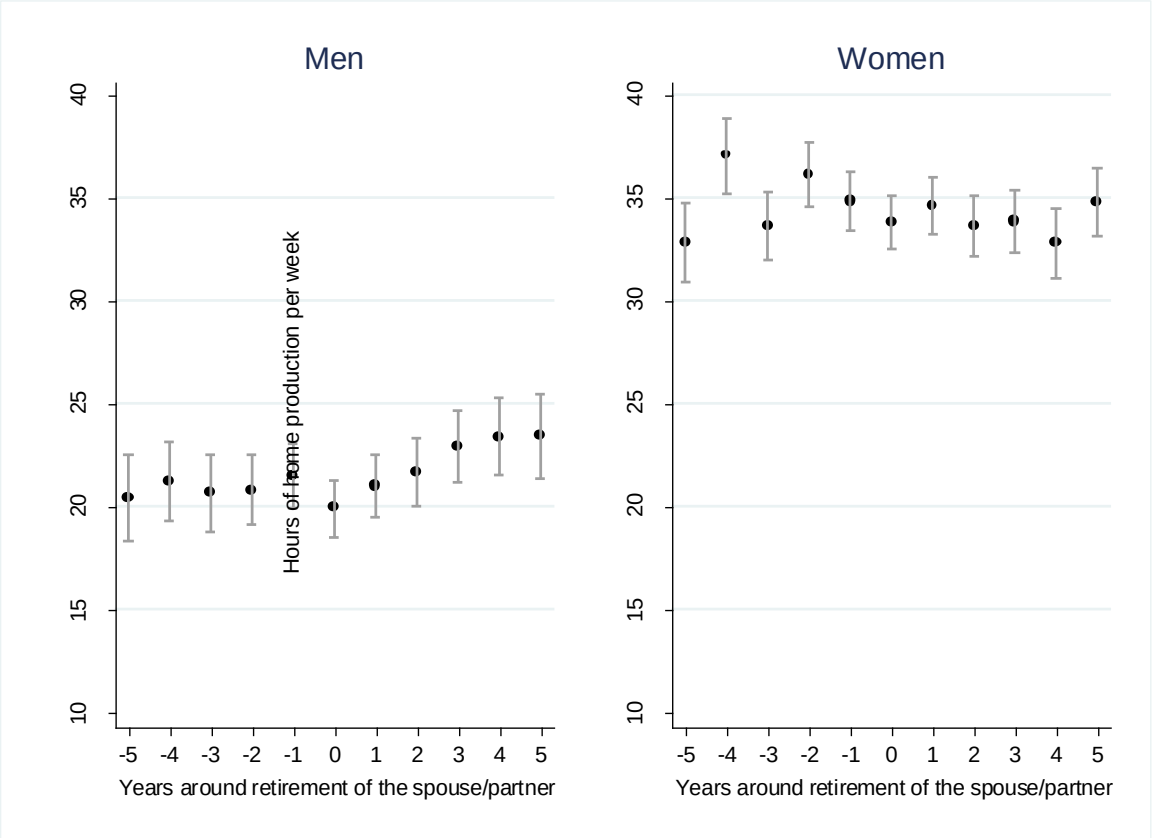


Figure 4. Average number of hours of home production per week around own retirement



