

# Retirement and Subjective Well-Being<sup>1</sup>

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## Abstract

We provide an explanation for the common finding that the effect of retirement on life satisfaction is negligible. For this we use subjective well-being measures for life and domains of life satisfaction that are available in the German Socio-Economic Panel (GSOEP) and show that the effect of voluntary retirement on satisfaction with current household income is negative, while the effect on satisfaction with leisure is positive. At the same time, the effect on health satisfaction is positive but small. Following the life domain approach we then argue that these effects offset each other for an average individual and that therefore the overall effect is negligible. Furthermore, we show that it is important to distinguish between voluntary and involuntary retirement. The effect of involuntary retirement is negative because the adverse effect on satisfaction with household income is bigger and the effect on satisfaction with health is negative rather than positive. These results turn out to be robust to using different identification strategies such as fixed effects and first differences estimation, as well as instrumental variables estimation using eligibility ages and plant closures as instruments for voluntary and involuntary retirement, respectively.

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## Introduction

It is a common finding that the average effect of retirement on life satisfaction is negligible (e.g. Lindeboom *et al.*, 2002).<sup>4</sup> We establish that this also holds for the average effect of voluntary retirement on life satisfaction in Germany and provide an explanation. In particular, we use subjective well-being measures that are available in the German Socio-Economic Panel (GSOEP) and show that the effect of voluntary retirement on satisfaction with current household income is negative, while the effect on satisfaction with leisure is positive. At the same time, the effect on health satisfaction is positive but small. Following the life domain approach we then argue that these effects offset each other for an average individual and that *therefore* the overall effect is negligible.<sup>5</sup> Furthermore, we show that it is important to distinguish between voluntary and involuntary retirement. The effect of involuntary retirement is negative because the adverse effect on satisfaction with household income is bigger and the effect on satisfaction with health is negative rather than positive. These results turn out to be robust to using alternative identification strategies such as fixed effects (FE) and first differences (FD) estimation, as well as instrumental variables (IV) estimation using eligibility ages and plant closures as instruments for voluntary and involuntary retirement, respectively.

Only recently economists have become less reluctant to regard subjective well-being as a proxy for the type of utility that decision making is based on.<sup>6</sup> Nevertheless, there are already a number of studies that characterize the relationship between well-being and retirement. In

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<sup>4</sup> In this paper we use, interchangeably, the expressions subjective well-being, satisfaction with life, general satisfaction, and life satisfaction. The use of subjective measures in economics has been developing since the 1970's with the Leyden school's approach (van Praag and Frijters, 1999). A large number of economic studies that use subjective data has burgeoned since the mid 1990's. See e.g. Clark and Oswald (1994), Frey and Stutzer (2000), Frijters (2000), Di Tella *et al.* (2001), Easterlin (2001), McBride (2001), Ferrer-i-Carbonell (2005), and van Praag (2007) for further references and discussions.

<sup>5</sup> The so-called life domain approach assumes that responses on global happiness are the net outcome of reported satisfaction in different domains of life. These in turn reflect the extent to which objective outcomes match the respondent's goals or needs in that area. See also Campbell *et al.* (1976), Campbell (1981), van Praag *et al.* (2003), Easterlin (2006), Easterlin and Sawangfa (2007), and Rojas (2007).

<sup>6</sup> Finkelstein *et al.* (2009), e.g., argue that subjective well-being could be a good proxy for utility. See also Layard *et al.* (2008) on this point.

those studies, it is typically emphasized that the retirement decision might be related to unobserved individual characteristics that by themselves are related to the level of subjective well-being. Usually, this is addressed by FE or FD estimation (for linear models), the inclusion of Mundlak (1978) regressors (for nonlinear models), or IV estimation that exploits exogenous variation in retirement incentives.<sup>7</sup> Lindeboom *et al.* (2002) perform FD estimation to investigate the effect of major events in life on mental health for a representative sample of individuals from the Netherlands and find insignificant effects of retiring. Charles (2004) uses HRS data with outcomes “being depressed” and “feeling lonely” as well as NLSMature Men data with outcome “subjective well-being” and finds a negative effect using the ordinary least squares (OLS) estimator, insignificant negative FE estimates, and positive IV estimates (some of these are significant). Generally, effects are not found to be statistically different from zero.<sup>8</sup>

At least two studies characterize associated dynamics.<sup>9</sup> Kim and Moen (2002) find “higher morale” in the short run and more symptoms of depression in the long run. Börsch-Supan and Jürges (2009) find that especially early retirement is related to subjective well-being. Individuals are less happy in the years of early retirement than in the years before and after retirement.

Unemployment resembles involuntary retirement in that individuals are not working but actually want to. It is well established that being unemployed is associated with lower levels of satisfaction (e.g. Clark and Oswald, 1994). Clark *et al.* (2001) find that life satisfaction is

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<sup>7</sup> There are also some more descriptive studies. Midanik *et al.* (1995) compare individuals who retired to individuals who did not do so. Controlling for age, gender, marital status and education they find that retired individuals report lower stress levels and engage in regular exercise more often. They find no differences with respect to self-assessed mental health status, coping, depression, smoking, and alcohol consumption. Portnoi (1983) finds an association between retirement and depression. Bossé *et al.* (1987) find that both early and late retirees reported more psychological symptoms. Blanchflower and Oswald (2004) use ordered logit regressions and find that in the United States and Great Britain retirement has no overall effect on well-being.

<sup>8</sup> An exception is the study by Pinguat and Schindler (2007) who use latent growth mixture modelling and GSOEP data to identify different groups with different effects of retiring. In Group 1, satisfaction declined at retirement but continued on a stable or increasing trajectory thereafter. Group 2 demonstrated a large increase in satisfaction at retirement but overall declining satisfaction. In Group 3, satisfaction showed a temporary very small increase at retirement. We take this as evidence for heterogeneity in the effect. In this study we estimate average effects.

<sup>9</sup> It turns out that dynamics are less important in the data we look at. Figure 2 and 3 below show that the main effect is permanent and takes place at the time of retirement.

lower for currently unemployed individuals and decreases in past unemployment. Clark *et al.* (2008) estimate an ordered probit model and find the strongest effects at the time of the event but also significant lag and lead effects. However, these findings could be explained by the presence of FE that are negatively related to the probability of being unemployed and positively related to life satisfaction. In fact, Winkelmann and Winkelmann (1998) reject a model without FE but still find “large non-pecuniary costs of unemployment”. Van Praag and Ferrer-i-Carbonell (2002) assess the monetary value of being in the labor force and find that it is substantial for many individuals.

This paper proceeds as follows. The next section contains a description of the data. We then discuss the econometric approach, present the results, and assess their robustness. The last section concludes.

