HOW SENSITIVE ARE SUBJECTIVE RETIREMENT EXPECTATIONS TO INCREASES IN THE STATUTORY RETIREMENT AGE? THE GERMAN CASE

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How sensitive are subjective retirement expectations

to increases in the statutory retirement age?

The German case

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Abstract. Population Aging poses an evident threat to the financial sustainability of pension systems based on a "pay-as-you-go" (PAYG) scheme. To cope with this threat, pension systems have undergone numerous reforms in many countries in order to keep people longer at work. One crucial element of these reforms typically is an increase in the statutory retirement age at which workers are legally allowed to retire. Two questions still remain unanswered: Will people really work longer? Who is more likely to retire before the new legal retirement age?

In this paper, we focus on subjective retirement expectations, analysing if and to what extent they are affected by such a policy change. We consider the legislative reform introduced in Germany in 2007, which gradually will increase the statutory retirement age (SRA) from 65 to 67 years. Using the SAVE survey, a representative panel of German households, we estimate the increase of the individuals' expected retirement age (ERA) as an effect of the reform.

Our results show that less productive workers living in relatively wealthier households are more likely to plan an early retirement. The introduction of the reform seems to motivate better educated workers to remain longer in the labour force although it does not seem to completely succeed in keeping women longer in the labour force: especially among the younger cohorts, whose SRA will be 67 years, women are still more likely than men to plan an early retirement. In terms of the magnitude of the effect, we find that the reform shifted the expectations of the younger cohorts by almost two years – if these expectations will be realized, this reform would have been quite successful.

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1. Introduction

Population ageing is one of the most relevant demographic phenomena affecting many countries in the world. The combination of low fertility rates and substantial gains in life expectancy – particularly at older ages – implies a substantial increase in the ratio of people aged 65 years and above to those of working age (15 to 64 years) over the next decades. In addition, many countries experienced a so-called baby boom in the 1950s and 1960s, followed by a so-called baby bust thereafter so that comparatively large cohorts were followed directly by comparatively small cohorts. This will worsen the ratio even further once the baby-boom cohorts reach age 65+. Such an outlook poses an evident threat to the financial sustainability of pension systems based on a "pay-as-you-go" (PAYG) scheme where the contributions of the working age population directly finance the benefits of the old. Furthermore, after the recent economic and fiscal crisis and the rapid increase in public debt, the implementation of reforms aimed at changing the generosity of social entitlements has been urged by several big political players (see for example IMF 2010). The increase in the statutory retirement age (that is, the age at which workers are legally allowed to retire) is one of tools widely recommended to cope with these threats (see for example OECD, 2006). Often coupled with closing existing windows for early retirements, increasing the statutory retirement age is supposed to keep people longer at work as it changes the set of economic incentives to retire.

However, in terms of the effectiveness of such type of reform, many questions still remain unanswered: Will people really work longer? For how many years? Who is going to stay in the labour market and who is more likely to leave before reaching the new legal retirement age? Are individuals saving enough to finance an early departure from the labour force that allows them to substitute smaller public pensions by additional private pension income?

To answer such questions it becomes extremely important to understand how individuals form their retirement plans and which factors affect their decisions. In this paper, we focus on subjective retirement expectations, analysing if and to what extent they are affected by such a policy change. Two reasons motivate our work: first, if public policies aimed at altering retirement patterns are to be successful, they have to alter workers' expectations concerning the tradeoffs associated with retirement. We need therefore to better understand the conditions that lead workers to formulate and alter their expected retirement age. Second, long term decisions, and in particular saving and investment decisions, are based on expectations about the future: among them, expectations about the retirement age are likely to play a prominent role, so that understanding how public policies affect them is quite important for understanding current saving behaviour and wealth accumulation altogether.

In recent years research using expectation questions has increased at a very fast pace: since the early 1990's socio-economic surveys have been enriched with questions to elicit expectations of significant events, such as macroeconomic shocks, risks faced or future income (see Manski, 2004; Pesaran and Weale, 2006). In general subjective expectations have been found to be strong predictors of future outcomes (see e.g. Hurd and McGarry, 2001, for an analysis of survival probability and subsequent mortality, or Stephens, 2004, on the relationship between job loss probabilities and job displacement).

