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Subjective Well-Being Around Retirement

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Abstract

Happiness and life satisfaction become important in economics research, since not only they are considered as an ultimate goal of life but also as a proxy for subjective well-being. Many studies have focused on the changes in income, consumption and leisure time around retirement. More recent studies use subjective indicators, such as satisfaction with life in general or in domains of life, to study well-being. This paper combines these two strands of literature to examine life satisfaction around retirement. More specifically, we study the effect of both retirement and unemployment on life satisfaction, using subjective satisfaction indicators from the German Socio-Economic Panel (GSOEP). Moreover, a unique feature of this data set is that individuals' expectation of future life satisfaction has been collected every year, resulting in a panel data set with both expectations and realizations of life satisfaction. We exploit this information to analyze how accurate individuals anticipate changes in satisfaction around retirement, as well as the correlation between the forecasting error in life satisfaction and the labour market status, income level, marital status and health condition. Our analysis uses panel data models to account for unobserved heterogeneity. Moreover, we use an ordered response model, explicitly take the ordinal nature of the satisfaction scale into account. We confirm a previous finding in the literature that unemployment and involuntary retirement have significant negative effects on life satisfaction; voluntary retirement on the other hand has no effect on life satisfaction. An important finding is that unemployed and involuntary retired individuals underestimate future life satisfaction. That is, their current labor market status has temporary negative effects on well-being, but, after 5 years, individuals are happier with their life than previously anticipated. Again, we find no effects of voluntary retirement on the forecasting error. Turning to marital status, we find small and generally insignificant effect of being widowed or divorced on either current life satisfaction or the forecast error. On the other hand, health factors are strongly correlated to well-being: poor health status yields to pessimism of the future, however realized life satisfaction was higher than expected, suggesting only temporary effects of being in bad health.

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Contents

1 Introduction

Retirement has been considered as one of the most important life transitions since it has a big impact on different aspects of individuals' life, and hence individuals' well-being. Upon retirement, an individual will typically face both a drop in income and an increase in leisure time. As such, the effect of retirement on well-being is not clear a priori, and is an empirical question, on which we hope to sketch light in this study.

The purpose of this study is to estimate the effect of retirement on life satisfaction, using a sample of German individuals around retirement drawn from the German Socio-Economic Panel (GSOEP). In particular, we analyze whether voluntary and involuntary retirement have a different effect on life satisfaction, as well as the sign and magnitude of these possible effects. As we use a panel of individuals, we try to control for both observable and unobservable factors which may confound the association we examine. An unique feature of the GSOEP is that it additionally collects information on individuals' expectation of future life satisfaction. Hence, we explore whether individuals are able to anticipate changes in life satisfaction around their retirement age. If people perfectly anticipate a drop or increase in satisfaction upon retirement, the finding that satisfaction increases or decreases upon retirement can be put in another perspective, not yet taken up in the current literature on well-being.[1]

[1] Mastrogiacomo (2004) analyzes expectations and realizations of households' financial situation around retirement.

Happiness and satisfaction has been on the forefront of research in psychology for decades (see e.g. Kahneman et al., 1999 for an overview). Since the work of Easterlin (1974), economists have become interested in analyzing subjective well-being and its determinants. This literature is vast, and is surveyed by Frey and Stutzer (2002a) and more recently by Dolan et al. (2008); see also Layard (2005) for a non-technical overview of happiness research from both psychological and economic perspectives. One of the reasons for the increasing attention in this field stems from the availability of individual-level data in widely used socioeconomic datasets such as the Health and Retirement Study (US), the World Values Survey, the GSOEP and many more. Examples of work that has been done includes the association between happiness and individuals' income (Bender, 2012; Frey and Stutzer, 2002b) or aggregate income (Easterlin, 1995; Tella et al., 2003; Frijters et al., 2004; Clark et al., 2008; Deaton, 2008). Much of this literature focuses on resolving the "Easterlin paradox", identified in the literature as the finding that average life satisfaction has remained roughly constant in the last decades, while real income has increased substantially over the same period, contradicting economic theory[2]. Microeconometric estimates of the same relation do find a positive association between income and happiness (Frijters et al., 2004).

The relationship between satisfaction and age has received considerable attention as well, with most studies documenting a U-shaped relationship (Blanchflower and Oswald, 2008). De Ree and Alessie (2011) and van Landeghem (2012) use panel data to study the satisfaction-age gra-

[2]When utility depends on consumption, we can express the indirect utility function to depend (positively) on income (Varian, 1992). If life satisfaction proxies utility, there should be a positive relationship between aggregate income and life satisfaction.

dient, and try to disentangle age- period- and cohort effects. De Ree and Alessie (2011) show that the U-shaped relationship is not rejected, but also not supported by the data, as age-effects cannot be identified without (arbitrary) assumptions on the cohort or time effects.

The effects of employment status has been examined in Winkelmann and Winkelmann (1998) and Clark and Oswald (1994), who focus on unemployment, and Bonsang and Klein (2011) who focus on unemployment and retirement respectively. The analysis in this paper is closely related to these two studies, as we consider both unemployment and retirement as determinants of individuals' life satisfaction. The contribution of this paper will be made clear below.

Recent literature has focused on the comparability of happiness scores between individuals within a country and in a cross-section of countries (Ng, 1997; Kapteyn et al., 2009, 2011). The availability of anchoring vignettes (Angelini et al., 2011; van Soest et al., 2011) to correct for between-individuals heterogeneity in reporting behavior turns out to be important for correct inference. Unfortunately, in this study we do not have vignette questions available. As long as reporting behavior is constant over time, fixed effects regressions are hoped to eliminate the bias, as we then essentially compare an individual with himself in the future.

This paper does not only build upon the results from satisfaction research, but also on research on expectations of the future. Since the work of Dominitz and Manski (1997), research has shown that individual-level expectations, asked in a survey, have some predictive power for actual behavior, in line with utility maximization under uncertainty. Examples include subjective survival expectations (Hurd and McGarry, 2002) in comparison with objective life tables, job loss expectations and subsequent realizations (Stephens, 2004), working after retirement (Maestas, 2010), income expectations and realizations (Dominitz and Manski, 1997; Dominitz, 1998; Das and

van Soest, 1997, 1999) and pension benefit expectations (Dominitz and Manski, 2006). Manski (2004) and Hurd (2009) summarize the literature on these subjective expectations.

Expectations of future life satisfaction have been used in Frijters et al. (2009), to study how well people forecast their future life satisfaction, and whether or not expectations are rational. Frijters et al. (2009) use the German reunification to investigate how accurate working-age Germans forecast their future life satisfaction. The dependent variable they employ, the expectation of life satisfaction minus its subsequent realization, is identical to the one used in this study. They find that East-Germans were overly optimistic after reunification; moreover, age and education are found to be of importance in modeling the forecast error. They do find convergence of expectations to realizations, in the sense that the forecast error becomes smaller several years after the reunification. In contrast, we use expectations of individuals around retirement age, to find out how accurate Germans forecast future life satisfaction when faced with an anticipated (voluntary retirement) or unanticipated (involuntary retirement, unemployment) change in their employment status.

As said, the study of Bonsang and Klein (2011) is closest to our study, and deserves some more attention. The focus of Bonsang and Klein (2011) is on well-being of men around retirement, where they distinguish between voluntary and involuntary retirement. Their main finding is that the average effect of retirement of voluntary retirement on life satisfaction was negligible, although involuntary retirement has negative effects on life satisfaction, which they attribute to negative effects on income satisfaction. This study uses their results as a benchmark, by first replicating their results. The contribution we make on top is the use of subjective expectations of life satisfaction, which allows us to answer interesting questions, such as ”Who are optimistic or

pessimistic about life after retirement?" and "Can individuals accurately predict their future life satisfaction, when confronted with changes in employment status?". Moreover, we do not only consider retirement, but also unemployment as a determinant of life satisfaction, in line with previous literature mentioned above (Winkelmann and Winkelmann, 1998; Clark and Oswald, 1994). Moreover, we test for the presence of selection biases in their specification, as those with lower life satisfaction might leave the sample, causing attrition bias from a non-random sample of stayers. Last but not least, we extend the analysis to women as well.

We confirm a previous finding in the literature that unemployment and involuntary retirement have significant negative effects on life satisfaction; voluntary retirement on the other hand has no effect on life satisfaction. An important finding is that unemployed and involuntary retired individuals underestimate future life satisfaction. That is, their current labor market status has temporary negative effects on well-being, but, after 5 years, individuals are happier with their life than previously anticipated.

This study is organized as follows. Section 2 describes the dataset used in this paper, and gives definitions of the variables used in this study. In addition, we look at some descriptive statistics on the main relationship we examine, between life satisfaction and retirement, as well as on the relationship between life satisfaction and marital status, which we anticipate to be important as well. Section 3 presents the models we use to estimate the relationship. Section 4 gives the empirical results. Section 5 concludes.