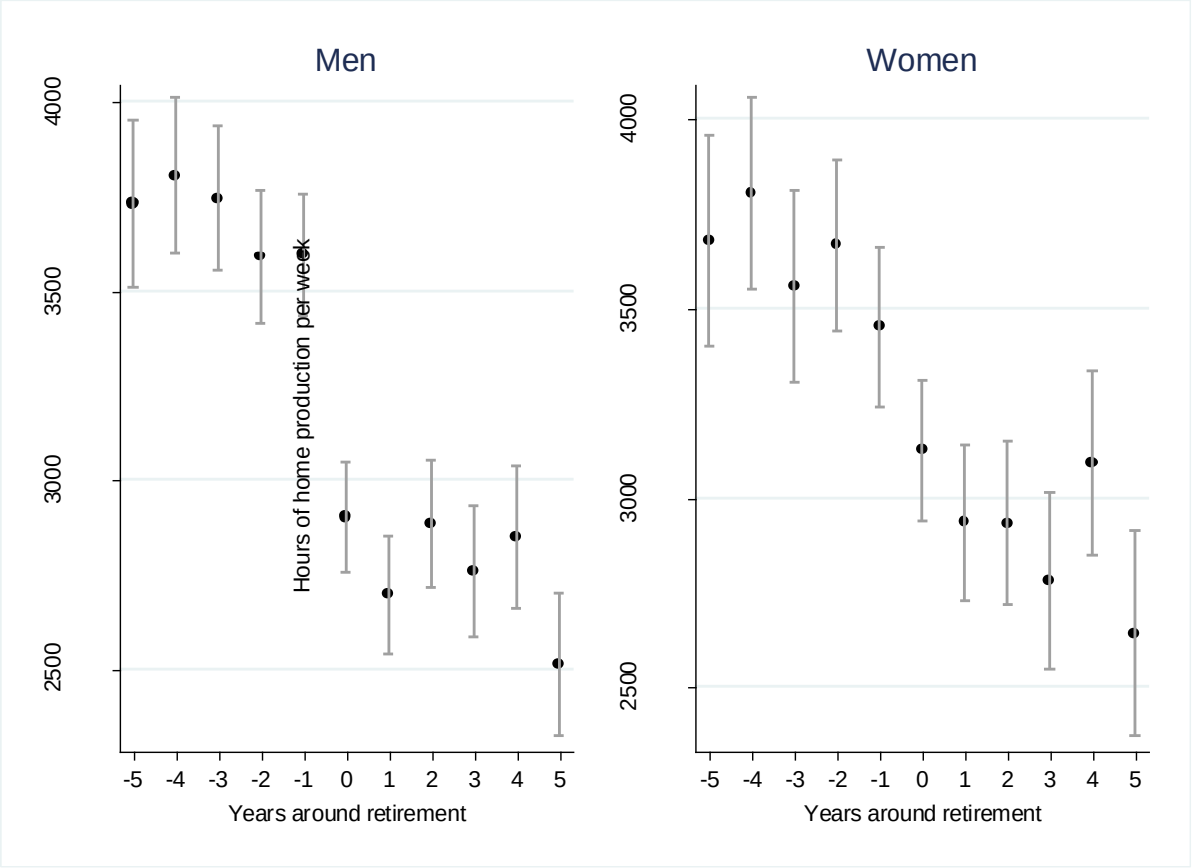
Note: The dots represent the average number of hours of home production per week and the vertical lines represent the 95% confidence interval.

Figure 5. Average number of hours of home production per week around retirement of the spouse.



Note: The dots represent the average number of hours of home production per week and the vertical lines represent the 95% confidence interval.

Figure 6. Average monthly net household income around retirement.



Note: The dots represent the average monthly net household income and the vertical lines represent the 95% confidence interval.

Table 1. Means of explanatory variables.

	Men				Women			
Individual:	Working	Working	Retired	Retired	Working	Working	Retired	Retired
Partner:	Working	Retired	Working	Retired	Working	Retired	Working	Retired
Age	53.4	56.4	61.0	67.3	51.1	55.5	55.1	65.0
Number of adults in the household	2.6	2.6	2.3	2.2	2.6	2.3	2.6	2.2
Number of children in the household	0.3	0.2	0.1	0.0	0.3	0.1	0.2	0.0
N	6,194	2,377	1,480	7,829	6,194	1,480	2,377	7,829

Table 2. Average number of hours of home production per week.

	Men				Women			
Individual:	Working	Working	Retired	Retired	Working	Working	Retired	Retired
Partner:	Working	Retired	Working	Retired	Working	Retired	Working	Retired
Home production	15.9	13.6	28.0	24.9	27.6	25.2	41.4	36.3
	(9.4)	(9.6)	(15.3)	(14.1)	(10.9)	(11.6)	(15.6)	(14.6)
N	6,194	2,377	1,480	7,829	6,194	1,480	2,377	7,829

Note: Standard errors in parentheses.