This applies particularly to retirement expectations.[1] Their accuracy has been examined in several studies which compare retirement expectations and outcomes. These studies generally conclude that individuals form rational retirement plans, stick to them, are able to anticipate most changes in factors relevant to their decision and respond in the expected way to unanticipated changes in circumstances (Bernheim 1989, 1990; Honig, 1996; Disney and Tanner, 1999; Dwyer and Hu, 1999; Chan and Stevens, 2004; Benitez-Silva and Dwyer, 2005; Haider and Stephens 2007; Cobb-Clark and Stillman, 2009). Other studies have focussed on the analysis of the determinants of retirement expectations, finding that retirement plans vary with individual circumstances in a plausible manner. In particular, Dwyer and Mitchell (1999) and Dwyer (2001) find that even after controlling for economic circumstances, health is a very important factor in shaping retirement plans, and health shocks induce people to retire earlier than expected. Munnell et al. (2004) focus on the role of pension coverage and pension type on the expected retirement age (ERA), finding that the presence of pension wealth lowers the ERA and that the incentives for early retirement under defined benefits plans reduce it even further.

Another strand of the literature has looked at the effect of policy changes on expectations. So for example, Michaud and van Soest (2007) analysed the effect on retirement expectations of the repeal in the USA of the earnings test above the normal retirement age, which taxes away earnings later in life. They found a substantial increase in the reported probability of working after age 62 for those workers whose marginal wage rate increased because of the repeal. Several studies have analysed the effect of pension reforms on retirement plans in Italy. These studies are closely related to our research for two reasons: first, among other things, the Italian reforms increased the mandatory retirement age for the employees in the private sectors as did the German reform. Second, the reforms affected some groups leaving others

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[1] Expectations are defined as „subjectively held beliefs by individual about uncertain future outcomes"(Pesaran and Weale, 2006 p.720). As individuals can actively determinate when enter retirement, strictly speaking we should talk about retirement *plans* rather than *expectations*. However, as the retirement decision is influenced by many factors over which individuals have no or little control (such as state regulations, health or employment status) we will use in the following the terms "retirement expectations" and "retirement plans" as almost synonyms.

unaffected – as it is the case in Germany – allowing the effects to be estimated with a difference-in-differences (DD) approach analogous to the one we use in our work. We will therefore summarize these studies more in detail. The first study dealing with this issue is Brugiavini (1997), which looks at the shift in retirement expectations between the years 1991 and 1993 (after a major bill of reforms was passed in 1992) finding a surprising decline in the ERA. She argues that the debate on early retirement that the reform initiated, shifted the attention of the respondents to this issue, so that after 1992 they started to think of their retirement age as the early retirement age and not any more as the normal retirement age, an effect known in the literature as *recognition effect* (Cagan, 1965). This interpretation is contested by Mastrogiacomo (2004), who points out two sources of bias not taken into account in Brugiavini's work, which make her results difficult to interpret: the bias due to sample attrition and that due to "*don't know*" answers. He finds that over the time span 1989 - 2000, the reforms indeed induced individuals to postpone their retirement plans by more than two years. He recognizes the existence of a recognition effect, but he finds that it can be ascribed only to those who were actually not involved in the reform. He also finds that the reforms, particularly the first one introduced in 1992, increased uncertainty among Italian workers, although the results remain unchanged after the model is corrected to take this into account. Also Bottazzi et al. (2006) estimate the effect of pension reforms on households' expectations of retirement outcomes in the attempt to understand to what extent individuals perceive and react to changes. Other than Mastrogiacomo (2004), the authors drop the information concerning the transitional period and compare the expectations before and after the whole reform process (that is, before 1992 and after 1999). They find that on average the ERA increased by about two years for men and three years for women as a result of the whole set of reforms.

While these studies reveal that subjective ERAs are a valuable source of information and that most groups actually revise their expectations in the anticipated direction, these effects are due to the simultaneous change of several parameters of the pension system (not only the legal retirement age but also the minimum years of contributions as well as the entire formula to calculate pension benefits) in different ways for different groups.[2] This makes it impossible to single out which is the effect of each piece of the reforms on retirement expectations. How much of the observed increase in the expected retirement age is due to the change in the legal retirement age and how much is due to the change in the pension award formula?

In our work we aim at identifying the effect of an increase in the statutory retirement

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[2]   So if, for example, the legal retirement age increased after the reforms in the same way for all the workers who started working before 1995, irrespectively of their years of contributions, the change in the pension award formula makes a distinction between workers with more or less than 18 years of contributions in 1995 (for details see Bottazzi et al. 2006, Table 1).

age (SRA) on subjective retirement expectations as distinct from other changes in the pension system. The legislative reform introduced in Germany in 2007 changed exclusively the SRA of employees (which will be gradually increased from 65 to 67 years from 2012 on) and offers a better setting for the analysis of this issue.