2 Data set description

2.1 Introduction to GSOEP

The data used in this thesis, the German Socio-Economic Panel (GSOEP), started in 1984 as a longitudinal survey of private households and persons in the Federal Republic of Germany. The data, provided by DIW Berlin, surveys not only the original sample from the first wave, but also households and persons that entered the survey at later points in time. For instance, they may enter when GSOEP households split, or when an original sample member give birth to a new sample member. In case of leaving a household, for example those moving out or split off, the new households are still followed in the survey but under a new household identifier. Moreover, refreshment samples are conducted to ensure representativeness of the sample in every year.

A set of core questions is asked every year in following areas:

- population and demography
- labor market and occupational dynamics
- earnings, income and social security
- education, training, and qualification
- housing
- household production
- health

The most essential areas of interest of our study are:

- basic orientation
  - preferences
  - values

  satisfaction
  - general life satisfaction
  - satisfaction with aspects of life

The questionnaires are answered through a face-to-face interviews with all members of a given household aged 16 years and above. Additionally, one person in the household, the (self-reported) head of household, is asked to answer a questionnaire covering information on housing, housing costs, and different sources of income (e.g. social transfers such as social assistance or housing allowances) including some questions on children in the household up to age 16 (such as attendance at institutions like kindergarten, elementary school, etc.). Note that in case of residential mobility, the person is to be followed within the survey territory (Federal Republic of Germany).

An interesting characteristic of the GSOEP questionnaire is that the questions are targeted at different dimensions of time (past, present and future) using different measurements of time. For example:

- employment or marital history (in the past)

- demographic changes since the last interview like marriage or death of spouse (in the past but concerning a specific time period)
- current employment status or current levels of satisfaction (present)
- satisfaction with life five years from now (future)

These last two types of questions (present and future) are the main sources of information used in this study, and provide us a tool to examine how accurate individuals can predict their future life satisfaction based on information they report in present and past. In Section 2.2 we introduce the dependent variables used, which are based on the following two questions:

- How satisfied are you with your life, all things considered? (LS_t)
- How do you think you will feel in five years? ($E_t(LS_{t+5})$)

For both questions, individuals answer with an integer between 0 and 10, with 0 being the least satisfied with life (or expected to be very dissatisfied) and 10 being completely satisfied (or expected to be completely satisfied).

2.2 Sample Selection and Definition of Variables

The empirical analysis uses GSOEP data from 1994 to 2009. We select the sample from 1994 till 2009 because the health-related questions we use (see below) as independent variables are not available before 1994. Moreover, the expectation of future life satisfaction is asked until 2004,

and as this concerns 5-year ahead expectations, we do not use the 2010 data.[3] Our final sample is restricted to men and women between 50 and 70 years old from 1994 to 2004. Moreover, we drop all observations without a clear employment status (neither retired, unemployed or working; definitions are given below) and observations with zero household income. Finally, we drop observations with missing values in the variables used in our analysis. Our final sample includes 10286 individuals with 45644 observations. The definition of the variables used are presented in Table 1.

Table 1: Variable Definition

Variable	variable label	Mean	Std. Dev.	Min.	Max.	N
degree of disability	Degree Of Disability	11.119	24.379	0	100	45644
nr dr visit	Number Of Doctor Visits Last Three months	3.267	4.963	0	93	45644
hospital stay	Hospital Stay Previous Year	0.132	0.339	0	1	45644
lifesat	Life Satisfaction, Ls_t	6.895	1.773	0	10	45644
Expected lifesat	Life Satisfaction 5 years from now, $E_t(LS_{t+5})$	6.556	1.996	0	10	44843
$\Delta(LS_t)^{optimistic}$	$E_t(LS_{t+5}) - LS_t$	-0.336	1.33	-10	10	44843
$\Delta(LS_{t+5})$	$E_t(LS_{t+5}) - LS_{t+5}$	-0.158	1.976	-10	10	34943
work	=1 if received labour income	0.481	0.5	0	1	45644
voluntary retired	=1 if receives pension and has no intention to go back to work	0.448	0.497	0	1	45644
involuntary retired	=1 if receives pension and has intention to go back to work	0.047	0.212	0	1	45644
unemployed	=1 if receives unemployment benefit and/or relief	0.066	0.249	0	1	45644
married	=1 if married	0.808	0.394	0	1	45644
divorce	=1 if divorced	0.077	0.266	0	1	45644
widow	=1 if widow	0.075	0.263	0	1	45644
single	=1 if single	0.039	0.193	0	1	45644
grosslabincome	Current Gross Labor Income in Euro	2594.927	2523.799	0	60000	22738
household income	Monthly Household Net Income in Euro	2440.34	1836.415	72	65000	45644
nr children	Number of Children in household	0.105	0.407	0	6	45644
nr adult	Number of adults in household	2.242	0.838	1	10	45644
dumeduc1	=1 if Inadequately Educated	0.022	0.148	0	1	45644
dumeduc2	=1 if General Elementary	0.153	0.36	0	1	45644
dumeduc3	=1 if Middle Vocational	0.498	0.5	0	1	45644
dumeduc4	=1 if Vocational Plus Abi	0.025	0.156	0	1	45644
dumeduc5	=1 if Higher Vocational	0.092	0.289	0	1	45644
dumeduc6	=1 if Higher Education	0.21	0.407	0	1	45644
male	=1 if Male	0.545	0.498	0	1	45644
west	=1 if lives in West Germany	0.683	0.465	0	1	45644

Employment status is an important variable in our study. Unfortunately, the GSOEP questionnaire does not contain a satisfactory question on this topic. The classification we prefer

[3]The questions eliciting expectations of future life satisfaction are asked again from 2008 onwards, but at the time of writing the realizations are not yet available.

assigns individuals to be either employed, unemployed or retired. We define individuals as unemployed if he/she reported to receive unemployment benefit and/or relief for at least 7 months. An individual is classified as retired if he/she reported to receive pension income (social security or company pension) for the entire year, or at least 7 months of that year. Any individual with gross labor income or reported wage for at least 7 months is classified as employed. The restriction of at least 7 months receiving salary, pension income or unemployment benefit rules out overlapping of categories for individuals part-time unemployed or retiring throughout the year[4]. The remaining individuals do not have a clear employment status, and are subsequently dropped from the sample. Note that we therefore consider the labor force as our population, as for individuals out of the labor force (e.g. homemakers), retirement or reaching the statutory retirement age is probably not a life-changing event.

Furthermore, we classify the retirees as being either voluntary or involuntary retired. Following Lazear (1987) and Bonsang and Klein (2011), we define retired individuals as voluntary retired if he/she reports to be retired and has definitely no intention to go back to work. Otherwise, individuals are considered as involuntary retired[5].

[4]Note that we define employment status based on income information, while Bonsang and Klein (2011) define individuals as working if they reported they engaged in paid employment, and retired otherwise. The unemployed are therefore not taken into consideration in their study.

[5]Note that our definition for voluntary and involuntary retired is different from Bonsang and Klein (2011). In their study they classified the non-working without the intention to go back to work as voluntary retired. Otherwise, individuals are classified as involuntary. In this way they may have classified some unemployed individuals as involuntary retired and the remaining unemployed as voluntary retired, even though they are not yet officially retired. Since we classified working, unemployed and retired based on income sources, we believe that the labor force status

The independent variable degree of disability is between zero and 100. Zero represent those without any disability, and number 1 to 100 give the legal percentage of disability. In order to receive disability relief as a disabled person in Germany, the degree of disability should be above 25 % (for more details on the disability rules, see Table 9 in the Appendix). The disability can be permanent, temporary or a combination of permanent and temporary causes, due to injury, disease or other causes. When there are two or more injuries related to pairs of limbs (two arms or two legs), the medical committee may add together the degrees of disability of these limbs. For example, a 40% disability in one arm and a 30% disability in the other will be equal to an overall 70% degree of disability. However, the final degree of disability will not exceed 100%. For example, a 40% disability in one leg and a 70% disability in the other equals an overall 100% degree of disability (and not 110%).

We will analyze subjective well-being around retirement. The main variable of interest is therefore life satisfaction in general, or LS in brief, and its relation to changing employment status. Furthermore, we will use the difference between predicted and realized life satisfaction, ΔLS, with the following definition:

$$\Delta LS_{t+5} = E_t(LS_{t+5}) - LS_{t+5}$$

Note that the order used in defining this variable is important. ΔLS_{t+5} measures the expectation of life satisfaction five years from now, minus the subsequent realization of life satisfaction five years from now. As such, it is a measure of over- or underestimation of future life satisfac-

we use is more accurate than in previous studies.

tion.