Table 3. Retirement and hours of home production per week in couples: Linear models

	Men			Women		
	RE model	FE model	FE-IV	RE model	FE model	FE-IV
Retired	11.264***	11.269***	10.485***	12.389***	10.385***	10.111***
	(0.287)	(0.359)	(2.265)	(0.304)	(0.428)	(3.341)
Spouse retired	-2.462***	-2.680***	-5.966***	-2.329***	-2.875***	-3.438**
	(0.279)	(0.390)	(1.994)	(0.312)	(0.375)	(1.431)
Number of adults in the household	-0.494***	-0.092	-0.044	1.819***	1.039***	1.039***
	(0.147)	(0.197)	(0.201)	(0.160)	(0.214)	(0.219)
Number of children in the household	-1.009***	-0.338	-0.136	1.428***	1.742***	1.770***
	(0.226)	(0.329)	(0.346)	(0.247)	(0.362)	(0.382)
Age	-8.327***	-5.723***	-9.795**	0.611	2.860	2.008
	(2.048)	(2.071)	(4.226)	(2.117)	(2.094)	(3.864)
$Age^2/100$	15.135***	10.705***	17.729**	-0.621	-4.614	-3.088
	(3.434)	(3.454)	(7.183)	(3.616)	(3.576)	(6.741)
$Age^3/1000$	-0.909***	-0.661***	-1.049***	0.004	0.215	0.128
	(0.190)	(0.190)	(0.396)	(0.203)	(0.201)	(0.381)
Spouse's age	2.583			4.317*		
	(1.947)			(2.227)		
Spouse's $age^2/100$	-4.948			-6.775*		
	(3.326)			(3.734)		
Spouse's $age^3/1000$	0.312*			0.342*		
	(0.187)			(0.206)		
Hausman test	$\chi^2(7) = -17.29$			$\chi^2(7) = 31.01$		
Angrist-Pischke multivariate F-test of excluded instruments for "Retired": F(5, 11592)			59.81			38.24
Angrist-Pischke multivariate F-test of excluded instruments for "Spouse retired": F(5, 11592)			92.28			171.65
Endogeneity test (p-value)			0.130			0.873
Number of observations	17,880	15,531	15,531	17,880	15,531	15,531
Number of individuals	6,277	3,928	3,928	6,277	3,928	3,928

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Retirement and hours of components of home production per week in couples: Fixed effects linear models

	Men			Women		
	FE model			FE model		
	Housework	Errands	Repairs/Garden	Housework	Errands	Repairs/Garden
Retired	4.097***	2.801***	4.371***	5.892***	2.131***	2.361***
	(0.188)	(0.140)	(0.236)	(0.295)	(0.157)	(0.199)
Spouse retired	-2.085***	-0.548***	-0.047	-2.134***	-0.562***	-0.179
	(0.205)	(0.152)	(0.256)	(0.258)	(0.138)	(0.174)
Number of adults in the household	-0.134	0.075	-0.032	1.022***	0.114	-0.097
	(0.104)	(0.077)	(0.130)	(0.148)	(0.079)	(0.100)
Number of children in the household	-0.323*	0.136	-0.152	1.513***	0.285**	-0.056
	(0.173)	(0.128)	(0.217)	(0.250)	(0.133)	(0.169)
Age	0.944	-1.769**	-4.898***	1.930	-0.183	1.114
	(1.086)	(0.807)	(1.361)	(1.443)	(0.770)	(0.974)
$Age^2/100$	-1.509	3.158**	9.056***	-3.321	0.363	-1.656
	(1.811)	(1.346)	(2.270)	(2.464)	(1.315)	(1.664)
$Age^3/1000$	0.082	-0.184**	-0.559***	0.168	-0.028	0.076
	(0.099)	(0.074)	(0.125)	(0.139)	(0.074)	(0.094)
Number of observations	15,531	15,531	15,531	15,531	15,531	15,531
Number of individuals	3,928	3,928	3,928	3,928	3,928	3,928

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

Table 5. Retirement and ln(monthly household resources): Fixed effects models

	Fixed effects model		
	No home production	Home production valued at 4/hour	Home production valued at 8.50/hour
Man retired	-0.208***	-0.105***	-0.048***
	(0.008)	(0.007)	(0.007)
Woman retired	-0.111***	-0.038***	0.003
	(0.009)	(0.007)	(0.007)
Number of adults in the household	0.160***	0.119***	0.097***
	(0.004)	(0.004)	(0.004)
Number of children in the household	0.093***	0.066***	0.054***
	(0.008)	(0.006)	(0.006)
Man's age	0.103**	0.092**	0.068*
	(0.047)	(0.039)	(0.040)
Man's age^2/100	-0.144*	-0.125*	-0.088
	(0.079)	(0.066)	(0.066)
Man's age^3/1000	0.007	0.005	0.003
	(0.004)	(0.004)	(0.004)
Number of observations	14,793	14,793	14,793
Number of couples	3,754	3,754	3,754

*** p<0.01, ** p<0.05, * p<0.1
Standard errors in parentheses.

APPENDIX (not intended for publication).