Using the SAVE survey, a representative panel of German households with a specific focus on saving and investment choices we use a DD approach to estimate the increase of the individuals' ERA as a result of the reform, after correcting (as suggested in Mastrogiacomo, 2004) for possible biases due to sample attrition and item nonresponse. Furthermore, our study complements the existing literature by looking at the role played by financial literacy in shaping individuals' reactions to policy reforms. Indeed, as recognized by Bottazzi et al. (2006), the success of a reform crucially depends on how individuals understand the new rules. Making use of two special questions asked in the survey 2009, we aim at detecting the role played by a better knowledge of the functioning of the pensions system.

The paper is structured as follows. Section 2 gives a short historical overview of the main reforms of the German pension system, with a special focus on the reform implemented in 2007; section 3 offers an overview of the literature on the determinants of today's actual retirement decisions in Germany; section 4 presents the data and the descriptive analysis; section 5 presents the results of the econometric models. Section 6, finally, concludes.

2. *The German pension system and the 2007 reform*

The German pension system was the first formal pension system in the world, designed by Bismarck 120 years ago. It was very successful in providing a high and reliable level of retirement income in the past at reasonable contribution rates, becoming a model for many social security systems worldwide. While the generosity of the German public pension system is considered a great social achievement, negative incentive effects of past reforms in the 1970s and 1980s and population aging are threatening the very core of the system. These have led to several pension reforms since 1992.

The German pension system is based on a point system where contributors acquire a certain amount of earning points per year depending on their wage.[3] The accumulated sum of earning points at the time of retirement is multiplied with the so-called pension value in order to determine the size of the individual pension. This pension value is indexed to the development of average wages and its formula has been

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[3] A person earning the average wage acquires one earning point (EP), persons who earn less (more) than the average wage, acquire proportionally less (more) EPso. E.g. a person that earns 80% of the average wage in a certain year acquires 0,8 EPs fort hat year.

altered several times during past reforms. It now comprises an additional component that accounts for changes in the system's dependency ratio.[4] Since the pension value is newly computed every year and is the same for all pensioners, changes in the development of the current pension value affect all pensioners equally. This is a crucial difference to other countries' pension systems where reforms often only affect younger pensioner cohorts and maintain the status of older pensioners.[5]

Another crucial parameter that determines the size of the individual pension is the retirement age. Persons who retire earlier (later) than the statutory retirement age get their accumulated sum of EPs reduced (increased) by a certain percentage for each month of earlier (later) retirement.[6] This reduction (increase) holds for the entire retirement period and thus is of a permanent nature.

The 2007 reform implemented a gradual increase in the statutory retirement age from age 65 today to age 67 in 2030. The increase will start in 2012, adjusting the SRA each year by one month from age 65 to 66 until 2023, and then each year by two months from age 66 to 67 until 2029. The phase-in is cohort-oriented, it will affect only cohorts younger than 1947. For cohorts born after 1963 the new statutory retirement age of 67 finally applies.[7] Table 1 gives an overview of the new SRAs for the different birth cohorts.

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[4] For a more detailed description of the German pension reform process in general and the German pension benefit formula in specific, see Wilke (2009).

[5] See e.g. the so called "Amato" reform in Italy in 1992, which increased the SRA and the minimum amount of years of contribution to collect benefits only for employees who at the time of the reform had less than 15 years of full-time contribution (for further information: Mastrogiacomo, 2004).

[6] A person looses 3% of their earning points for each month of earlier retirement and gains 5% for each month of later retirement.

[7] For a detailed description of the reform and a first assessment, see Bucher-Koenen und Wilke (2009).