## Data

The empirical analysis uses GSOEP data from 1995 to 2007. The GSOEP is a longitudinal household survey that was started in the Federal Republic of Germany in 1984.<sup>10</sup> Our sample is restricted to West-German men that are between 50 and 70 years old and do not belong to the high-income subsample.<sup>11</sup> Moreover, we drop individuals who go back to work during the sampling period. Finally, we drop all observations with missing or unreliable values for the variables used in the analysis. Our final sample includes 3,938 individuals constituting an unbalanced panel with 19,994 observations.

### *General and domains of life satisfaction*

The GSOEP contains a wide range of questions about satisfaction in different domains of life (e.g. health, household income, work, leisure, environment, and housing) and satisfaction

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<sup>10</sup> The GSOEP is described in Wagner *et al.* (1993). The GSOEP is sponsored by the Deutsche Forschungsgemeinschaft. It is administered by the German Institute for Economic Research (Berlin) and the Center for Demography and Economics of Aging (Syracuse University).

<sup>11</sup> There is a subsample with residents of West-Germany and one with foreigners living in West-Germany. An additional subsample including East-German households was added from 1990 onwards. In 1994 and 1995, a subsample of immigrants to West-Germany was added. A subsample of high-income households has been included in 2002. Besides, there are refreshment samples.

with life in general. Respondents are asked to evaluate their respective domain and general life satisfaction on a 10-points scale. The original questionnaire states

*How satisfied are you today with the following areas of your life?*

*Please answer by using the following scale:*

*0 means totally unhappy, 10 means totally happy.*

*How satisfied are you with . . .*

*– your health?*

*– your job? (if employed)*

*– your household income?*

*– your free time?*

*– ...*

These questions are placed in the middle of the questionnaire. The very last question individuals answer reads

*In conclusion, we would like to ask you about your satisfaction with your life in general.*

*Please answer according to the following scale:*

*“0” means completely dissatisfied, “10” means completely satisfied.*

*How satisfied are you with your life, all things considered?*

In our analysis we use evaluations of satisfaction with life and three domains of life that are particularly relevant regarding life satisfaction and retirement: satisfaction with household income, satisfaction with free time, and satisfaction with health.<sup>12</sup>

It is worth noting that in order to estimate the effects of retirement on satisfaction with life and the domains of life we do *not* have to assume that the answers are fully interpersonally comparable because we control for FE that shift the location of the response scale. By allowing for FE we also control for cohort effects that have been documented by Jürges (2003). However, we assume that the scale is comparable across individuals and estimate a linear model. Ferrer-i-Carbonell and Frijters (2004) have shown that doing so does generally not lead to different conclusions.

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<sup>12</sup> It is not clear from the questionnaire whether satisfaction with leisure refers to the quality or quantity of leisure. Therefore, we expect respondents to evaluate both at the same time.

### *Labor force status*

There exist many definitions for retirement. For the purpose of our analysis, we define an individual as being retired if he is out of the labor force with the intention of remaining out permanently (Lazear, 1986). The GSOEP includes a question about the intention of non-working individuals with respect to going back to work: *Do you intend to engage in paid employment (again) in the future?* “No, definitely not”/“Probably not”/“Probably”/“Yes, definitely.” We define an individual as voluntarily retired if he reports not being employed and having “definitely” no intention to go back to work. Individuals are classified as involuntarily retired if they report not being employed and state that they have the intention to go back to work in the future. Moreover, if an individual is classified as voluntarily retired or involuntarily retired but we observe that he goes back to work in one of the following waves, we drop him from the sample. Finally, individuals are defined as working if they report being currently engaged in paid employment.

Figure 1 shows how labor force status is related to age for West-German men. It shows that there is a substantial amount of early retirement, beginning at the age of 55. Although the normal retirement age is 65 we see that by then at least 90 per cent of the individuals are already retired according to our definition.

Figure 1 about here

### *Other explanatory variables*

We use household characteristics and health indicators as additional explanatory variables. Household characteristics consist of an indicator for the individual living in a couple (married or not) and the number of adults and children in the household. We also include three objective health measures to control for time varying factors that are related to both the well-being measures and voluntary or involuntary retirement. The measures we use are the number of visits to the doctor within the last year, a dummy for at least one hospital stay within the previous year, and the legal degree of disability of the individual.

### *Summary statistics and descriptive analysis*

Table 1 presents summary statistics for all variables used in the analysis. They are reported by labor market status. Retired individuals are older on average and less healthy. This is also reflected in a lower level of satisfaction with health. Besides, they are more satisfied with their free time. Already from these summary statistics it is apparent that involuntarily retired individuals report substantially lower levels of satisfaction with life and income.

Table 1 about here

OLS estimates that describe the associations between life satisfaction and satisfaction with income, leisure and health on the one hand, and voluntary and involuntary retirement on the other hand, are presented in Table 2. Retired individuals report lower levels of life satisfaction, lower levels of income satisfaction, higher levels of satisfaction with free time, and lower levels of satisfaction with health. However, those estimates have no causal interpretation because there could be selection into retirement that is based on time invariant individual characteristics. For example, the negative association between retirement and life satisfaction could be due to the fact that individuals that are generally less happy retire earlier.

Table 2 about here

## **Econometric Approach**

Our main results consist of estimates of the effect of voluntary and involuntary retirement on life satisfaction and satisfaction with the domains of life. They are obtained using the standard FE estimator, thus controlling for time invariant individual heterogeneity that is related to selection into retirement. The assumption we make for this is that retirement is unrelated to transitory components of the error term in all periods (strict exogeneity). These transitory components could be related to health shocks and changes in household characteristics. In our model, we address this concern by controlling for household and objective health characteristics. We assess whether this is sufficient by comparing our baseline results to FD estimates (OLS estimates using first-differenced data), relaxing the strict exogeneity assumption, and to IV estimates, relaxing the assumption that retirement is in addition not related to time varying individual heterogeneity.

## Results

### *Main results*

Table 3 reports our main results. The first column is for the effect of voluntary and involuntary retirement on life satisfaction. We find that there is no significant overall effect of voluntary retirement on life satisfaction. This is consistent with Lindeboom et al. (2002)'s finding that there is no effect of retirement on mental health. However, we find in addition that *involuntary* retirement has adverse effects on life satisfaction. Considering that the baseline level of life satisfaction for working individuals is 7.055, our estimate of a loss of 0.638 is large in terms of magnitude.<sup>13</sup> This is consistent with findings on the effect of unemployment on well-being (Clark and Oswald, 1994; Winkelmann and Winkelmann, 1998; e.g.) and not surprising since our definition of involuntary retirement involves the individuals' intention to go back to work while they are actually not working.

Table 3 about here

The last three columns explain these findings. Satisfaction with household income drops significantly due to retirement. The magnitude of the drop due to involuntary retirement is three times as high as the one due to voluntary retirement. At the same time, we observe a significant increase in satisfaction with the individuals' free time both for voluntary and involuntary retirement. The magnitude is bigger for voluntary than for involuntary retirement. Finally, we find significant positive (but relatively small) effects of voluntary retirement on satisfaction with health and significant negative (and bigger) effects for involuntary retirement.