Table A0. Sample selection

Full sample (biennial sample from 1993 to 2013)	207,242
Individuals living in a couple	145,007
mismatch id couple	144,954
Individual with available info of the spouse	137,042
Drop same sex couples	133,670
Both partners being between 45 and 75	65,326
Time use available for both partners and reliable	51,046
Exclusion of individuals going back to work	35,760

Table A1. Results with third degree polynomial in age and different sample selections

	Men				Women		
	RE model	FE model	FE-IV		RE model	FE model	FE-IV
	Excluding those observed going back to work (17,880 obs.; 6,277 couples)						
Retired	11.264***	11.269***	10.485***		12.389***	10.385***	10.111***
	(0.287)	(0.359)	(2.265)		(0.304)	(0.428)	(3.341)
Spouse retired	-2.462***	-2.680***	-5.966***		-2.329***	-2.875***	-3.438**
	(0.279)	(0.390)	(1.994)		(0.312)	(0.375)	(1.431)
	All (25,523 obs; 8,210 couples)						
Retired	10.208***	10.208***	10.208***	10.208***	10.208***	10.208***	10.208***
	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)	(0.207)
Spouse retired	-1.818***	-1.818***	-1.818***	-1.818***	-1.818***	-1.818***	-1.818***
	(0.203)	(0.203)	(0.203)	(0.203)	(0.203)	(0.203)	(0.203)
	Excluding those observed going back to work and those who were not working initially (9,038 obs.; 2,987 couples)						
Retired	10.873***	10.024***	11.074***		9.727***	8.568***	10.872***
	(0.370)	(0.433)	(2.215)		(0.401)	(0.459)	(2.553)
Spouse retired	-1.879***	-1.958***	-4.935***		-1.950***	-2.510***	-2.897*
	(0.378)	(0.432)	(1.758)		(0.392)	(0.436)	(1.630)

Table A1bis. Results with second degree polynomial in age and different sample selections

	Men			Women		
	RE model	FE model	FE-IV	RE model	FE model	FE-IV
	Excluding those observed going back to work (17,880 obs.; 6,277 couples)					
Retired	11.623***	11.648***	14.675***	12.336***	10.287***	8.910***
	(0.276)	(0.343)	(1.350)	(0.299)	(0.418)	(2.156)
Spouse retired	-2.427***	-2.512***	-5.690***	-2.496***	-2.939***	-3.278**
	(0.274)	(0.387)	(2.001)	(0.300)	(0.370)	(1.456)
	All (25,523 obs; 8,210 couples)					
Retired	10.441***	10.044***	12.762***	10.039***	8.018***	7.326***
	(0.202)	(0.239)	(1.099)	(0.218)	(0.271)	(1.565)
Spouse retired	-1.781***	-1.620***	-3.151**	-2.142***	-2.090***	-1.945
	(0.200)	(0.252)	(1.428)	(0.220)	(0.257)	(1.200)
	Excluding those observed going back to work and those who were not working initially (9,038 obs.; 2,987 couples)					
Retired	11.070***	10.311***	13.886***	9.788***	8.613***	10.794***
	(0.363)	(0.420)	(1.654)	(0.394)	(0.448)	(2.018)
Spouse retired	-1.852***	-1.823***	-5.143***	-1.956***	-2.484***	-3.142*
	(0.372)	(0.429)	(1.768)	(0.385)	(0.432)	(1.655)

Table A2. Retirement and hours of home production per week in couples: Linear models including controls for health satisfaction.