Finally, we use as dependent variable $\Delta(LS_t)^{optimistic}$, which we calculate as follows:

$$\Delta(LS_t)^{optimistic} = E_t(LS_{t+5}) - LS_t$$

We apply this variable to examine whether individuals are optimistic or pessimistic around retirement age. A positive value for this variable implies people expecting to be happier than today, and can thus be interpreted as optimism. The reverse holds for negative values. To stress the difference between $\Delta(LS)^{optimistic}$ and ΔLS, note that the latter is positive when life has turned out to be less satisfying than expected, which is not the same as optimism, but instead can be interpreted as overestimation of future life satisfaction, i.e. a positive forecast error.[6] In the methodology section (Section 3) we refer to 5 different dependent variables:

1. LS_t
2. $E_t(LS_{t+5})$
3. $\Delta(LS_t)^{optimistic}$
4. LS_{t+5}
5. $\Delta(LS_{t+5})$

The first three dependent variables are all measured at time t, the fourth is measured in $t+5$ while the last is measured using data from both periods t and $t+5$.

[6] In this paper, we use the terms ΔLS_{t+5} and forecast error interchangeably.

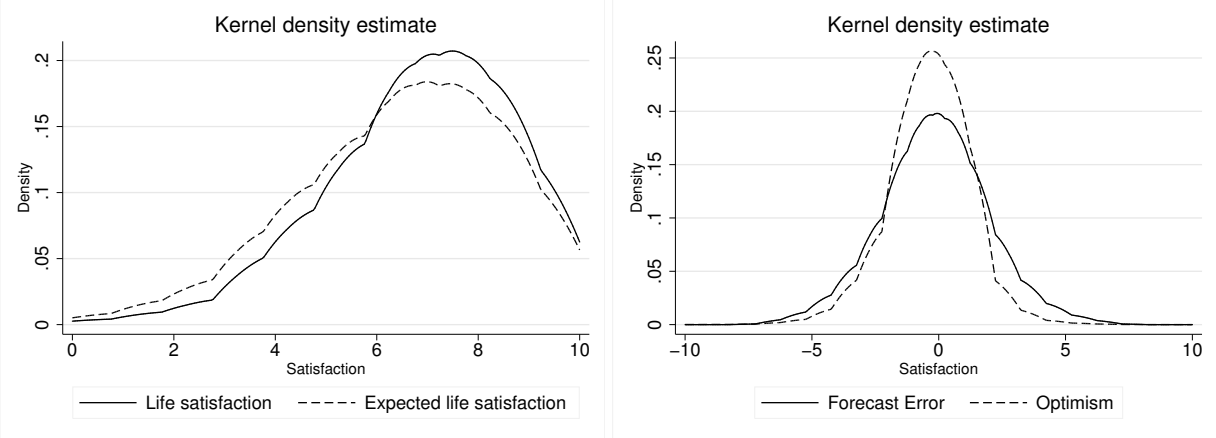

Figure 1: Distribution of dependent variables

Figure 1 plots the density of the four dependent variables used in this study. On the left, we compare current life satisfaction (LS_t) with Expected life satisfaction five years from now ($E_t(LS_{t+5})$). As one can see, the densities look very similar, although the probability mass of LS_t seems more concentrated at high satisfaction compared to expected life satisfaction. The graph on the right compares $\Delta(LS_{t+5})$ (Forecast error) with $\Delta(LS_t)^{optimistic}$ (Optimism). The dashed line (Optimism) shows that most of individuals reported their future life satisfaction around the same level as their current satisfaction, i.e. most density is at zero. The forecast error has less mass at zero, and more mass between 5 points under- or overestimated. However, on average, table 1 suggests (see row ΔLS_{t+5}) that people underestimate their future well-being.

The research questions posed in the Introduction are translated into two hypotheses, which we will test in Section 4. In the first hypothesis, we expect that voluntary retirement has no effect on life satisfaction while involuntary retirement and unemployment may have a negative effect (Section 4.1). The second hypothesis we state is that in the absence of shocks (such as

dramatic changes in employment status or marital status), expectation of life satisfaction are rational (Section 4.3).

2.3 Descriptive Analysis

Before conducting the formal statistical analysis to test our hypotheses in Section 4, we provide a descriptive analysis to give some insights into the data. We categorize individuals in different groups based on any transition in their employment status during every five years. For instance, if the employment status has not changed in a 5-year period, individuals are categorized either as employed (ww), unemployed (uu) or retired (rr). Others face a transition once or more in five years, such as changing status from work to retirement (wr). This preliminary study give us insight whether transition or stability in employment status has any significant effect on their life satisfaction.

Table 2 tabulates the difference between expected life satisfaction and the realized value of life satisfaction in five years (the forecast error) for each category of employment transitions. The number is the percentage of individuals within an employment category. For ease of presentation, we grouped individuals in three categories of $\Delta LS \leq -2$, $\Delta LS \geq 2$ and those with $-1 \leq \Delta LS_{t+5} \leq 1$. Hence, those having $\Delta LS \leq -2$ have underestimated their life satisfaction by at least 2 points (on a scale from 0-10); the opposite (overestimation) holds for those categorized as $\Delta LS \geq 2$. The middle group makes individuals with the minimum forecast error or no forecast error.[7] The bottom of the table shows the number of individuals per category, as well as the $p - value$ of Pearson χ^2–test of independence between employment transition and forecast

[7] We use a wider scale for the forecast error in the empirical models of Section 4.

error. The last column (total) is employment status transition in total. Table 2 last column (total) shows that individuals in general are underestimating their future life satisfaction respect to the transition in their employment status. However, in some transition groups people showed more overestimation rather than underestimation.

Those individuals that remained working for 5 years (ww) on average predict future satisfaction the most accurate (about 66%) amongst all individuals, as well as a fairly even division between over- and under estimators, the latter group being somewhat bigger. This accuracy decreases to 54% in the unemployed group (uu), with the remaining group again being fairly evenly distributed between overestimating or underestimating.

The involuntary retired (rr-inv) group showed 51% accuracy and a slight sign of overestimating while the voluntary retirees (rr-vol) underestimated life satisfaction. For the voluntary retired group, this phenomenon can be explained by other factors rather than financial situations, factors such as health situation, living as a couple, number of children in household and so on. People whom job status changed from unemployed to working(uw), shows large underestimation of their future life satisfaction which is logical since they forecasted their satisfaction while they were jobless and reported their actual satisfaction while they were employed.

Individuals whom status changed from working to voluntary retired (wr-vol) anticipate their future life satisfaction more accurate than those whom status changed from working to involuntary retired (wr-inv). Voluntary retirees underestimate their well-being, while involuntary retirees dramatically overestimate life satisfaction.[8]

[8]We note that there is a small group of individuals who went back to work after they reported to be retired. Since this group was very small (about 0.5 percent) we drop them from the data.

The most interesting groups are wu (working to unemployed), ur-vol and ur-inv (unemployed to voluntary and involuntary retirement, respectively). Among all categories individuals with changing status from unemployed to involuntary retired (ur-inv) have the lowest accuracy in prediction (less than 50%). People in this group largely overestimate their future satisfaction. In contrary, individuals with changing unemployed to voluntary retired underestimating their future satisfaction. This phenomena may be explained for ur-vol by the fact that their status change from unstable situation of being unemployed to more relax and stable situation of being a pensioner. Moreover, since they retire voluntarily, they were likely to be prepared for retirement, and probably chose to be retired. Finally, those who had a transition from working to unemployed showed large overestimation. This is natural since these people were employed when they answered question about about expected life satisfaction, while they were unemployed when they reported the actual life satisfaction after five years. Hence, unemployment is seen as a shock which affects life satisfaction.

In general, there is strong evidence that the transition in employment status is associated with the forecast error in life satisfaction. For example, those staying in employment (ww=1) have a significantly different forecast error (P=0.000) compared to those not staying in employment (ww=0).

Table 2: Forecast error by employment status

ΔLS_{t+5}	ww	uu	rr-vol	rr-inv	wr-vol	wr-inv	wu	ur-vol	ur-inv	uw	total
$\Delta LS \leq -2$	17.75	22.14	24.59	23.50	20.89	16.43	19.59	24.53	21.59	31.02	21.73
$-1 \leq \Delta LS \leq 1$	66.26	54.05	59.29	51.37	61.37	53.49	52.80	59.76	49.43	50.83	61.40
$\Delta LS \geq 2$	15.99	23.81	16.12	25.14	17.73	30.09	27.61	15.72	28.98	18.15	16.87
Observations	11521	420	17764	366	6304	1047	1322	1737	352	303	41136
p-value	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.035	0.000	0.000	0.000

w=work, u=unemployed and r=retired. The table shows how employment status changed over a 5-year period, "vol" and "inv" stand for voluntary and involuntary retirement,

Changes in employment status is not the only reason why individuals may face changes in life satisfaction. Here, we also conisder (changes in) marital status as a determinant, and repeat the analysis conducted above for individuals grouped in remaining married (mar-mar), divorced(div-div), widowed (wid-wid) or single(sing-sing). The variables mar-div, mar-wid, sing-mar and div/wid-mar stand for transition from married to divorced, married to widow, single to married and divorced or widow to married respectively. The results are represented in Table 3.