These results are illustrated in Figure 2 and 3. These figures were obtained by regressing the respective dependent variables in Table 3 on the same controls as above, as well as dummies for the time to, or since, voluntary and involuntary retirement, respectively. These variables are endogenous in the same way retirement is, and we therefore use the FE estimator to control for time invariant unobserved differences between individuals.

Figure 2 and 3 about here

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<sup>13</sup> Throughout, we de-mean the covariates, but not the retirement indicators.



Both figures show that retirement affects satisfaction with life and the three domains of life at the time individuals retire. The main effects of retirement are found to set in at the time of retiring, which is denoted by zero, and seem to be permanent. This means that being retired, rather than retiring has an effect, justifying our specification in which SWB depends on the state of working or being retired, and not on the action of retiring. Put differently, dynamics do not seem to play a major role here.

*Relative importance of satisfaction with health, household income, and free time*

The results that were presented above show that while there is no overall effect of voluntary retirement on life satisfaction, there is a negative effect on satisfaction with household income, a positive effect on satisfaction with free time, and a positive effect on satisfaction with health. This suggests that those effects offset each other.

This argument can be attributed to the so-called life domain approach, which says that responses on global happiness are the net outcome of reported satisfaction in different domains of life.<sup>14</sup> Regressing life satisfaction on satisfaction with the most important domains of life allows us to evaluate the relative importance of those domains of life for life satisfaction as a whole. Furthermore, we can thereby investigate whether the relative importance of the domains of life changes at retirement. This can be done by adding interaction terms between satisfaction with the domains of life and labor force status to the right hand side variables. We also include interaction terms between satisfaction with the domains of life and age to assess whether the relative importance of those domains of life changes with age. FE estimates are presented in Table 4.<sup>15</sup>

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<sup>14</sup> See Campbell et al. (1976), Campbell (1981), van Praag et al. (2003), Easterlin (2006), Easterlin and Sawangfa (2007), and Rojas (2007).

<sup>15</sup> We assume that there is no correlation between the transitory error term and the domains of life satisfaction measures. It is violated if self-reported satisfaction measures are sensitive to the current mood of the individuals (mood or context effects), see, e.g., Schwarz and Clore (1983), Lucas *et al.* (1996), and Kahneman and Krueger (2006). In such a case, a common component of the error term would appear in the well-being production function and in each satisfaction with domains of life equations, which would lead to an overestimation of the coefficients on the domains of life in the well-being production function. In addition, we require that the unobserved satisfactions with the other domains of life are not correlated to the observed satisfaction with the domains of life included in our model. This assumption is strong in that it requires for example that satisfaction with family and satisfaction with leisure or finance are independent.

#### Table 4 about here

The first column repeats the baseline results of the life satisfaction equation (the same as in Table 3). The second column presents the results of the model that includes domain of life satisfaction as explanatory variables.<sup>16</sup> Satisfaction with health is the most important determinant of life satisfaction, while satisfaction with free time is the least important domain of life. The third column shows the results from the model that allows the relative importance of the domains of life to change with labor force status. While there is no significant change in the relative importance of the domains of life for individuals who are involuntarily retired, individuals retiring voluntarily put more weights on satisfaction with free time and less on satisfaction with income. Moreover, satisfaction with health becomes more important for voluntarily retired individuals. However, once we additionally include interaction terms between age and the domains of life in order to control for changes in the weights due to aging, the latter effect is not significantly different from zero anymore. In addition, we see that satisfaction with health becomes more important as individuals age.<sup>17</sup>

Taken together Table 3 and 4 explain why we find no overall effect of being voluntarily retired on life satisfaction. In particular, the loss in income satisfaction (0.418) is compensated by gains in satisfaction with free time (1.287) and health (0.196). If anything, individuals who retire voluntarily amplify this by putting more weight on the domains in which the effect of retirement is positive, and putting less weight on the domain in which it is negative. Individuals who retire involuntarily suffer a loss in overall satisfaction because for

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<sup>16</sup> Measures for satisfaction with the domains of life were de-meaned. If interaction terms between voluntary and involuntary retirement were included then variables were de-meaned separately for voluntarily and involuntarily retired and only then interacted with retirement indicators. Therefore, the coefficients on indicators for voluntary and involuntary retirement are average effects.

<sup>17</sup> In psychology several models attempt to describe strategies that people may employ to cope with the difficulties associated with ageing. One of the leading models is the lifespan model of selective optimization with compensation (SOC) developed by Baltes and Baltes (1990). In this model individuals continuously *choose* life domains that are important to them and then optimize the resources and aids that facilitate success in these domains. By putting more or less weight on the different domains of life individuals adapt to biological, psychological, and socio-economic changes (Ouweland *et al.*, 2007). This re-weighting becomes increasingly important at later stages in life since health and resources decrease (Marsiske *et al.*, 1995, Baltes and Carstensen, 1996, Baltes and Lang, 1997, Freund *et al.*, 1999, Freund and Baltes, 2000).

them the drop in income satisfaction is higher (1.287), while the increase in leisure satisfaction is lower (0.802). Also the effect on satisfaction with health is lower (a drop of 0.283).

## **Robustness**

In this section, we assess the robustness of our results. They have been obtained using the FE estimator, assuming that the explanatory variables in all periods are unrelated to the error terms in all periods (strong exogeneity). This assumption is stronger than the assumption needed for estimating the model on first-differenced data because for the latter we only need to assume that explanatory variables and error terms are uncorrelated in the same and adjacent periods.

Table 5 about here

Table 5 presents results using the FD estimator (OLS estimates on first-differenced data). They are very similar to the results presented in Table 3, both in terms of significance and magnitude.<sup>18</sup>

Finally, in order to assess whether unobserved shocks, as opposed to time invariant individual differences, confound satisfaction with life and the domains of life on the one hand, and labor force status on the other hand, we obtain IV estimates. We have access to instruments that are related to voluntary and involuntary retirement, respectively. This allows us, in addition, to assess the validity of our definition of voluntary and involuntary retirement, because we estimate the average effect of retiring (not working in that case) for those individuals who retire voluntarily when we use only instruments that are related to voluntary retirement, and the average effect of retiring for those individuals who retire involuntarily when we use only instruments that are related to involuntary retirement (Imbens and Angrist, 1994).<sup>19</sup>

For voluntary retirement we use indicators for being older than 60, 63, and 65 years, respectively. This choice is based on the institutional rules, which, for the study population,

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<sup>18</sup> An exception is the effect of being involuntary retired on satisfaction with free time that is no more significant.