	Men			Women		
	RE model	FE model	FE-IV	RE model	FE model	FE-IV
Retired	11.508***	11.386***	10.321***	12.607***	10.493***	10.009***
	(0.292)	(0.364)	(2.284)	(0.309)	(0.433)	(3.334)
Spouse retired	-2.674***	-2.729***	-5.607***	-2.415***	-2.880***	-3.552**
	(0.283)	(0.396)	(2.005)	(0.317)	(0.378)	(1.442)
Satisfaction with health	0.446***	0.297***	0.295***	0.431***	0.398***	0.400***
	(0.045)	(0.057)	(0.057)	(0.049)	(0.061)	(0.061)
Spouse's health satisfaction	-0.362***	-0.186***	-0.177***	-0.327***	-0.152**	-0.152**
	(0.045)	(0.057)	(0.057)	(0.049)	(0.061)	(0.061)
Number of adults in the household	-0.508***	-0.090	-0.047	1.819***	1.073***	1.074***
	(0.148)	(0.199)	(0.203)	(0.161)	(0.215)	(0.222)
Number of children in the household	-1.035***	-0.285	-0.097	1.358***	1.721***	1.761***
	(0.229)	(0.333)	(0.350)	(0.249)	(0.365)	(0.385)
Age	-7.535***	-5.724***	-10.006**	1.909	4.223**	3.026
	(2.075)	(2.094)	(4.272)	(2.138)	(2.109)	(3.865)
$Age^2/100$	13.807***	10.670***	18.045**	-2.847	-6.908*	-4.770
	(3.481)	(3.493)	(7.260)	(3.652)	(3.602)	(6.742)
$Age^3/1000$	-0.836***	-0.657***	-1.064***	0.130	0.343*	0.221
	(0.192)	(0.192)	(0.400)	(0.205)	(0.203)	(0.381)
Spouse's age	1.955			3.781*		
	(1.971)			(2.252)		
Spouse's $age^2/100$	-3.939			-5.859		
	(3.366)			(3.777)		
Spouse's $age^3/1000$	0.259			0.290		
	(0.189)			(0.209)		
Hausman test	$\chi^2(9) = 40.52$			$\chi^2(9) = 57.23$		
Angrist-Pischke multivariate F-test of excluded instruments for "Retired": F(5,11203)			58.19			38.00
Angrist-Pischke multivariate F-test of excluded instruments for "Spouse retired": F(5,11203)			90.79			166.56
Endogeneity test (p-value)			0.173			0.806

Number of observations	17,260	14,777	14,777	17,260	14,777	14,777
Number of individuals	6,044	3,561	3,561	6,044	3,561	3,561

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A3. Hours of work and hours of home production per week in couples: Linear models

	Men			Women		
	RE model	FE model	FE-IV	RE model	FE model	FE-IV
Hours of work/week	-0.242***	-0.250***	-0.259***	-0.311***	-0.272***	-0.267***
	(0.005)	(0.007)	(0.054)	(0.007)	(0.009)	(0.073)
Spouse's hours of work/week	0.074***	0.066***	0.145***	0.047***	0.058***	0.069**
	(0.006)	(0.008)	(0.046)	(0.006)	(0.007)	(0.029)
Number of adults in the household	-0.342**	0.006	0.056	1.628***	1.017***	1.012***
	(0.145)	(0.194)	(0.200)	(0.158)	(0.212)	(0.217)
Number of children in the household	-0.800***	-0.250	0.079	0.547**	1.185***	1.218***
	(0.225)	(0.326)	(0.374)	(0.245)	(0.360)	(0.435)
Age	-6.587***	-2.682	-4.528	0.747	3.886*	3.125
	(2.015)	(2.037)	(5.014)	(2.085)	(2.064)	(3.651)
$Age^2/100$	11.936***	5.383	8.635	-1.024	-6.494*	-5.122
	(3.380)	(3.398)	(8.562)	(3.561)	(3.527)	(6.390)
$Age^3/1000$	-0.723***	-0.360*	-0.542	0.035	0.326	0.247
	(0.187)	(0.187)	(0.474)	(0.200)	(0.198)	(0.363)
Spouse's age	2.422			4.498**		
	(1.915)			(2.194)		
Spouse's $age^2/100$	-4.595			-7.146*		
	(3.270)			(3.681)		
Spouse's $age^3/1000$	0.290			0.367*		
	(0.184)			(0.203)		
Hausman test	$\chi^2(7) = -22.92$			$\chi^2(7) = 1.51$		
Angrist-Pischke multivariate F-test of excluded instruments for "Retired": F(5, 11592)			37.18			37.86
Angrist-Pischke multivariate F-test of excluded instruments for "Spouse retired": F(5, 11592)			80.38			143.90
Endogeneity test (p-value)			0.192			0.899
Number of observations	17,880	15,531	15,531	17,880	15,531	15,531
Number of individuals	6,277	3,928	3,928	6,277	3,928	3,928