Individuals whom marital status stayed the same underestimate their future life satisfaction, with widows being the exception, as widows (wid-wid) are more likely to underestimate than others. This phenomenon can be explained by other factors such as financial situation, health and etc. Moreover, in comparison with the divorced group, one may argue that the event of divorce might occur with financial preparation and tend to stable emotional situation probably faster than death of partner, while death of partner normally occur unexpected (at least in this age group) and therefore the person might not be financially prepared.

Furthermore, individuals whom status changed from married to divorced (mar-div) and married to widow (mar-wid) overestimate their future life satisfaction. This is in line with intuition, since they predict their future life satisfaction while being married and reported the actual satisfaction after 5 years when they were divorced or widow. In general, there is evidence that the transition in marital status is associated with the forecast error in life satisfaction except for those that remained single, or had a transition from single, divorced or widow to married.

Table 4 represent optimism and pessimism regarding employment status. Individuals who are in working group mostly (about 80%) anticipated their future life satisfaction around their current satisfaction. However about 14% showed to pessimistic and only 7% were optimistic. About

Table 3: Forecast error by marital status

ΔLS_{t+5}	mar-mar	div-div	wid-wid	sing-sing	mar-div	mar-wid	sing-mar	d/w-mar	total
$\Delta LS \leq -2$	21.60	22.70	26.14	23.66	18.42	22.85	17.99	19.49	22.05
$-1 \leq \Delta LS \leq 1$	62.15	58.05	58.68	60.96	56.43	54.14	62.85	62.99	61.27
$\Delta LS \geq 2$	16.26	19.25	15.19	15.37	25.15	23.01	19.16	17.51	16.68
Observations	31766	2639	3095	1327	342	1195	428	354	41146
P-value	0.000	0.000	0.000	0.241	0.000	0.000	0.085	0.498	0.000

mar=married, div=divorce, wid=widow and sing=single. The table shows how marital status changed over a 5-year period, e.g. "mar-div" denotes marital status changing from married to divorced.

71 voluntary and 72% of Involuntary retired group predicted their future life satisfaction around current level. The rest were almost equally distributed between optimistic and pessimistic, however the weight of pessimistic group are a bit bigger than optimistic one in involuntary category. The most interesting group are unemployed one who showed to be rather pessimistic than optimistic while about 77% predicted about the same level of life satisfaction. In general individuals showed to be more pessimistic rather than optimistic about their future satisfaction respect to their employment status. This is consistent to result of table 2. We showed that people in general underestimate their future life satisfaction.

Table 4: Optimism and Pessimism vs. employment status

$\Delta(LS_t)^{optimistic}$	work	unemployed	voluntary ret	involuntary ret	total
$\Delta(LS_t) \leq -2$	13.59	19.61	14.96	15.39	16.65
$-1 \leq \Delta(LS_t) \leq 1$	79.57	76.75	70.87	72.49	77.77
$\Delta(LS_t) \geq 2$	6.83	3.65	14.17	12.12	5.58
Observations	21215	19798	2132	2479	45624
P-value	0.000	0.000	0.000	0.000	0.000

3 Methodology

In this section, we demonstrate the panel data models explaining life satisfaction and the forecast (error) of life satisfaction around retirement age used to test our hypotheses. We distinguish

between linear and nonlinear (ordered) panel data models. In what follows, we use the index i to denote the individual, $i = 1, ...N$, and t denotes the time period (or survey year), $t = 1, ..., T$.

3.1 Linear Models

The first estimator we use is the Pooled OLS estimator combined with Mundlak (1978)'s approach. The pooled OLS estimator can be obtained by stacking the data over i and t into a long regression with NT observations, and estimating by OLS

$$y_{i,t} = \alpha + X'_{i,t}\beta + u_{i,t} \tag{1}$$

where $y_{i,t}$ denotes one of the dependent variables defined in section 2.[9]

In order to incorporate unobserved heterogeneity, we use Mundlak (1978) terms in equation 1, by modeling the relationship between individual effects and regressors as

$$\alpha_i = \bar{X}_i{}'\gamma + v_i$$

The Pooled OLS estimator can be obtain from the regression

$$y_{i,t} = \alpha + X'_{i,t}\beta + \bar{X}_i{}'\gamma + \varepsilon_{i,t}$$

The assumption made is $E(u_{i,t}|X_{i,t}, \bar{X}_i) = 0$, i.e. the error terms are mean zero conditional on the explanatory variables X_{it} and the Mundlak terms $\bar{X}_i$. The Pooled OLS estimator is consistent

[9] LS_t, $E_t(LS_{t+5})$, $\Delta(LS_t)^{optimistic}$, LS_{t+5} and $\Delta(LS_{t+5})$

and asymptotically normally distributed. However, using panel data, it is unlikely that the error terms are identically and independently distributed (*i.i.d.*). Therefore Pooled OLS is generally inefficient, except in some special cases such as when all regressors are time-invariant. To allow the error terms to be heteroscedastic and serially correlated for an individual, instead of the usual OLS variance estimate we use a panel-robust estimate of the covariance matrix of β (and γ) for inference.

The fixed effects model assumes the existence of unobserved individual heterogeneity (α_i) that is correlated with the regressors $X_{i,t}$, as in the Mundlak case. However, in this case, we do not specify how these are correlated, but instead use a transformation to eliminate the unobserved individual effects. Consider the time averaged model

$$\bar{y_i} = \alpha_i + \bar{X_i}'\beta + \bar{u_i}$$

The fixed effects model is obtain by subtracting the time-averaged variables from (1) to eliminate the fixed effects α_i (i.e. the within transformation):

$$y_{i,t} - \bar{y_i} = (X_{i,t} - \bar{X_i})'\beta + (u_{i,t} - \bar{u_i})$$

Estimation by OLS yields the fixed effects estimator $\widehat{\beta_W}$, where

$$\widehat{\beta_W} = \left[\sum_{i=1}^{N}\sum_{t=1}^{T}(X_{i,t} - \bar{X_i})(X_{i,t} - \bar{X_i})'\right]^{-1} \sum_{i=1}^{N}\sum_{t=1}^{T}(X_{i,t} - \bar{X_i})(y_{i,t} - \bar{y_i})$$

The fixed effects estimator should be numerically identical to the Pooled OLS estimator once Mundlak terms are included in the latter, a result well known from Mundlak (1978). As a robustness check, we therefore estimate both, and indeed find they are the same. The FE results are therefore delegated to the Appendix.

The individual fixed effects α_i may be estimated by

$$\widehat{\alpha_i} = \bar{y}_i - \bar{X}_i'\widehat{\beta_W}$$

The estimator $\widehat{\alpha_i}$ is unbiased for α_i and it is consistent if T is large enough. Therefore, in short panels, the estimator of $\widehat{\alpha_i}$ is inconsistent, however $\widehat{\beta_W}$ is nonetheless consistent for β.

These linear models ignore the ordered scale of our dependent variables, for which estimators are presented below. However, they are computationally attractive, and allow for unrestricted correlation between the individual effect and the explanatory variables. Given the fairly wide 0 to 10 scale we have for life satisfaction, and the -10 to +10 scale for the forecast error, we hope that ignoring the discrete ordered scale in these linear models does not yield predictions outside of the range of the dependent variable.