Table 1: *Statutory Retirement Age (SRA) by birth cohorts*

Birth year	Legal Retirement Age (years/months)	Legal Retirement Age for very long-time insured workers
1945	65	65
1946	65	65
1947	65/1	65
1948	65/2	65
1949	65/3	65
1950	65/4	65
1951	65/5	65
1952	65/6	65
1953	65/7	65
1954	65/8	65
1955	65/9	65
1956	65/10	65
1957	65/11	65
1958	66	65
1959	66/2	65
1960	66/4	65
1961	66,6	65
1962	66/8	65
1963	66/10	65
1964	67	65

3. Determinants of actual retirement behaviour in Germany

The economic and sociological literature on the determinants of retirement behaviour uses to distinguish between *push* and *pull* factors (for a classification of the *push* and *pull* factors and a selective review of the studies dealing with retirement decisions see OECD, 2006). While the former are usually perceived as beyond the control of individuals (such as general labour market conditions, occupational policies at the firm level or health shocks), the latter are closely related to individuals' preferences. Although push factors play definitely a role in determining the transition into retirement (see for example Wübbeke, 2005; Radl, 2007), pull factors have turned out to be more relevant in shaping retirement decisions (see Riphahn and Schmidt, 1997; Börsch-Supan, 2000).

In particular, previous research for Germany has shown that individuals are quite sensitive to the financial incentives embedded in the pension system: when included in a regression explaining individual retirement behaviour, the financial costs of postponing retirement (measured by the so-called option value[8]) are found to be a strong determinant of the probability of being retired at a given age. Börsch-Supan (2000) e.g. finds that the option value turns out to be statistically highly significant in

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[8] For a detailed explanation of the option value approach, see e.g. Stock and Wise (1990).

all his regressions while most of the socio-demographic determinants such as gender, marital status or education mostly remain insignificant. Similarly, Berkel and Börsch-Supan (2004) find a strong effect of the option value on the retirement decision and estimate an increase in the average retirement age of men by about 2.5 years for a scenario where the statutory retirement age is changed from 65 to 67 years. More recently, Hanel (2010) estimated that the changes in accrued social security wealth as a result of the German pension reforms of the 1990's led to a postponement of individual retirement entries by about 14 months and a shift in the exit-from the labour market by about 10 months.

In addition to these institutional incentives, several other factors have also been found to affect the retirement decisions of Germans. Health status for example appears to have a very strong effect (Siddiqui, 1997; Börsch-Supan, 2000; Berkel and Börsch-Supan, 2004; Wübbeke, 2005; Radl, 2007) as well as subjective survival probability (Börsch-Supan et al., 2009). These results have important implications: in an actuarially fair system, early retirement implies receiving a smaller pension for a longer time. If poor health conditions force individuals out of the labour force earlier than planned there are possible negative consequences on the living standard because of the tighter financial means. And an increase in the statutory retirement age is likely to urge more people into early retirement than under the status quo. The question is to what extent social security systems can cover these risks.[9] Self-reported health, however, suffers from a justification bias: early retirees might report poor-health in order to legitimate their early departure from the labour market. The effect of health status on retirement behaviour thus might be overestimated if endogeneity is not adequately taken into account (Anderson and Burkhauser, 1985; Bazzoli, 1985; Bound, 1991; for a review of the literature on health and retirement decisions see Deschryvere, 2005).

Higher educational attainments are generally associated with a later retirement (Berkel and Börsch-Supan, 2004; Radl, 2007) while wealthier individuals are usually found to retire earlier (Berkel and Börsch-Supan, 2004). The relationship between income and retirement behaviour appears to have an inverted U-shape: while individuals at the very top and at the very bottom of the income distribution tend to retire later than the average, individuals at the centre of the distribution have a higher probability to retire earlier than the statutory retirement age (Drobnic, 2002; Wübbeke, 2005; Radl, 2007).

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[9] The German pension system e.g. offers disability benefits for workers who are no longer able to work up to 6 hours a week. See e.g. Wilke (2009) for an institutional description of the German disability benefits.

4. The data

The analysis in this paper is based on SAVE (Sparen und Altersvorsorge in Deutschland), a longitudinal dataset started in 2001 that focuses on households' saving and asset choices. The panel consists of about 3,000 households, which, since 2005, are surveyed every year. The present work only uses these waves from 2005 to 2009. Interviews are conducted with the individual who knows best about the household's financial situation and the questions focus on the respondent and his/her spouse.[10]

This dataset is particularly well-suited for the purposes of the current study: the SAVE survey not only collects extensive information on all aspects of the household's balance sheet, it also offers information on actual health and relevant social and psychological conditions. Most important to us, the survey includes questions on individual expectations. In particular, interviewees who are not yet retired have to answer the following question: "*At which age do you expect to retire or respectively to draw retirement benefits?*".[11] As pointed out in Hanel (2010), retirement entry, labour force exit and the claiming of benefits are not necessarily interchangeable terms: indeed she finds a discrepancy between the age at which individuals leave the labour force and that at which they start receiving pension benefits. Given the wording of the question, we argue that respondents in SAVE report the age at which they plan to claim their benefits. However, as a great part of the respondents has still many years to go until retirement, the two events (exiting the labour force and claiming benefits) are likely to be indistinguishable for them. Thus, in the remainder of the paper we will use the word *retirement* in a broader sense that reflects both perspectives.