<sup>19</sup> That is, we now have one endogenous variable, being retired, which takes on the value one if the individual is not working.

provided financial incentives to retire no earlier than at age 60, and additional benefits if individuals retired at age 63 and more so at age 65.<sup>20</sup>

Figure 4 about here

Figure 4 shows the retirement hazard as a function of age, confirming that there is an empirical relationship between reaching age 60, 63, and 65, and the outflow of the labor force. The figure shows that the hazard rate is highest at age 65. However, recalling Figure 1, most individuals are already retired by that age. This shows that the empirical relationship between retiring and the instruments is stronger than the relationship between being retired and the instruments. Therefore, we implement the IV estimator on first-differenced. As usual in duration models we use only data on individuals who have been working in the previous period. Hence, the first stage is essentially a linear approximation to the hazard rate. Table 6 shows our IV estimates. The first column shows that the hazard rate out of retirement increases significantly when individuals turn 60, 63, and 65, respectively.

Table 6 about here

Very much in line with the results presented in Table 3 we find that voluntary retirement has only a small effect on life satisfaction, a sizable positive effect on satisfaction with free time, a smaller negative effect on satisfaction with income, and a small effect on satisfaction with health. However, it should be noted that, as usual, IV estimates are less precise, and in fact we cannot conclude from this table alone that effects of voluntary retirement are significantly different from zero.

Next, following Salm (2009) and Kuhn, Lalive, and Zweimuller (2009), among others, we use firm closures as an instrument for involuntary retirement. For the individuals in our sample it is highly unlikely that they find a new job once their firm closes because they are already older than 50 years. Table 7 shows that a firm closure is associated with a 45.6 percentage point increase in the hazard rate out of work. Again very much in line with our

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<sup>20</sup> See e.g. Börsch-Supan and Jürges (2009) for details on the institutional rules. This identification strategy to estimate the effect of retirement on different outcomes has been used by e.g. Charles (2004), Neumann (2007), Bernheim et al. (2001), and Haider and Stephens (2007).

previous findings presented in Table 3, we find that the effect of involuntary retirement on life satisfaction is negative, while it is positive for satisfaction with leisure (but smaller than for voluntary retirement), and much more negative for satisfaction with income than it is for voluntary retirement. As before, we find adverse effects on satisfaction with health. Due to the small number of plant closures in our sample the effects on satisfaction with those three domains of life are not significant, but the overall effect is.

Table 7 about here

## Summary

This paper provides an explanation for the common finding that the average effect of voluntary retirement on life satisfaction is typically found to be negligible. We show that while satisfaction with current household income decreases substantially, satisfaction with free time increases. At the same time, the effects on health are relatively small. We complement these estimates with estimates of the importance of domain satisfaction for life satisfaction and allow this link to depend on labor market status. This shows that, if anything, individuals amplify this, once they retire, by putting more weight on satisfaction with free time and less weight on satisfaction with income.

We show that it is important to distinguish between voluntary and involuntary retirement. While the average effect of the former on life satisfaction is indeed negligible on average, we find that involuntary retirement has adverse effects on life satisfaction due to bigger negative effects on satisfaction with household income and smaller positive effects on satisfaction with leisure. At the same time, there are small adverse effects on satisfaction with health and individuals do not put more weight on satisfaction with leisure, the only domain in which the effect of retiring is positive for them.

## References

Baltes, P.B. and M.M. Baltes (1990): "Psychological perspectives on successful aging: The model of selective optimization with compensation," in Baltes, P.B. and Baltes, M.M. (eds.): *Successful aging: Perspectives from the behavioral sciences*, 1-34, Cambridge, England: Cambridge University.

Baltes, M.M. and L.L. Carstensen (1996): "The process of successful ageing," *Ageing and*

*Society*, 16, 397-422.

Baltes, M.M. and F.R. Lang (1997): "Everyday functioning and successful aging: The impact of resources," *Psychology and Ageing*, 12, 433-443.

Blanchflower D.G. and A.J. Oswald (2004): "Well-being over time in Britain and the USA," *Journal of Public Economics*, 88; 1359-1386.

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

Bossé, R., C.M. Aldwin, M.R. Levenson, and D.J. Ekerdt (1987): "Mental health differences among retirees and workers: Findings from the normative aging study," *Psychology and Aging*, 2, 383-389.

Campbell, A. (1981): *The Sense of Well-Being in America*, New York: McGraw-Hill.

Campbell, A., P.E. Converse, and W.L. Rodgers (1976): *The Quality of American Life*, New York: Russell Sage Foundation.

Charles, K.K (2004): "Is retirement depressing?: Labor force inactivity and psychological well-being in later life," *Research in Labor Economics*, 23, 269-299.

Clark, A.E., E. Diener, Y. Georgellis, and R.E. Lucas (2008): "Lags and leads in life satisfaction: a test of the baseline hypothesis," *Economic Journal*, 118, 222-243.

Clark, A.E., and A.J. Oswald (1994): "Unhappiness and unemployment," *Economic Journal*, 104(426), 648-659.

Clark, A.E., Y. Georgellis, and P. Sanfey (2001): "Scarring: the psychological impact of past unemployment," *Economica*, 68, 221-241.

Di Tella, R., R.J. MacCulloch and A.J. Oswald (2001): "Preferences over inflation and unemployment, evidence from surveys of subjective well-being," *American Economic Review*, 91, 335-341.

Easterlin, R.A. (2001): "Income and happiness: towards a unified theory," *Economic Journal*, 111, 465-484.

Easterlin, R.A. (2006): "Life cycle happiness and its sources: intersections of psychology, economics and demography," *Journal of Economic Psychology*, 27, 463-482.

Easterlin, R.A. and O. Sawangfa (2007): "Happiness and domain satisfaction: theory and evidence," IZA Discussion Paper No. 2584.

Ferrer-i-Carbonell, A. (2005): "Income and well-being: an empirical analysis of the comparison income effect," *Journal of Public Economics*, 89(5-6), 997-1019.

Ferrer-i-Carbonell, A., and P. Frijters (2004): "How important is methodology for the estimates of the determinants of happiness," *Economic Journal*, 114(497), 641-659.

Finkelstein, A., E.F.P. Luttmer, and M.J. Notowidigdo (2009): "Approaches to Estimating the Health State Dependence of the Utility Function," *American Economic Review*, 99(2): 116–21.

Freund, A.M. and P.B. Baltes (2000) "The orchestration of selection, optimization, and compensation: An action-theoretical conceptualization of a theory of developmental regulation," in: W.J. Perrig and A. Grob (eds.): *Control of human behavior, mental processes, and consciousness: Essays in honor of the 60th birthday of August Flammer*, Lawrence Erlbaum Associates Publishers, London, 35-58.

Freund, A.M., K.Z.H. Li and P.B. Baltes (1999): "Successful development and aging: The role of selection, optimization, and compensation," in: J. Brandtstädter and R.M. Lerner (eds): *Action and self-development: Theory and research through the life span*, Sage Publications, Thousand Oaks, 401-434.

Frey, B.S. and A. Stutzer (2000): "Subjective well-being, economy and institutions," *Economic Journal*, 110, 918-938.

Frijters, P. (2000): "Do individuals try to maximize general satisfaction?," *Journal of Economic Psychology*, 21, 281-304.