3.2 Ordered Response Models

Life satisfaction is observed on an ordinal scale with 11 categories from 0 to 10. These numbers represent the life satisfaction in scale from extremely unsatisfied ($y_{i,t} = 0$) to extremely satisfied ($y_{i,t} = 10$) respectively. The link between the observed life satisfaction responses and the latent (continuous) life satisfaction index is assumed to be of the ordered probit type. Therefore, we

present the standard ordered probit and the random-effects ordered probit models in this section. Let $y_{i,t}$ be the observed variables as in section 2.2, and a latent variable $y^*_{i,t}$ be determined by

$$y^*_{i,t} = X'_{i,t}\beta + u_{i,t} \quad \text{where } u_{i,t} \quad I.I.D \quad N(0,1)$$

Let $m_1 < m_2 < ... < m_J$ be unknown cut points or threshold parameters and define

$$y_{i,t} = j \quad \text{if } m_{j-1} < y^*_{i,t} < m_j \quad j = 0, 1, 2, ..., 10$$

We set $m_{-1} = -\infty$ and $m_{10} = \infty$. Note that $y_{i,t} = 0$ if $y*_{i,t} \leq m_1$ and $y_{i,t} = 10$ if $y*_{i,t} \geq m_9$. The idea is that, for each unit i in the population (individuals) we have a binary outcome, $y_{i,t}$ for each of T time periods. Given the standard normal assumption for $u_{i,t}$, it is straightforward to derive the conditional probabilities of $y_{i,t}$ taken on value j given $X_{i,t}$,

$$\begin{aligned} P_{it,j} \equiv Pr(y_{i,t} = j) &= Pr(m_{j-1} < y^*_{i,t} \leq m_j) \\ &= Pr(m_{j-1} < X'_{i,t}\beta + u_{i,t} \leq m_j) \\ &= Pr(m_{j-1} - X'_{i,t}\beta < u_{i,t} \leq m_j - X'_{i,t}\beta) \\ &= \Phi(m_j - X'_{i,t}\beta) - \Phi(m_{j-1} - X'_{i,t}\beta) \end{aligned}$$

where Φ is the standard normal cdf of $u_{i,t}$. The regression parameters β and the $(j-1)$ threshold parameters(m_j) are obtained by maximizing the following partial log-likelihood with $P_{it,j}$ defined above and $y_{it,j} = 1(y_{it} = j)$:

$$\ln L_N = \sum_{i=1}^{N} \sum_{t=1}^{T} \sum_{j=0}^{J} y_{it,j} \ln P_{it,j} \tag{2}$$

This gives us the Pooled Ordered Probit estimator. Note that we only need to specify the distribution of $y_{i,t}$ conditional on $x_{i,t}$ to have consistent estimates of the parameter β, i.e. we do not have to assume strict exogeneity of the independent variables, as we do not specify the distribution of the T-vector y_i given X_i. The pooled estimator ignores unobserved heterogeneity, and inference is based on panel-robust standard errors, allowing for serial correlation in the error terms for each individual.

Allowing for fixed effects is not possible in a nonlinear model, such as the ordered probit model, due to the incidental parameters problem. In general, there is not transformation possible to eliminate the fixed effects. To include fixed effects then means to estimate N extra nuisance parameters. Without the time dimension going to infinity, these parameters are not estimated consistently. Furthermore, the estimator for β is then also inconsistent. However, to incorporate unobserved heterogeneity, we can use again Mundlak (1978)'s approach, by modeling the relationship between individual effects and regressors as

$$\alpha_i = \bar{X}_i{}' \gamma + v_i$$

Hence, the individual effect consists of two components: the weighted mean of the individuals' explanatory variables and a residual v_i. Optimization of log-likelihood 2 is then over β, γ and m with $P_{it,j}$ as following

$$P_{it,j} \equiv Pr(y_{i,t} = j) = \Phi(m_j - X'_{i,t}\beta - \bar{X}_i{}'\gamma) - \Phi(m_{j-1} - X'_{i,t}\beta - \bar{X}_i{}'\gamma)$$

Section 4 presents the parameter estimates of the models described above.

4 Empirical Results

In this section we estimate the models presented in Section 3. First, we analyze subjective well-being around retirement. Subsequently, we analyze the degree of optimism and the accuracy in forecasting life satisfaction. We group the results in two tables according to the methodology used in obtaining the parameter estimates: Table 5 gives the results for a Pooled OLS model with Mundlak variables, and Table 7 for the Ordered Probit model with Mundlak terms. The Mundlak variables are calculated as the individual's mean of all explanatory variables over time, with the exception of the time-invariant variables (Education and Gender). For completeness we present the Fixed effect result in Table 10 in the appendix, as these result are numerically the same as Pooled OLS with Mundlak.

The explanatory variables X_{it} include three dummies for labor force status: voluntary retired, involuntary retired and unemployed, as defined above. The benchmark group is employed. We include age, its square and its cube to allow for nonlinearities in the wellbeing-age gradient (see, for example,van Landeghem (2012)). In addition, we include the natural log of household income, education dummies (benchmark are the least educated, "Inadequately"), dummies for

marital status (benchmark is single), and household composition (number of adults and number of children in the household). We use three indicators for the health status of the individual: the number of doctor visits in the previous year, the hospital stays (at least one night) in the previous year, and the (legal) degree of disability. All are self-reported, but are more objective compared to subjective health ratings. We include time fixed effects to account for (unobserved) macroeconomic factors. The time effects are assumed to sum up to zero, and to be orthogonal to a linear time trend, following Deaton and Paxson (1994). Furthermore, we add dummies for living in (former) West Germany (benchmark East Germany) and for being male. We have performed the Chow-test to check whether there is any substantial difference between men and women, for the Pooled OLS specification. The Chow-test does not reject (P-value = 0.085) the equality of the parameters between males and females (except for the constant term). Therefore we pool men and women together, and allow only the intercept to differ between the two genders. Finally, we include a set of selection dummies, to pick up possible (dynamic) sample selection effects, where those that stay in the sample are different from those that drop out. We follow Kapteyn et al. (2005), and define the selection dummy $SD_{it} = 1$ if the individual participates in survey year t and at least once more thereafter. The dummy is zero otherwise, and in particular, it is zero for those dropping out from the survey in the next year. We use the following procedure for testing for attrition bias: First, we estimate the models with selection dummies and check whether their significance using a Wald test. If they are not significant, we re-estimate the model again excluding the selection dummies, and report the P-value of the Wald test.

4.1 Subjective Well-Being around Retirement

In this part we present the results related to subjective well-being around retirement. As mentioned before, we add selection dummies to check for the presence of selective non-response in the data. Some selection dummies are individually significant, although the variable addition test shows they are not jointly significant at the 5% significance level for Pooled OLS and Ordered Probit, both with Mundlak terms (P-values 0.076 and 0.097, respectively)as well as for the fixed effect models (the P-value is 0.092; see Table 10). Hence variable addition test shows attrition is not biasing our results. Therefore, we conclude their existence has no effect on consistency of β (see Verbeek and Nijman (1992)).

We analyze current life satisfaction LS_t using two different models: Pooled OLS with Mundlak terms and Ordered probit model with Mundlak terms. Table 5, column (1) represent the results of the Pooled OLS model for current life satisfaction LS_t. We find that there is no significant effect of voluntary retirement on life satisfaction. On the contrary, involuntary retirement and unemployment have significant negative effects on life satisfaction. This is consistent with Bonsang and Klein (2011)'s finding that there is no effect of voluntary retirement on life satisfaction and an adverse effect of involuntary retirement on life satisfaction. We take from this that retirement per se does not lead to lower well-being, as long as the decision to retire has been made voluntarily, and has been anticipated. Household income has a positive and statistically significant effect on life satisfaction. A better financial situation thus results in higher satisfaction with life. One can see that there is almost no significant effect of marital status, number of children, number of adults and living in the West on life satisfaction. Number of doctor visits,

staying at least one night in the hospital and the degree of disability all have negative effects; individuals with poorer health are thus less satisfied with their life. The male dummy has a significant negative effect, hence, men are less satisfied compare to women. Compared to the least educated (Inadequate), higher educated people are slightly more satisfied, however the education dummies are jointly insignificant.

Like in the previous literature, we also examine the relationship between life satisfaction and age (Blanchflower and Oswald, 2008; De Ree and Alessie, 2011; van Landeghem, 2012). For Pooled OLS, the impact of age is significantly different from zero. The OLS model shows that life satisfaction is decreasing up to age 50 as they are aging, and will increase between 50 and 70, after which satisfaction starts to decrease. The variable addition test shows that age is very significant(P-values 0.000).

Table 7 presents the results of the Ordered Probit model with Mundlak-type of individual effects. Although the parameter estimates are more difficult to interpret for this model, we still find very similar signs and significance levels of the coefficients. Again, we find that there is no significant effect of voluntary retirement on life satisfaction, but significant negative effects of involuntary retirement and unemployment. Poor health leads to less satisfaction. The results are consistent with the results reported for the linear model.