The longitudinal structure of the survey represents a further advantage of the SAVE data over other data sources, as it allows observing how the reported retirement expectations evolve over time with the arrival of new information.

An important aspect that needs to be mentioned is the phenomenon of item nonresponse. As in all surveys that deal with sensitive topics such as household finances, item nonresponse to sensitive questions is not ignorable.[12] To prevent biased

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[10] See Börsch-Supan et al. (2008) for a detailed description of the dataset. Essig (2005) and Schunk (2006) provide further technical details.

[11] In German: „In welchem Alter werden Sie voraussichtlich in Ruhestand gehen bzw. das Alterseinkommen beziehen?" Actually the same question is asked also with respect to the respondent's partner. These answers, however, cannot be used in our analysis, as it is the reference person who reports the expected retirement age of the partner, so that we cannot treat this answer as if it was given directly by the partner.

[12] See e.g. Essig and Winter (2003) and Schunk (2006) for a discussion and documentation on this

inference based on an analysis of complete cases only, an iterative multiple imputation procedure has been applied to the SAVE data.[13] Multiple imputation simulates the distribution of missing data and allows for a more realistic assessment of variances in subsequent analyses than single imputation. The procedure uses a Markov-Chain Monte-Carlo method to replace missing data by draws from an estimate of the conditional distribution of the data (see e.g. Hoynes et al. (1998), Kennickell (1998)). All results in this paper use the fully imputed SAVE data: when it comes to the regressions, however, imputed values for the expected retirement age are reset to missing to avoid a spurious boost in the observed correlation between the expected retirement age and the other covariates.[14]

4.1 The sample

We restrict the sample in several ways. As the 2007 pension reform affects only employees, we discard the self-employed, civil servants and farmers Furthermore, we discard respondents who report to be casual workers or who are completely out of the labour force (retirees, students, home keepers). That leaves us with almost 3,000 observations distributed over 5 years. Table 2 offers an overview of the main characteristics of our sample.

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issue.

[13] See Schunk (2008).

[14] As missing values are imputed conditional on other observable characteristics, the correlation between the variable of interest and the covariates used for its imputation is (by construction) extremely high.

Table 2: *Sample characteristics*

Year	2005	2006	2007	2008	2009	Total
Female RP	56.41%	56.86%	56.85%	56.49%	55.23%	56.41%
Age RP						
Under 30	17.08%	17.42%	17.70%	17.95%	15.71%	17.21%
30 – 39	21.95%	21.92%	23.13%	20.90%	21.41%	21.90%
40 – 49	21.24%	22.53%	19.74%	22.90%	24.39%	22.01%
50 – 59	21.24%	22.53%	19.74%	22.90%	24.39%	22.01%
60 and above	4.21%	3.75%	3.73%	4.34%	4.29%	4.05%
Mean	41.97	42.31	41.62	42.59	43.26	42.28
Median	42	43	42	43	44	43
Marital Status						
Married	51.23%	50.58%	52.08%	53.75%	58.35%	52.77%
Separated	3.70%	2.64%	2.65%	2.23%	2.29%	2.82%
Single	25.93%	29.09%	27.65%	25.96%	23.57%	26.56%
Divorced	16.54%	15.87%	15.53%	16.63%	14.19%	15.87%
Widowed	2.59%	1.82%	2.08%	1.42%	1.60%	1.98%
Partner HH	60.00%	60.50%	61.55%	64.50%	67.05%	62.23%
Secondary Education						
Basic	34.07%	29.09%	30.68%	28.60%	27.69%	30.49%
Middle	45.56%	46.28%	43.18%	45.84%	45.54%	45.32%
High	20.37%	24.63%	26.14%	25.56%	26.77%	24.19%
Post-secondary and tertiary education						
None	11.85%	11.40%	11.74%	12.78%	10.98%	11.76%
Vocational training	77.78%	75.87%	74.24%	74.85%	76.20%	75.98%
University	10.37%	12.73%	14.02%	12.37%	12.81%	12.25%
Income and Wealth						
Net monthly income	2253.98	1961.65	2024.93	2117.94	2315.41	2136.32
Median	1780	1700	1870	1800	2000	1800
Net financial wealth	20878.91	17063.24	23082.47	20329.85	22500.31	20632.78
Median	4930	3000	3667	3400	5336	4000
Net Worth	128910	102807.7	113454.4	94550.54	97965.98	109970.2
Median	20897.5	16000	21786	16972	22000	19655
Observations	810	605	528	493	437	2873