Imbens, G.W. and J.D. Angrist (1994): "Identification and estimation of local average treatment effects," *Econometrica*, 62(2), 467-452.

Jürges, H. (2003): "Age, cohort, and the slump in job satisfaction among West German workers," *Labour* 17(4), 489-518.

Kahneman, D. and A.B. Krueger (2006): "Developments in the measurement of subjective well-being," *Journal of Economic Perspectives*, 20(1), 3-24.

Kim, J. and P. Moen (2002): "Retirement transitions, gender, and psychological well-being: A life-course approach," *Journal of Gerontology: Psychological Sciences*, 57(B), 212-222.

Kuhn, A., R. Lalive, and J. Zweimuller (2009): "The public health costs of job loss," *Journal of Health Economics*, 28 (6), 1099-1115.

Layard, R., G. Mayraz, and S. Nickell (2008): "The marginal utility of income," *Journal of Public Economics*, 92, 1846-1857.

Lazear, E. (1986): "Retirement from the labor force," in: O. Ashenfelter and R. Layard: *Handbook of Econometrics*, Elsevier, 305-355.

Lindeboom, M., F. Portrait and G. J. van den Berg (2002): "An econometric analysis of the mental-health effects of major events in the life of older individuals," *Health Economics*, 11(6), 505-520.

- Lucas, R.E., E. Diener, and E.M. Suh (1996): “Discriminant validity of well-being measures,” *Journal of Personality and Social Psychology*, 71, 616-628.
- Marsiske, M., F.R. Lang, P.B. Baltes and M.M. Baltes (1995): “Selective optimization with compensation: Life-span perspectives on successful human development,” in: R.A. Dixon and L. Bäckman (eds): *Compensating for psychological deficits and declines: Managing losses and promoting gains*, Lawrence Erlbaum Associates, Publishers, New Jersey, 35-79.
- McBride, M. (2001): “Relative income effects on subjective well-being in the cross-section,” *Journal of Economic Behavior and Organization*, 45, 251-278.
- Midanik, L. T., K. Soghikian, L.J. Ransom, and I.S. Tekawa (1995): “The effect of retirement on mental health and health behaviors: The kaiser permanente retirement study,” *Journal of Gerontology: Social Sciences*, 50(B), S59–S61.
- Mundlak, Y. (1978): “On the pooling of time series and cross section data,” *Econometrica*, 46, 69-85.
- Ouwehand, C., D.T.D. de Ridder and J.M Bensing (2007): “A review of successful aging models: proposing proactive coping as an important additional strategy,” *Clinical Psychology Review*, 27(8), 873-884.
- Pinquart, M. and I. Schindler (2007): “Changes of life satisfaction in the transition to retirement: A latent-class approach,” *Psychology and Aging*, 22, 442-455.
- Portnoi, V. A. (1983): “Postretirement Depression: Myth or Reality”, *Comprehensive Therapy*, 9, 31-37.
- Rojas, M. (2007): “The complexity of well-being: A life satisfaction conception and domains-of-life approach,” in: I. Gough and A. McGregor (eds.): *Well-Being in Developing Countries*, Cambridge (UK): Cambridge University Press.
- Salm, M. (2009): “Does job loss cause ill health?” *Health Economics*, 18 (9), 1075-1089.
- Schwarz, N. and G.L. Clore (1983): “Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states,” *Journal of Personality and Social Psychology*, 45(3), 513-523.
- Van Praag, B.M.S. (2007): “Perspectives from the happiness literature and the role of new instruments for policy analysis,” *CESifo Economic Studies*, 53(1), 42-68.
- Van Praag, B.M.S. and A. Ferrer-i-Carbonell (2002): “Life satisfaction differences between workers and non-workers—The value of participation per se,” Tinbergen Institute Discussion Papers 02-018/3.
- Van Praag, B.M.S. and P. Frijters (1999): “The measurement of welfare and well-being; the Leyden approach,” in: D. Kahneman, E. Diener, and N. Schwarz (eds.): *Well-Being: The Foundations of Hedonic Psychology*, Russell Sage Foundation, New York, 413-433.



Van Praag, B. M. S., P. Frijters, and A. Ferrer-i-Carbonell (2003): "The anatomy of subjective well-being," *Journal of Economic Behavior & Organization*, vol. 51(1), 29-49.

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

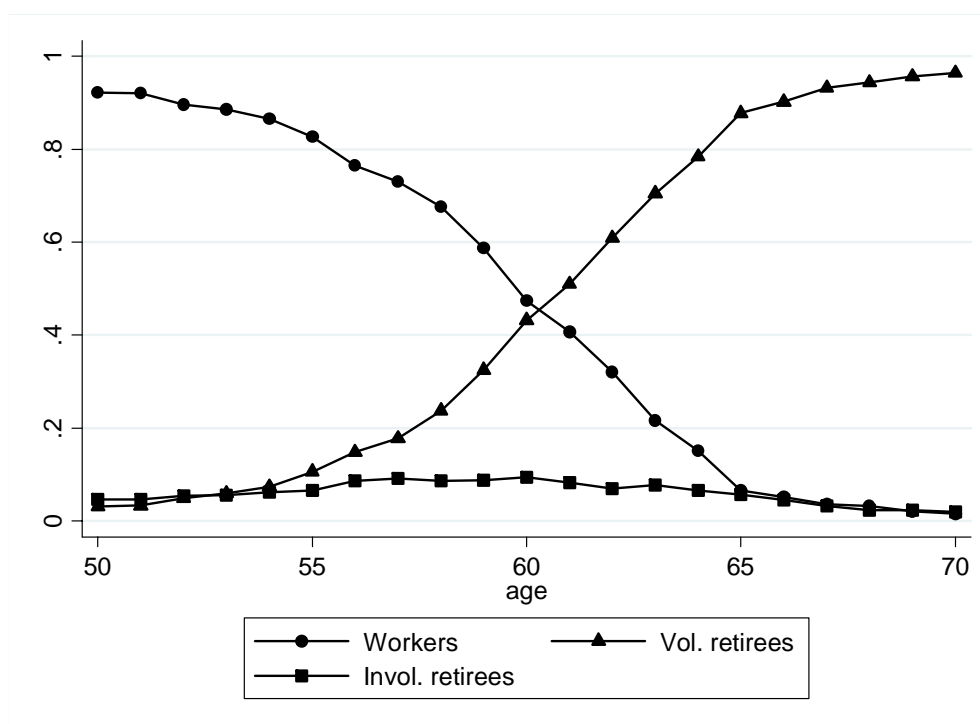
Winkelmann, L., and R. Winkelmann (1998): "Why are the unemployed so unhappy? Evidence from panel data," *Economica*, 65: 1-15.