We can calculate marginal effects for the Ordered Probit model, which can be compared in magnitude to the Pooled OLS estimates. Two difficulties arise however. First, as the marginal effect depends on the level of the explanatory variables, we need to choose a point to evaluate these at. Hence, we set all variables to their sample mean to calculate the marginal effect. Second, the marginal effect can differ between the thresholds, i.e. the marginal effect of, say, employment

Table 5: Pooled OLS Results with Mundlak terms

Variable	(1) LS_t	(2) $E_t(LS_{t+5})$	(3) LS_{t+5}	(4) $\Delta(LS_{t+5})$	(5) $\Delta(LS_t)^{optimistic}$
Voluntary retired	-0.0135	-0.0203	0.00562	-0.0438	-0.00789
	(0.0321)	(0.0364)	(0.0371)	(0.0552)	(0.0296)
Involuntary retired	-0.376***	-0.244***	0.0609	-0.259***	0.141***
	(0.0515)	(0.0564)	(0.0538)	(0.0797)	(0.0488)
Unemployed	-0.223***	-0.127***	0.00535	-0.139**	0.0882**
	(0.0407)	(0.0465)	(0.0477)	(0.0679)	(0.0411)
Age	-2.262***	-0.445	-1.116*	0.668	1.815***
	(0.541)	(0.643)	(0.678)	(0.961)	(0.504)
$Age^2/100$	3.872***	0.874	2.075*	-1.181	-2.986***
	(0.909)	(1.081)	(1.141)	(1.617)	(0.846)
$Age^3/1000$	-0.222***	-0.0598	-0.129**	0.0689	0.161***
	(0.0506)	(0.0602)	(0.0636)	(0.0901)	(0.0471)
log(Income)	0.326***	0.189***	-0.0663*	0.271***	-0.148***
	(0.0356)	(0.0392)	(0.0391)	(0.0586)	(0.0325)
General Elementary	0.145	-0.204**	0.360**	-0.396***	-0.339***
	(0.0995)	(0.103)	(0.154)	(0.115)	(0.0554)
Middle Vocational	0.175*	-0.168*	0.404***	-0.399***	-0.332***
	(0.0955)	(0.0994)	(0.150)	(0.112)	(0.0529)
Vocational Plus Abi	0.0551	-0.240*	0.322*	-0.406***	-0.280***
	(0.128)	(0.140)	(0.178)	(0.134)	(0.0788)
Higher Vocational	0.199*	-0.236**	0.436***	-0.514***	-0.417***
	(0.106)	(0.113)	(0.159)	(0.121)	(0.0624)
Higher Education	0.126	-0.196*	0.429***	-0.472***	-0.308***
	(0.103)	(0.108)	(0.156)	(0.117)	(0.0579)
Divorce	0.0708	0.245	0.190	0.184	0.152
	(0.141)	(0.150)	(0.135)	(0.228)	(0.109)
Widow	-0.249	0.120	0.296**	-0.0607	0.358***
	(0.162)	(0.166)	(0.146)	(0.245)	(0.122)
Married	0.0289	0.129	-0.00411	0.254	0.0889
	(0.140)	(0.153)	(0.137)	(0.234)	(0.110)
Nr children	0.0555	0.0610	0.0166	0.0629	0.00690
	(0.0380)	(0.0396)	(0.0407)	(0.0565)	(0.0318)
Nr adult	-0.0348	-0.00645	0.0246	-0.00443	0.0263
	(0.0220)	(0.0251)	(0.0248)	(0.0358)	(0.0201)
log(# Doctor visits+1)	-0.176***	-0.118***	0.0266**	-0.132***	0.0522***
	(0.0118)	(0.0132)	(0.0131)	(0.0194)	(0.0110)
Hospital stays	-0.209***	-0.102***	0.0566	-0.146***	0.0997***
	(0.0317)	(0.0356)	(0.0365)	(0.0537)	(0.0295)
log(Degree disability +1)	-0.0362***	-0.0484***	0.0173	-0.0650***	-0.0110
	(0.0106)	(0.0117)	(0.0118)	(0.0184)	(0.00875)
West	-0.0297	0.793***	0.300	0.442	0.791***
	(0.260)	(0.235)	(0.221)	(0.326)	(0.244)
Male	-0.0768**	-0.106***	-0.0866**	-0.0289	-0.0318
	(0.0306)	(0.0354)	(0.0361)	(0.0312)	(0.0209)
Constant	-19.24	-63.64**	-78.43**	2.561	-43.93**
	(24.41)	(28.02)	(32.79)	(30.76)	(17.09)
Time dummies	yes	yes	yes	yes	yes
Selection dummies	no	no	no	no	no
Mundlak terms	yes	yes	yes	yes	yes
Observations	45644	44843	35561	34943	44843
Individuals	10286	10233	7720	7686	10233
R^2	0.175	0.157	0.143	0.031	0.043
P-value age	0.000	0.000	0.000	0.702	0.000
P-value education	0.223	0.355	0.110	0.001	0.000
P-value selection	0.0921	0.0968	0.307	0.554	0.981
P-value time effects	0.000	0.000	0.000	0.000	0.000
P-value model	0.000	0.000	0.000	0.000	0.000
P-value Mundlak	0.000	0.000	0.000	0.000	0.000

Panel robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

can be different for the (conditional) probability of life satisfaction equal to 4 and the probability of life satisfaction equal to 8. Hence, we show the marginal effect for all levels of the dependent variable. The results for 4 important variables in this study, the three labor market dummies and the level of income, in percentage terms, are shown in Table 6.

We see that there is a change in sign of all occurring between the probabilities of life satisfaction being equal to 7 and 8. In particular, voluntary retirement and income have a positive marginal effect on the probability life satisfaction being equal to 8 or higher, and negative for 7 or below. The reverse is true for involuntary retirement and unemployment. Hence, the probability of high life satisfaction is increasing in income, but decreasing when individuals are unemployed or involuntarily retired. We see that the probability of life satisfaction being equal to 8 is 3 percentage points lower when individuals are involuntarily retired, and almost 2 percentage points lower when unemployed. The effect of income is small in economic terms: an increase in monthly household income of 1800 Euro (the sample standard deviation) gives a 2 percentage point lower probability of satisfaction equal to 5, and a 2.3 percentage point higher probability being equal to 8. The effects of voluntary retirement are very small, which is not surprising given the finding that voluntary retirement has an insignificant effect on life satisfaction.

To summarize our results so far, we note that the involuntary retirees and unemployed have significantly lower levels of well-being compared to the working class. We find no effect of voluntary retirement on well-being. These results are robust to different estimation methods, as well as controlling for unobserved individual effects. Moreover, we find that higher income results in higher satisfaction in all models. Finally, we note there is a strong negative effect of a poor health condition on life satisfaction.

Table 6: Marginal effects (in %) for dependent variable LS_t

	Voluntary retired	Involuntary retired	Unemployed	Income
$Pr(y = 0\|x)$	-0.001	0.243	0.155	-0.097 $\times 10^{-3}$
$Pr(y = 1\|x)$	-0.001	0.160	0.102	-0.064 $\times 10^{-3}$
$Pr(y = 2\|x)$	-0.001	0.431	0.276	-0.172 $\times 10^{-3}$
$Pr(y = 3\|x)$	-0.002	0.842	0.538	-0.336 $\times 10^{-3}$
$Pr(y = 4\|x)$	-0.003	1.067	0.682	-0.426 $\times 10^{-3}$
$Pr(y = 5\|x)$	-0.008	2.715	1.735	-1.083 $\times 10^{-3}$
$Pr(y = 6\|x)$	-0.004	1.376	0.879	-0.549 $\times 10^{-3}$
$Pr(y = 7\|x)$	-0.001	0.434	0.277	-0.173 $\times 10^{-3}$
$Pr(y = 8\|x)$	0.009	-3.152	-2.014	1.257 $\times 10^{-3}$
$Pr(y = 9\|x)$	0.006	-2.153	-1.375	0.859 $\times 10^{-3}$
$Pr(y = 10\|x)$	0.006	-1.964	-1.255	0.783 $\times 10^{-3}$

Marginal effects for Ordered Probit model with Mundlak terms

4.2 The Degree of Optimism

In this part we study the degree of optimism or pessimism of individuals around their retirement age. We analyze the expected life satisfaction, $E_t(LS_{t+5})$ and its difference with current life satisfaction LS_t namely $\Delta(LS_t)^{optimistic}$ using the same two models as above. The results are presented in Columns (2) and (5) of Tables 5 and 7.

Using Pooled OLS we find that the least educated individuals expect higher satisfaction in the future, although the education dummies are jointly insignificant. Being involuntary retired or unemployed has significantly negative effects on individuals' expectation of life satisfaction, which shows that adverse labor market outcomes affects both current life satisfaction as well as the expectation of future well-being. Marital status does not show any significant effect except for being a widow(er), which has a positive effect on expected life satisfaction. Health factors

and income play the same role in the expectation of life satisfaction as in current satisfaction, although income has a smaller positive effect. The dummy variable west has a strongly significant positive coefficient, hence individuals living in West Germany expect a higher satisfaction in the future compared to those living in the East.