Note: The standard errors (in parentheses). *** p<0.01, ** p<0.05, * p<0.1

Table A4. Retirement and hours of home production per week: Full results of the linear FE-IV model. Men

	Retired	Spouse retired	Home production
Retired			10.485***
			(2.265)
Spouse retired			-5.966***
			(1.994)
1[Age>=60]	0.111***	0.015	
	(0.010)	(0.010)	
1[Age>=63]	0.123***	0.013	
	(0.010)	(0.009)	
1[Age>=65]	0.080***	0.006	
	(0.010)	(0.009)	
1[Spouse's Age>=60]	0.006	0.156***	
	(0.009)	(0.008)	
1[Spouse's Age>=63]	0.004	0.066***	
	(0.010)	(0.009)	
1[Spouse's Age>=65]	-0.019*	0.002	
	(0.010)	(0.009)	
Number of adults in the household	-0.007	0.010**	-0.044
	(0.005)	(0.005)	(0.201)
Number of children in the household	0.016*	0.043***	-0.136
	(0.008)	(0.008)	(0.346)
Age	-0.812***	-0.287***	-9.795**
	(0.075)	(0.068)	(4.226)
$Age^2/100$	1.415***	0.527***	17.729**
	(0.125)	(0.114)	(7.183)
$Age^3/1000$	-0.079***	-0.030***	-1.049***
	(0.007)	(0.006)	(0.396)
Angrist-Pischke multivariate F-test of excluded instruments for "Retired": F(5, 11592)			59.81
Angrist-Pischke multivariate F-test of excluded instruments for "Spouse retired": F(5, 11592)			92.28
Endogeneity test (p-value)			0.130
Number of observations	15,531	15,531	15,531
Number of individuals	3,928	3,928	3,928

Note: Standard errors are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A5. Retirement and hours of home production per week: Full results of the linear FE-IV model. Women

	Retired	Spouse retired	Home production
Retired			10.111***
			(3.341)
Spouse retired			-3.438**
			(1.431)
1[Age>=60]	0.119***	0.005	
	(0.009)	(0.010)	
1[Age>=63]	0.047***	0.006	
	(0.009)	(0.010)	
1[Age>=65]	-0.010	-0.010	
	(0.009)	(0.010)	
1[Spouse's Age>=60]	0.021**	0.172***	
	(0.008)	(0.009)	
1[Spouse's Age>=63]	0.018**	0.159***	
	(0.009)	(0.009)	
1[Spouse's Age>=65]	0.012	0.115***	
	(0.009)	(0.009)	
Number of adults in the household	0.012**	-0.008	1.039***
	(0.005)	(0.005)	(0.219)
Number of children in the household	0.040***	0.024***	1.770***
	(0.008)	(0.009)	(0.382)
Age	-0.512***	-0.093	2.008
	(0.063)	(0.069)	(3.864)
$Age^2/100$	0.926***	0.221*	-3.088
	(0.107)	(0.118)	(6.741)
$Age^3/1000$	-0.053***	-0.015**	0.128
	(0.006)	(0.007)	(0.381)
Angrist-Pischke multivariate F-test of excluded instruments for "Retired": F(5, 11592)			38.24
Angrist-Pischke multivariate F-test of excluded instruments for "Spouse retired": F(5, 11592)			171.65
Endogeneity test (p-value)			0.873
Number of observations	15,531	15,531	15,531
Number of individuals	3,928	3,928	3,928

Note: Standard errors are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A6. Retirement and components of home production per week of couples: FE-IV linear models

	Men			Women		
	FE-IV			FE-IV		
	Housework	Errands	Repairs/Garden	Housework	Errands	Repairs/Garden
Retired	1.053	1.746**	7.686***	6.254***	1.466	2.390
	(1.200)	(0.882)	(1.497)	(2.303)	(1.230)	(1.556)
Spouse retired	-3.405***	-1.183	-1.377	-3.041***	-1.058**	0.660
	(1.057)	(0.777)	(1.318)	(0.987)	(0.527)	(0.666)
Number of adults in the household	-0.122	0.082	-0.004	1.012***	0.119	-0.092
	(0.106)	(0.078)	(0.133)	(0.151)	(0.081)	(0.102)
Number of children in the household	-0.191	0.192	-0.137	1.524***	0.326**	-0.081
	(0.183)	(0.135)	(0.229)	(0.263)	(0.141)	(0.178)
Age	-5.591**	-4.177**	-0.026	1.451	-1.404	1.961
	(2.239)	(1.647)	(2.794)	(2.663)	(1.422)	(1.799)
$Age^2/100$	9.689**	7.286***	0.753	-2.438	2.536	-3.187
	(3.806)	(2.799)	(4.748)	(4.646)	(2.482)	(3.139)
$Age^3/1000$	-0.536**	-0.412***	-0.101	0.117	-0.152	0.163
	(0.210)	(0.154)	(0.262)	(0.263)	(0.140)	(0.177)
Endogeneity test (p-value)	0.001	0.169	0.076	0.596	0.312	0.320
Number of observations	15,531	15,531	15,531	15,531	15,531	15,531
Number of individuals	3,928	3,928	3,928	3,928	3,928	3,928