**Table 1. Summary statistics**

	All	Workers	Vol. retirees	Invol. Retirees
Number of observations	19,994	10,003	8,739	1,252
Life satisfaction	7.05	7.23	7.02	5.86
Satisfaction with leisure	7.44	6.69	8.26	7.66
Satisfaction with income	6.62	6.86	6.60	4.80
Satisfaction with health	6.17	6.60	5.82	5.20
Years of education	11.5	12.0	11.0	10.5
Age	59.4	55.5	64.1	58.8
Living in a couple	87.1%	87.3%	87.4%	82.7%
Number of adults	2.32	2.46	2.16	2.28
Number of children	0.16	0.26	0.05	0.16
Doctor visits	12.79	9.88	15.65	16.07
Legal degree of disability	14.9%	6.8%	23.9%	17.5%
Hospital stay	13.9%	10.2%	17.8%	16.1%

Note: GSOEP 1995-2007. Pooled sample.

**Figure 1. Labor force status by age**



**Table 2. OLS results**

	Life satisfaction	Satisfaction with income	Satisfaction with free time	Satisfaction with health
Intercept	7.250*** (0.059)	6.988*** (0.074)	6.766*** (0.080)	6.341*** (0.072)
Vol. retired	-0.219*** (0.062)	-0.490*** (0.079)	1.384*** (0.076)	-0.247*** (0.070)
Inv. retired	-1.188*** (0.111)	-1.922*** (0.143)	0.952*** (0.116)	-0.896*** (0.112)
Years of education	0.053*** (0.009)	0.113*** (0.010)	-0.002 (0.010)	0.061*** (0.009)
Age	0.124** (0.062)	-0.174** (0.076)	-0.095 (0.076)	0.068 (0.071)
Age <sup>2</sup>	-0.073 (0.052)	0.186*** (0.064)	0.097 (0.063)	-0.038 (0.059)
Living in couple	0.552*** (0.083)	0.554*** (0.107)	0.319*** (0.099)	0.146 (0.091)
Number of adults	-0.093*** (0.031)	-0.114*** (0.039)	-0.173*** (0.042)	-0.063* (0.036)
Number of children	-0.087** (0.042)	-0.163*** (0.055)	-0.224*** (0.056)	-0.047 (0.049)
Log(doctor visits+1)	-0.217*** (0.014)	-0.141*** (0.018)	-0.068*** (0.017)	-0.539*** (0.016)
Legal degree of disability	-0.981*** (0.103)	-0.457*** (0.122)	-0.368*** (0.110)	-1.955*** (0.111)
Hospital stay	-0.259*** (0.045)	-0.020 (0.053)	-0.041 (0.052)	-0.668*** (0.051)
Year fixed-effects	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.136	0.116	0.136	0.278
N	19,994	19,994	19,994	19,994

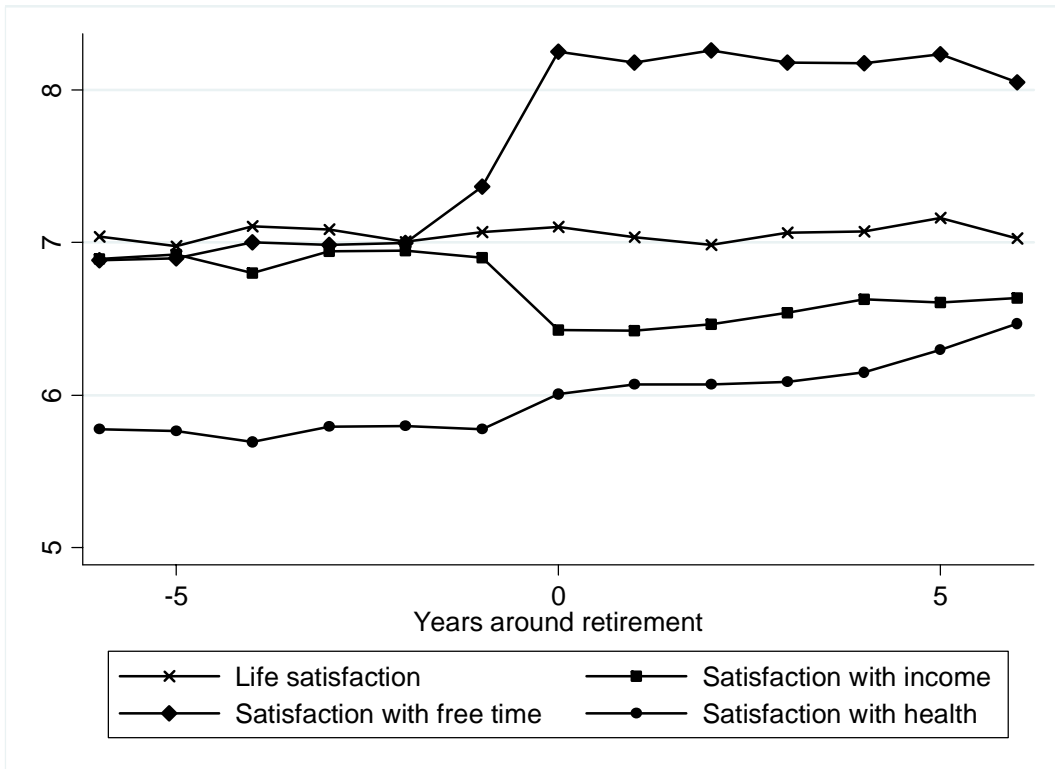
Note: Ordinary least squares estimates. Cluster robust standard errors are in parentheses. (\*), (\*\*), (\*\*\*) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% level, respectively.