In Column (5) we use the degree of optimism as dependent variable. We find that the involuntary retired and unemployed both are significant more optimistic compared to voluntary retirees and employees. Apparently, they see their current employment status as a temporary event, with no long lasting effects on well-being. Education has significant negative effects: lower educated individuals (Inadequate group) are more optimistic than higher educated people. Individuals with higher income show to be more pessimistic, although income has a positive effect on expected satisfaction. This means that individuals with higher income have higher expectation for future satisfaction compared to those with lower income, but still their expected satisfaction is lower than their current satisfaction. People living in the west Germany are more optimistic compare to those living in the east. A perhaps surprising finding is that the age terms are insignificant in forming expectations of future life satisfaction, although they are jointly significant. Marital status does not show any significant effects except for being widow, who expect to be happier in the future compared to today. Hence, widow(er)s are optimistic about their future. The degree of disability is insignificant, while the number of doctor visits and staying in the hospital are both significant and positive. Hence, individuals with a currently poor health situation expect their (health) situation to improve. In that light the insignificance of disability is not surprising, as this condition is unlikely to improve in the near future. The results of the Ordered Probit model (Table 7) are consistent with those from the Pooled OLS model, except for the dummy variable

divorced which, was insignificant in Pooled OLS but significantly positive in the Ordered Probit model.

4.3 The Forecast Error in Life Satisfaction

In this section we investigate the rationality of expectations using dependent variables LS_{t+5} and $\Delta(LS_{t+5})$. The results are presented in columns (3) and (4) of Tables 5 and 7. The rationale for column (3) is to check whether anything occurring at time t has long lasting effects until at least year $t+5$. In column (4), we regress the forecast error in life satisfaction on the same explanatory variables. As there are few observations in either tail of the forecast error distribution (see Figure 1), we combine the observations with a forecast error equal to 7, 8, 9 or 10 into one category, and similarly for the lower tail of the distribution. Hence, the dependent variable used in the regression is measured on a scale from -7 to +7, with 15 possible outcomes.

The Pooled OLS results show that current employment status (voluntary or involuntary retirement or unemployment) has no significant effects on future (realized) life satisfaction (LS_{t+5}). However, being unemployed or involuntary retired has a significant negative effect on the forecast error. From the previous subsection, we have seen that the unemployed and involuntary retired are more optimistic than employees (column (5)). Hence, those individuals underestimate their future life satisfaction although they are optimistic. This means they are optimistic but not enough to anticipate their satisfaction: the future turns out to be better than initially expected. Similarly, people with current poor health (hospital stays, doctor visits) underestimated life satisfaction while they were optimistic. Current degree of disability has no significant effect

on future life satisfaction and optimism, however it has a negative effect on the forecast error: the disabled are underestimating their future life satisfaction. A possible explanation for these findings is that those with a disability and those becoming unemployed or involuntarily retired are adapting themselves to a new life situation (i.e. re-optimizing their utilities), and as a result are even more satisfied than initially expected.

Current income has a significant negative effect on future satisfaction, but still shows a positive effect on the forecast error. In other words, people with high income overestimate their future satisfaction. We take from this that those with higher income, even though they were in fact pessimistic (column (5)), were still overly optimistic about the future, as income in time t has a negative effect on realized life satisfaction 5 years later.

Education has a strong and significant impact on the forecast error: compared to the least educated, higher educated individuals are more likely to underestimate their future life satisfaction. However, from our data (not reported), we observe that the least educated are (unconditionally) overestimating their future life satisfaction, compared to the higher educated groups, and especially compared to the highest educated. Therefore, the finding that the high educated are underestimating should be seen in this light, and not as evidence that high education leads to a large forecast error. In fact, we find evidence of the reverse.

Using the Ordered Probit model (Table 7), the signs and significance levels are very similar to the coefficient in the Pooled OLS model. Again we present here the marginal effects, now for the forecast error, evaluated at the means of the explanatory variables, for the labor force status indicators and the level of income, in Table 8. As in Table 6, there is a change in sign of the marginal effect occurring between two levels of the dependent variable: voluntary retirement,

Table 7: Ordered probit model with Mundlak terms

Variable	(1) LS_t	(2) $E_t(LS_{t+5})$	(3) LS_{t+5}	(4) $\Delta(LS_{t+5})$	(5) $\Delta(LS_t)^{optimistic}$
Voluntary retired	0.000573	-0.0129	-0.00470	-0.0232	-0.0194
	(0.0199)	(0.0199)	(0.0226)	(0.0286)	(0.0232)
Involuntary retired	-0.204***	-0.125***	0.0323	-0.133***	0.110***
	(0.0292)	(0.0295)	(0.0310)	(0.0408)	(0.0376)
Unemployed	-0.130***	-0.0639***	0.00545	-0.0747**	0.0598*
	(0.0242)	(0.0247)	(0.0276)	(0.0353)	(0.0320)
Age	-1.452***	-0.245	-0.615	0.331	1.404***
	(0.335)	(0.351)	(0.408)	(0.500)	(0.402)
$Age^2/100$	2.481***	0.477	1.156*	-0.586	-2.314***
	(0.563)	(0.589)	(0.687)	(0.841)	(0.674)
$Age^3/1000$	-0.142***	-0.0325	-0.0728*	0.0342	0.124***
	(0.0313)	(0.0328)	(0.0383)	(0.0469)	(0.0374)
log(Income)	0.198***	0.105***	-0.0291	0.137***	-0.119***
	(0.0219)	(0.0214)	(0.0236)	(0.0302)	(0.0251)
General Elementary	0.101	-0.111*	0.218**	-0.207***	-0.298***
	(0.0636)	(0.0585)	(0.0920)	(0.0604)	(0.0466)
Middle Vocational	0.114*	-0.0898	0.235***	-0.211***	-0.289***
	(0.0612)	(0.0565)	(0.0893)	(0.0587)	(0.0447)
Vocational Plus Abi	0.0309	-0.123	0.178*	-0.216***	-0.248***
	(0.0807)	(0.0781)	(0.107)	(0.0705)	(0.0655)
Higher Vocational	0.125*	-0.128**	0.253***	-0.273***	-0.367***
	(0.0676)	(0.0638)	(0.0954)	(0.0634)	(0.0519)
Higher Education	0.0853	-0.105*	0.255***	-0.252***	-0.281***
	(0.0654)	(0.0611)	(0.0935)	(0.0616)	(0.0488)
Divorce	0.0434	0.151*	0.120	0.125	0.123
	(0.0839)	(0.0829)	(0.0767)	(0.115)	(0.0883)
Widow	-0.160*	0.0520	0.168**	-0.0100	0.290***
	(0.0966)	(0.0898)	(0.0848)	(0.125)	(0.0981)
Married	0.00339	0.0673	-0.00854	0.152	0.0729
	(0.0841)	(0.0839)	(0.0775)	(0.119)	(0.0886)
Nr children	0.0281	0.0338	0.0103	0.0302	0.0136
	(0.0228)	(0.0222)	(0.0243)	(0.0300)	(0.0268)
Nr adult	-0.0212	-0.00516	0.0105	0.00414	0.0224
	(0.0136)	(0.0138)	(0.0152)	(0.0187)	(0.0159)
log(# Doctor visits+1)	-0.109***	-0.0646***	0.0148*	-0.0702***	0.0412***
	(0.00734)	(0.00727)	(0.00793)	(0.0101)	(0.00876)
Hospital stays	-0.113***	-0.0509***	0.0355*	-0.0762***	0.0751***
	(0.0192)	(0.0192)	(0.0214)	(0.0274)	(0.0231)
log(Degree disability +1)	-0.0192***	-0.0227***	0.0108	-0.0350***	-0.00885
	(0.00622)	(0.00628)	(0.00687)	(0.00940)	(0.00694)
West	-0.0220	0.437***	0.187	0.223	0.652***
	(0.147)	(0.123)	(0.134)	(0.176)	(0.185)
Male	-0.0492**	-0.0580***	-0.0501**	-0.0164	-0.0260
	(0.0194)	(0.0194)	(0.0222)	(0.0162)	(0.0171)
Time dummies	yes	yes	yes	yes	yes
Selection dummies	no	no	no	no	no
Mundlak terms	yes	yes	yes	yes	yes
Observations	45644	44843	35561	34943	44843
Individuals	10286	10233	7720	7686	10233
P-value age	0.000	0.000	0.000	0.721	0.000
P-value education	0.222	0.403	0.129	0.001	0.000
P-values selection	0.058	0.076	0.491	0.568	0.981
P-value time effects	0.000	0.000	0.000	0.000	0.000
P-value model	0.000	0.000	0.000	0.000	0.000
P-value Mundlak	0.000	0.000	0.000	0.000	0.000

Panel robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Marginal effects (in %) for dependent variable $\Delta(LS_{t+5})$