Three aspects are worth to be stressed. First, the average age of the reference person (RP) in the household is 42 years and almost 40% of them are in their 40s. The predominance of younger respondents, who are 20 or more years away from retirement, is a new feature in comparison with other samples (like the HRS for the USA) that typically focus more on older workers. The age structure of the sample is ideal for the scope of our analysis, as it is especially the younger birth cohorts who will be fully affected by the 2007 pension reform. Of course, young respondents face bigger uncertainty concerning their retirement plans, so that their answers are likely to undergo bigger changes over time and to be less representative of the actual behaviour. However, in this work we are not interested in the match between expectations and outcomes, but rather in the expectations themselves, as we believe they are the driving force of today's behaviours (such as saving decisions). Therefore, as long as reported ERAs are not random numbers but a real expression of individuals' expectations, it does not matter if they do not exactly match future

outcomes.

Second, the distribution of the main characteristics does not reveal a specific bias toward specific subgroups. On the contrary, the sample seems to offer a good variation allowing for an accurate description of the distribution and the determinants of subjective retirement expectations.

Finally, the structure of the sample is pretty stable over time. In other words, the sample does not seem to suffer from a selective drop-out: we can therefore rule out that the observed trends are simply due to a change over time in the composition of the data. However, as selective attrition could seriously bias the results, we will have a closer look at this topic.

Table 3 offers an overview of how respondents of the 2005 sample are distributed by the number of waves they participated in the panel. Of all the individuals observed in 2005, more than 60% remained in the sample for at least 3 waves. About a quarter, however, dropped out after only one wave.[15]

Table 3: *Observations by panel survival*

Number of Waves	Number of observations	Relative Frequency
1	212	25.21%
2	102	12.13%
3	73	8.68%
4	91	10.82%
5	363	43.16%
Total	841	100%

A common way for detecting attrition bias in the characteristics of the sample is to use *t*-tests to compare those who responded to all waves with those with a lower survival in the panel (see for example Miller and Wright, 1995).

For the households in the sample 2005, we have compared the means of selected variables among the various subgroups (survival in the panel for 5 waves vs. survival in the panel for only i waves, $i=1$ to 4) to see if the differences are statistically significant.

We find little evidence of selective attrition for the education variables. The percentage of respondents with the lowest secondary degree (Hauptschule) e.g. is significantly higher among those who dropped out of the panel after one wave than among those who remained until 2009 (Diff. = 8.1 percentage points, p-value = 0.052). The same applies for individuals without post-secondary qualifications: their

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[15]   A drop-out can happen either because the respondent refused to participate in further waves of the survey, or because he/she changed status so that have been discarded from our sample (for example she/he retired, or she/he turned into self-employment).

percentage is significantly higher among those who dropped out after one wave in comparison with those who are observed for all 5 waves (Diff. = 6.6 percentage points, p-value = 0.023). There are no further significant differences looking at other characteristics such as age, marital status or wealth.[16]

While attrition based on observable characteristics is harmless when performing a multivariate analysis, attrition based on unobservable attributes may severely bias the results: if, for example, individuals with higher labour attachment are more likely to stay longer in the panel and at the same time more likely to report higher ERAs, the regression results would overestimate the upward adjustment in the ERAs over time.

Indeed, looking at the reported ERAs in 2005, we find a slightly significant difference of about half a year between respondents who dropped out after one wave and individuals who are observed for all the 5 waves, although no significant differences are found among respondents with other different panel survival (Table 4).

Table 4: *ERA by number of waves in the panel. Sample 2005.*

Number of waves in the panel	ERA by panel survival		Difference	p-value
	waves = i	waves = 5		
i = 1	63.43	63.93	-0.50	0.079
i = 2	63.91	63.93	-0.02	0.960
i = 3	63.32	63.93	-0.61	0.119
i = 4	63.65	63.93	-0.28	0.510

In order to control for possible selection bias due to attrition, we follow the approach suggested in Verbeek and Nijman (1992) and include various selectivity dummies in our regressions.