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A7. Retirement and hours of home production per week in couples: Linear models with the narrower definition of home production (excluding repairs/gardening)

	Men			Women		
	RE model	FE model	FE-IV	RE model	FE model	FE-IV
Retired	6.981***	6.898***	2.799*	10.475***	8.024***	7.721***
	(0.196)	(0.255)	(1.621)	(0.251)	(0.357)	(2.794)
Spouse retired	-2.586***	-2.633***	-4.589***	-1.760***	-2.696***	-4.098***
	(0.189)	(0.276)	(1.428)	(0.259)	(0.313)	(1.197)
Number of adults in the household	-0.498***	-0.060	-0.040	1.899***	1.136***	1.131***
	(0.100)	(0.140)	(0.144)	(0.132)	(0.179)	(0.184)
Number of children in the household	-0.431***	-0.186	0.001	1.639***	1.798***	1.850***
	(0.153)	(0.233)	(0.248)	(0.204)	(0.303)	(0.319)
Age	-3.578**	-0.825	-9.769***	0.659	1.746	0.047
	(1.414)	(1.466)	(3.026)	(1.761)	(1.750)	(3.231)
$Age^2/100$	6.195***	1.649	16.975***	-0.937	-2.957	0.098
	(2.371)	(2.446)	(5.143)	(3.007)	(2.989)	(5.637)
$Age^3/1000$	-0.357***	-0.102	-0.948***	0.036	0.139	-0.035
	(0.131)	(0.134)	(0.283)	(0.169)	(0.168)	(0.319)
Spouse's age	4.249***			5.753***		
	(1.346)			(1.851)		
Spouse's $age^2/100$	-7.558***			-9.264***		
	(2.298)			(3.105)		
Spouse's $age^3/1000$	0.445***			0.485***		
	(0.129)			(0.171)		
Hausman test	$\chi^2(7) = 153.66$			$\chi^2(7) = 57.94$		
Angrist-Pischke multivariate F-test of excluded instruments for "Retired": F(5, 11592)			59.81			38.24
Angrist-Pischke multivariate F-test of excluded instruments for "Spouse retired": F(5, 11592)			92.28			171.65
Endogeneity test (p-value)			0.001			0.345
Number of observations	17,880	15,531	15,531	17,880	15,531	15,531
Number of individuals	6,277	3,928	3,928	6,277	3,928	3,928

Note: Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A8. Retirement and ln(monthly household resources): Fixed effects models with the narrower definition of home production (excluding repairs/gardening)

	Fixed effects model		
	No home production	Home production valued at 4/hour	Home production valued at 8.50/hour
Man retired	-0.208***	-0.134***	-0.089***
	(0.008)	(0.007)	(0.007)
Woman retired	-0.111***	-0.055***	-0.018**
	(0.009)	(0.008)	(0.007)
Number of adults in the household	0.160***	0.127***	0.107***
	(0.004)	(0.004)	(0.004)
Number of children in the household	0.093***	0.071***	0.060***
	(0.008)	(0.006)	(0.006)
Man's age	0.103**	0.121***	0.120***
	(0.047)	(0.040)	(0.039)
Man's age^2/100	-0.144*	-0.179***	-0.181***
	(0.079)	(0.067)	(0.065)
Man's age^3/1000	0.007	0.008**	0.008**
	(0.004)	(0.004)	(0.004)
Number of observations	14,793	14,793	14,793
Number of couples	3,754	3,754	3,754

*** p<0.01, ** p<0.05, * p<0.1
Standard errors in parentheses.