	Voluntary retired	Involuntary retired	Unemployed	Income
$Pr(y \leq -7\|x)$	0.020	0.112	0.064	-0.048 $\times 10^{-3}$
$Pr(y = -6\|x)$	0.027	0.154	0.089	-0.067 $\times 10^{-3}$
$Pr(y = -5\|x)$	0.062	0.348	0.200	-0.150 $\times 10^{-3}$
$Pr(y = -4\|x)$	0.107	0.607	0.349	-0.262 $\times 10^{-3}$
$Pr(y = -3\|x)$	0.209	1.181	0.678	-0.509$\times 10^{-3}$
$Pr(y = -2\|x)$	0.254	1.435	0.825	-0.619$\times 10^{-3}$
$Pr(y = -1\|x)$	0.210	1.184	0.681	-0.511$\times 10^{-3}$
$Pr(y = 0\|x)$	-0.048	-0.271	-0.155	0.117 $\times 10^{-3}$
$Pr(y = 1\|x)$	-0.268	-1.515	-0.870	0.653 $\times 10^{-3}$
$Pr(y = 2\|x)$	-0.241	-1.360	-0.781	0.587 $\times 10^{-3}$
$Pr(y = 3\|x)$	-0.160	-0.903	-0.519	0.389 $\times 10^{-3}$
$Pr(y = 4\|x)$	-0.079	-0.449	-0.258	0.194 $\times 10^{-3}$
$Pr(y = 5\|x)$	-0.053	-0.298	-0.171	0.128 $\times 10^{-3}$
$Pr(y = 6\|x)$	-0.021	-0.116	-0.067	0.050 $\times 10^{-3}$
$Pr(y \geq 7\|x)$	-0.020	-0.112	-0.064	0.048 $\times 10^{-3}$

involuntary retirement and unemployment have a positive marginal effect on the probability of the forecast error being equal to -1 or below, and negative for 0 or above. The reverse is true for income. We see that the involuntary retired have a 0.27 percentage point higher probability of having a zero forecast error. The probability of overestimating life satisfaction by 2 points (on the 10-point scale) increases by 1.4 percentage points in case of involuntary retirement, and 0.8 percentage points in case of unemployment. Again we see a small marginal effect of income: a standard deviation increase in monthly income increases the probability of a zero forecast error by 0.21 percentage points, and the probability of overestimating life satisfaction by two points by 1 percentage point.

To summarize our results, we find that unemployed and involuntary retired individuals underestimate future life satisfaction. That is, their current labor market status has temporary negative effects on well-being, but, after 5 years, individuals are happier with their life than previously anticipated. We find no effects of voluntary retirement on the forecasting error. Turning to marital status, we find generally insignificant effect of being widowed or divorced on either current life satisfaction or the forecast error. On the other hand, health factors are strongly correlated to well-being: poor health status yields to forecast error, however realized life satisfaction was higher than expected, suggesting only temporary effects of being in bad health. This logic does not apply to disabilities, which have permanent effect on health, and on life satisfaction.

5 Conclusion

Using panel data from the German Socio-Economic Panel (GSOEP), we study the effect of both retirement and unemployment on the subjective well-being around retirement. A unique feature of this data set is that individuals' expectation of future life satisfaction has been collected every year, resulting in a panel data set with both expectations and realizations of life satisfaction. We exploit this information to analyze how accurate individuals anticipate changes in satisfaction around retirement, as well as the correlation between the forecasting error in life satisfaction and the labor market status, income level, marital status and health condition.

We find that employees and voluntary retirees have a very similar level of satisfaction with life. Involuntary retirement and unemployment on the other hand have significant negative effects on current life satisfaction. This confirm the results of previous literature, such as Bonsang and

Klein (2011), who are closest to this study by analyzing well-being and retirement. Moreover, we find that higher income results in higher satisfaction, and we note a strong negative effect of having a poor health condition on life satisfaction. An important finding is that unemployed and involuntary retired individuals underestimate future life satisfaction, even though they are optimistic. Hence, these individuals are optimistic, but not enough to anticipate their satisfaction 5 years ahead, i.e their current labor market status has temporary negative effects on well-being, but, after 5 years, individuals are happier with their life than previously anticipated. Again, we find no effects of voluntary retirement on the forecasting error. We find that health factors have similar effects on well-being as being involuntary retired or unemployed: poor health status leads to pessimism of the future, however realized life satisfaction was higher than expected, suggesting only temporary effects of being in bad health. Finally, we show that richer individuals overestimate their future satisfaction, while they were pessimistic. These results are robust to the methodology used (linear versus ordered response models), and are not driven by unobserved heterogeneity or a selected sample due to attrition.

Our results suggest that German individuals who retired voluntarily are well prepared, in the sense that although they may experience a drop in household income upon retiring, they are able to offset this by deriving more satisfaction from other aspects, such as leisure time. Hence, they face no overall drop in life satisfaction, and anticipate their future life satisfaction accurately. On the contrary, those who are unemployed at older age, and those retiring involuntarily face a drop in life satisfaction. For them, the good news is that this drop is temporary, i.e. they underestimate their future life satisfaction; the future is better than initially anticipated. A similar result is found for those with a poor health condition. Most likely, adverse labor market or health outcomes

urges individuals to adapt to a new life situation, and, as a result, offset the initial drop in life satisfaction.

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Appendix

Table 9: Level of benefit paid out related to the degree of disability

Degree of disability(%)	Benefit paid out(%)
<25	0
25-35	30
35-45	40
45-55	50
55-65	60
65-80	75
80-100	100

Table 10: Fixed effect model Results

Variable	(1) LS_t	(2) $E_t(LS_{t+5}$	(3) LS_{t+5}	(4) $\Delta(LS_{t+5})$	(5) $\Delta(LS_t)^{optimistic}$
Voluntary retired	-0.0135	-0.0199	0.0323	-0.0476	-0.00801
	(0.0321)	(0.0364)	(0.0351)	(0.0551)	(0.0296)
Involuntary retired	-0.376***	-0.241***	0.0419	-0.258***	0.143***
	(0.0515)	(0.0564)	(0.0522)	(0.0800)	(0.0488)
Unemployed	-0.223***	-0.133***	0.0204	-0.164**	0.0865**
	(0.0407)	(0.0466)	(0.0449)	(0.0687)	(0.0412)
Age	-2.261***	-0.389	-1.151*	1.091	1.882***
	(0.541)	(0.640)	(0.638)	(0.980)	(0.505)
Age^2/100	3.871***	0.781	2.143**	-1.936	-3.101***
	(0.909)	(1.075)	(1.073)	(1.649)	(0.847)
Age^3/1000	-0.222***	-0.0547	-0.135**	0.114	0.167***
	(0.0506)	(0.0599)	(0.0598)	(0.0920)	(0.0471)
log(income)	0.326***	0.181***	-0.0652*	0.238***	-0.151***
	(0.0355)	(0.0392)	(0.0378)	(0.0588)	(0.0325)
Divorce	0.0708	0.249*	0.0706	0.322	0.162
	(0.141)	(0.150)	(0.114)	(0.220)	(0.108)
Widow	-0.249	0.136	0.244*	0.0263	0.367***
	(0.162)	(0.165)	(0.130)	(0.238)	(0.120)
Married	0.0289	0.158	-0.104	0.389*	0.0946
	(0.140)	(0.153)	(0.117)	(0.224)	(0.108)
Nr children	0.0555	0.0605	-0.0336	0.0620	0.00637
	(0.0380)	(0.0396)	(0.0380)	(0.0604)	(0.0319)
Nr adult	-0.0348	-0.000923	0.00519	0.0187	0.0286
	(0.0220)	(0.0251)	(0.0232)	(0.0361)	(0.0201)
log(# Doctor visits+1)	-0.176***	-0.116***	0.0170	-0.126***	0.0532***
	(0.0118)	(0.0131)	(0.0123)	(0.0195)	(0.0110)
Hospital stays	-0.209***	-0.100***	0.0247	-0.103*	0.104***
	(0.0317)	(0.0354)	(0.0350)	(0.0536)	(0.0294)
log(Degree disability +1)	-0.0362***	-0.0489***	0.0147	-0.0612***	-0.0111
	(0.0106)	(0.0117)	(0.0112)	(0.0186)	(0.00875)
West	-0.0297	0.800***	0.307	0.503	0.796***
	(0.260)	(0.239)	(0.217)	(0.325)	(0.244)
Constant	48.96***	11.72	28.18**	-22.89	-37.36***
	(10.68)	(12.62)	(12.59)	(19.32)	(9.971)
Time dummies	yes	yes	yes	yes	yes
Selection dummies	no	no	no	no	no
Observations	45644	44843	35561	34943	44843
Individuals	10286	10233	7720	7686	10233
R^2	0.037	0.035	0.016	0.021	0.014
P-value age	0.000	0.000	0.000	0.150	0.000
P-value selection	0.092	0.083	0.557	0.675	0.981
P-value model	0.000	0.000	0.000	0.000	0.000
P-value time effects	0.000	0.000	0.000	0.000	0.000

Panel-robust standard errors in parentheses

*** P<0.01, ** P<0.05, * P<0.1