**Table 3. Fixed effects results**

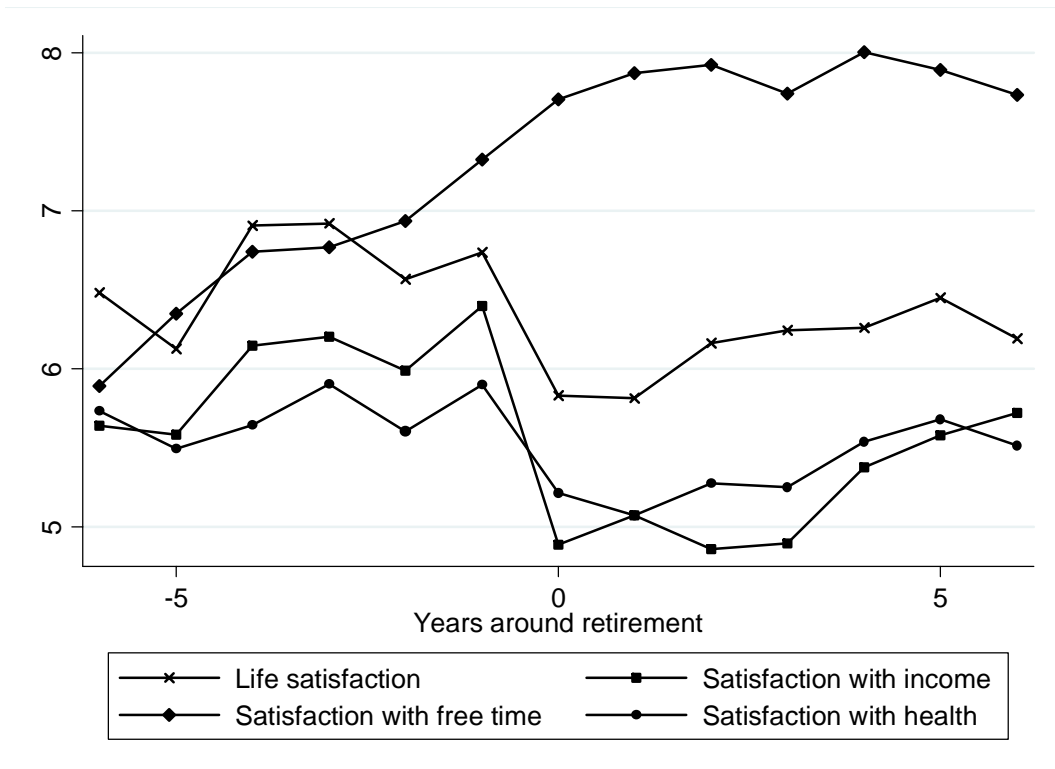
	Life satisfaction	Satisfaction with income	Satisfaction with free time	Satisfaction with health
Intercept	7.055*** (0.025)	6.881*** (0.031)	6.867*** (0.037)	6.106*** (0.030)
Vol. retired	0.076 (0.050)	-0.418*** (0.065)	1.190*** (0.076)	0.196*** (0.063)
Inv. retired	-0.638*** (0.166)	-1.287*** (0.170)	0.802*** (0.222)	-0.283* (0.164)
Age	0.154** (0.063)	-0.095 (0.068)	-0.080 (0.075)	0.144** (0.072)
Age <sup>2</sup>	-0.153*** (0.052)	0.081 (0.056)	0.069 (0.062)	-0.155** (0.061)
Living in couple	0.386*** (0.119)	0.175 (0.140)	0.155 (0.133)	0.036 (0.114)
Number of adults	-0.035 (0.028)	0.010 (0.034)	-0.053 (0.037)	-0.008 (0.032)
Number of children	0.028 (0.051)	0.213*** (0.057)	-0.113* (0.059)	0.047 (0.058)
Log(doctor visits+1)	-0.111*** (0.010)	-0.053*** (0.012)	-0.019 (0.013)	-0.310*** (0.014)
Legal degree of disability	-0.550*** (0.110)	-0.133 (0.117)	-0.183 (0.131)	-0.615*** (0.127)
Hospital stay	-0.192*** (0.033)	-0.041 (0.037)	0.033 (0.041)	-0.414*** (0.043)
Within-R <sup>2</sup>	0.030	0.021	0.046	0.073
N	19,994	19,994	19,994	19,994

Note: FE estimates. Robust standard errors are in parentheses. (\*), (\*\*), (\*\*\*) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% level, respectively.

**Figure 2. The effect of voluntary retirement**



**Figure 3. The effect of involuntary retirement**



**Table 4. Domains of life model**

	Life satisfaction			
	(i)	(ii)	(iii)	(iv)
Intercept	7.055*** (0.025)	7.080*** (0.022)	7.069*** (0.023)	7.071*** (0.023)
Vol. retired	0.076 (0.050)	-0.008 (0.045)	-0.023 (0.046)	-0.026 (0.045)
Inv. retired	-0.638*** (0.166)	-0.452*** (0.134)	-0.308** (0.146)	-0.304** (0.146)
Age	0.154** (0.063)	0.147*** (0.055)	0.142*** (0.055)	0.108* (0.056)
Age <sup>2</sup>	-0.153*** (0.052)	-0.141*** (0.045)	-0.136*** (0.045)	-0.107** (0.046)
Living in couple	0.386*** (0.119)	0.336*** (0.108)	0.329*** (0.108)	0.331*** (0.108)
Number of adults	-0.035 (0.028)	-0.030 (0.025)	-0.032 (0.025)	-0.032 (0.025)
Number of children	0.028 (0.051)	-0.005 (0.043)	-0.008 (0.043)	-0.009 (0.044)
Log(doctor visits+1)	-0.111*** (0.010)	-0.039*** (0.009)	-0.040*** (0.009)	-0.040*** (0.009)
Legal degree of disability	-0.550*** (0.110)	-0.390*** (0.098)	-0.366*** (0.098)	-0.358*** (0.097)
Hospital stay	-0.192*** (0.033)	-0.106*** (0.030)	-0.104*** (0.030)	-0.104*** (0.030)
Satisfaction with health	-	0.200*** (0.008)	0.180*** (0.010)	0.191*** (0.012)
Satisfaction with income	-	0.159*** (0.009)	0.178*** (0.012)	0.178*** (0.013)
Satisfaction with free time	-	0.094*** (0.008)	0.069*** (0.010)	0.062*** (0.011)
Vol. retired x Satisfaction with health	-	-	0.036** (0.015)	0.012 (0.019)
Vol. retired x Satisfaction with income	-	-	-0.053*** (0.017)	-0.052*** (0.020)
Vol. retired x Satisfaction with free time	-	-	0.058*** (0.016)	0.073*** (0.019)
Inv. retired x Satisfaction with health	-	-	0.035 (0.035)	0.025 (0.036)
Inv. retired x Satisfaction with income	-	-	0.047 (0.036)	0.047 (0.036)
Inv. retired x Satisfaction with free time	-	-	0.047 (0.035)	0.052 (0.035)
Age x Satisfaction with health	-	-	-	0.003* (0.002)
Age x Satisfaction with income	-	-	-	0.000 (0.002)
Age x Satisfaction with free time	-	-	-	-0.002 (0.002)
Within-R <sup>2</sup>	0.030	0.166	0.169	0.169
N	19,994	19,994	19,994	19,994