4.2 Descriptive analysis: how reliable are retirement expectations data?

Figure 1 plots the distribution of ERA answers for men and women separately. The distribution of the expected ages of retirement is dominated for both men and women by spikes at specific ages such as 60, 65, 67 and, to a lesser extent, 63 and 70.

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[16] We compared: age, marital status, education, unemployment status, past spells in unemployment and stock of financial assets. Results available upon request. For a general overview of attrition rates in the SAVE survey see Börsch-Supan et al., 2008.
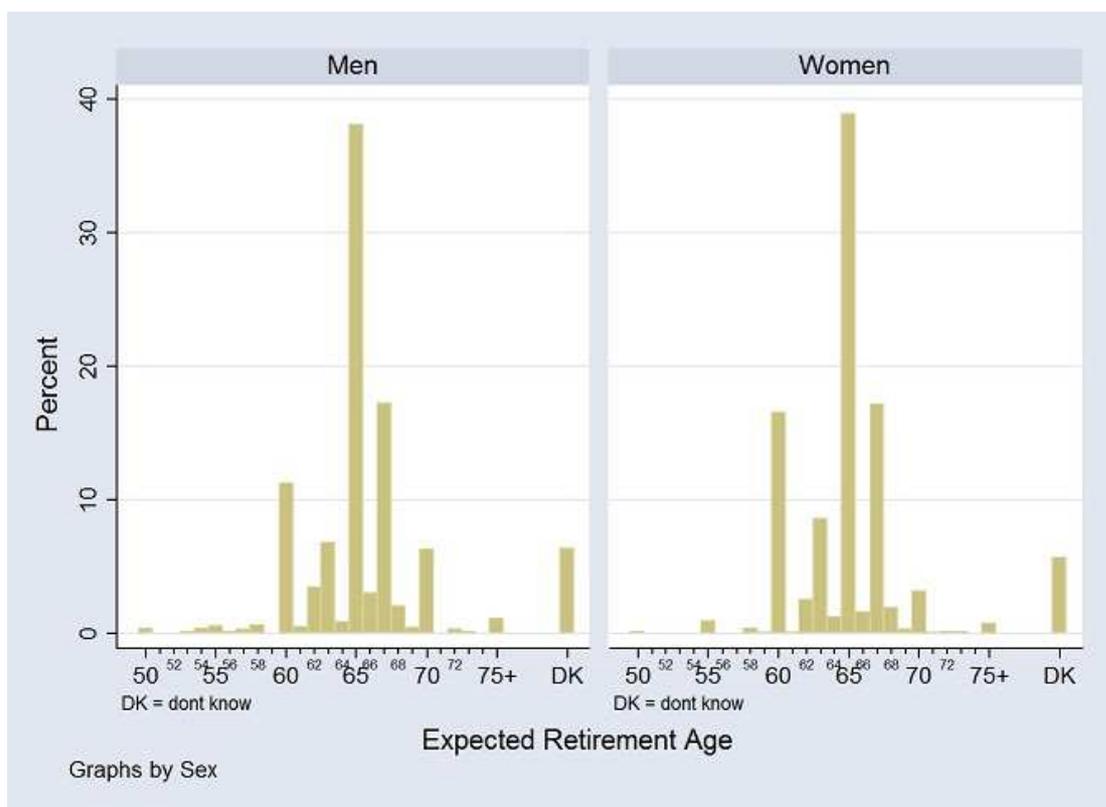
Figure 1: *Distribution of the Expected Retirement Age by gender*

These spikes (or focal points – FPs thereafter) are related to institutional aspects of the German pension system: 60 years, for example, represents the age at which, before the 1992 reform, men were first allowed to claim disability benefits and women were allowed to enter early retirement.

The dominance of the distribution by spikes at "institutional" ages might suggest that little relevant information is provided by these responses. Indeed, looking at the SAVE respondents who, over the whole period 2001 – 2009, entered into retirement, we can see that the actual retirement ages are distributed much more continuously (see Figure 2).