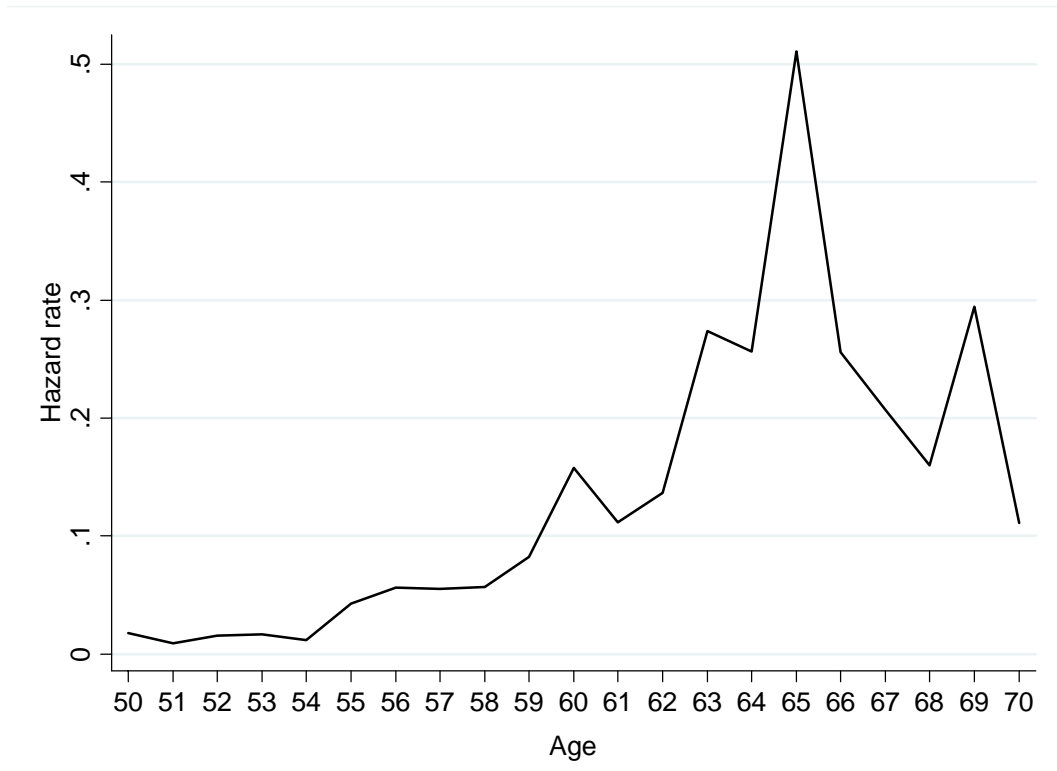
Note: FE estimates. Robust standard errors are in parentheses. (\*), (\*\*), (\*\*\*) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% level, respectively.

**Table 5. First difference results**

	Life satisfaction	Satisfaction with income	Satisfaction with free time	Satisfaction with health
Vol. retired	0.094 (0.075)	-0.464*** (0.093)	0.973*** (0.100)	0.195** (0.094)
Inv. retired	-0.912*** (0.238)	-1.336*** (0.256)	0.104 (0.249)	-0.510** (0.219)
Age	0.063 (0.085)	-0.144 (0.098)	-0.206* (0.107)	0.076 (0.107)
Age <sup>2</sup>	-0.090 (0.071)	0.112 (0.081)	0.171* (0.088)	-0.107 (0.089)
Living in couple	0.273 (0.172)	0.223 (0.164)	0.017 (0.167)	-0.075 (0.185)
Number of adults	0.029 (0.037)	-0.009 (0.042)	-0.050 (0.050)	0.022 (0.049)
Number of children	0.131* (0.073)	0.098 (0.070)	-0.017 (0.087)	0.153* (0.078)
Log(doctor visits+1)	-0.086*** (0.011)	-0.027** (0.012)	-0.010 (0.014)	-0.239*** (0.015)
Legal degree of disability	-0.453*** (0.127)	-0.023 (0.120)	-0.161 (0.123)	-0.398*** (0.154)
Hospital stay	-0.082** (0.036)	-0.031 (0.037)	0.051 (0.043)	-0.230*** (0.044)
R <sup>2</sup>	0.013	0.007	0.009	0.036
N	15,535	15,535	15,535	15,535

Note: FD estimates. Robust standard errors are in parentheses. (\*), (\*\*), (\*\*\*) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% level, respectively.

**Figure 4. Retirement hazard**





**Table 6. IV estimates for voluntary retirement (age related instrument)**

	Retired	Life satisfaction	Satisfaction with income	Satisfaction with free time	Satisfaction with health
Retired	-	-0.378 (0.413)	-0.133 (0.516)	0.834 (0.575)	-0.146 (0.576)
Age	-0.568*** (0.051)	-0.686* (0.367)	-0.169 (0.473)	-1.136** (0.534)	-0.253 (0.542)
Age <sup>2</sup>	0.553*** (0.047)	0.598* (0.349)	0.103 (0.449)	1.023** (0.506)	0.187 (0.514)
Living in couple	-0.014 (0.024)	0.088 (0.207)	0.054 (0.198)	0.046 (0.211)	-0.265 (0.257)
Number of adults	-0.002 (0.008)	0.012 (0.042)	-0.025 (0.052)	-0.039 (0.065)	-0.020 (0.057)
Number of children	0.004 (0.011)	0.090 (0.081)	0.054 (0.083)	-0.023 (0.104)	0.063 (0.091)
Log(doctor visits+1)	0.001 (0.002)	-0.081*** (0.014)	-0.024 (0.016)	-0.023 (0.019)	-0.255*** (0.018)
Legal degree of disability	0.241*** (0.052)	-0.322 (0.269)	-0.215 (0.277)	0.209 (0.328)	-0.220 (0.317)
Hospital stay	0.009 (0.009)	-0.020 (0.052)	-0.042 (0.055)	0.078 (0.069)	-0.234*** (0.066)
Age 60+	0.049*** (0.018)	-	-	-	-
Age 63+	0.132*** (0.030)	-	-	-	-
Age 65+	0.346*** (0.052)	-	-	-	-
N	7,974	7,974	7,974	7,974	7,974

Note: FD IV estimates. Robust standard errors are in parentheses. (\*), (\*\*), (\*\*\*) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% level, respectively.

**Table 7. IV estimates for involuntary retirement (plant closure instrument)**

	Retired	Life satisfaction	Satisfaction with income	Satisfaction with free time	Satisfaction with health
Retired	-	-1.274** (0.579)	-0.851 (0.538)	0.391 (0.662)	-0.592 (0.645)
Age	-0.831*** (0.047)	-1.435*** (0.508)	-0.768 (0.488)	-1.506** (0.602)	-0.626 (0.580)
Age <sup>2</sup>	0.796*** (0.043)	1.318*** (0.485)	0.680 (0.463)	1.379** (0.573)	0.545 (0.552)
Living in couple	-0.008 (0.026)	0.077 (0.212)	0.045 (0.197)	0.041 (0.213)	-0.271 (0.259)
Number of adults	-0.002 (0.008)	0.010 (0.043)	-0.026 (0.052)	-0.040 (0.066)	-0.021 (0.058)
Number of children	0.003 (0.011)	0.092 (0.082)	0.055 (0.083)	-0.023 (0.105)	0.064 (0.092)
Log(doctor visits+1)	0.001 (0.002)	-0.080*** (0.014)	-0.023 (0.016)	-0.022 (0.019)	-0.255*** (0.018)
Legal degree of disability	0.245*** (0.053)	-0.108 (0.296)	-0.044 (0.272)	0.315 (0.331)	-0.114 (0.330)
Hospital stay	0.010 (0.009)	-0.011 (0.053)	-0.035 (0.054)	0.082 (0.069)	-0.229*** (0.067)
Closure of the firm	0.436*** (0.064)	-	-	-	-
N	7,974	7,974	7,974	7,974	7,974

Note: FD IV estimates. Robust standard errors are in parentheses. (\*), (\*\*), (\*\*\*) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% level, respectively.