This phenomenon is actually common also to other studies who elicit expectations as point estimates (for the US see Bernheim, 1989; for the UK see Disney and Tanner, 1999; for Italy, see Mastrogiacomo, 2004; for Australia, see Cobb-Clark and Stillman, 2009). In fact, given that individuals have to report a single summary statistics of their underlying distribution of possible retirement ages, the distribution of the reported expectations is by construction more heavily concentrated than the distribution of actual retirement ages, even if the two distributions were the same. To avoid such a problem, other surveys (such as the U.S. Health and retirement survey) ask individuals to indicate the chances of various future events, such as retiring at 62 or 65, on a scale of 1 to 10.
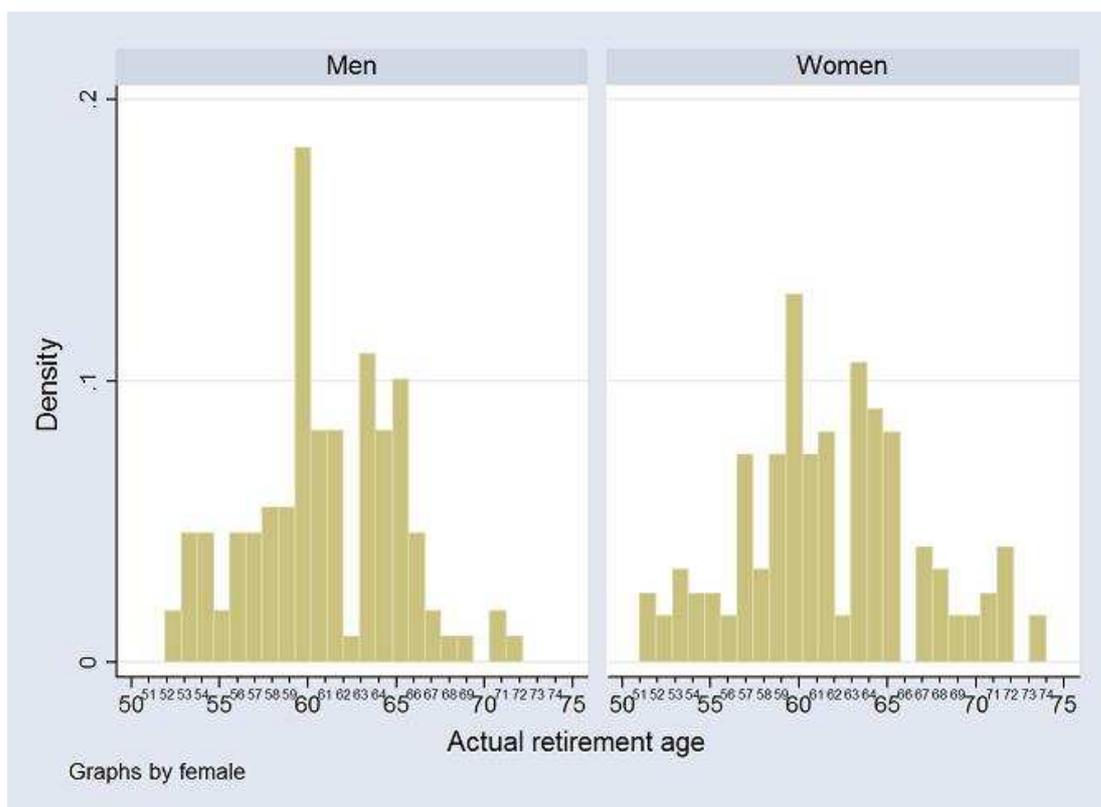
Figure 2 *Distribution of the Actual Retirement Ages by gender*
Source: *SAVE-Data 2001 – 2009; employees only; men = 141 obs.; women=183 obs.*

Nonetheless, we can argue that the answers are still informative about individuals' expectations. First, not-sophisticated individuals might have a specific retirement age in mind rather than a distribution of probabilities, and it could be difficult for them to translate such specific ages into probabilities. Second, reported retirement ages vary with individual characteristics in a reasonable manner: several studies find out that observable characteristics, known to affect actual retirement decisions, co-vary with retirement expectations in a similar way. In a panel setting they also find that in proximity of retirement the reported expectations of are strong predictors of the actual age of retirement also after including a large number of observable characteristics.[17]

A further piece of evidence in favour of the informativeness of the answers especially in relation with the effect of a change in the SRA can be found looking at the evolution of the FPs over time for different cohorts. Table 5 shows the percentage of respondents reporting specific FPs by gender and reform affectedness. Columns 4 and 8 report the percentage of respondents that report a specific ERA in each year as well as in the whole sample, while columns 1 – 3 and 5 – 7 report the percentages according to the individuals' SRA as after the reform 2007.[18] First of all we can note

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[17]   Disney and Tanner, 1999, Dwyer and Benítez-Silva, 2002, Loughran et al., 2001, Haider and Stephens, 2007

[18]   As for many cohorts the SRA is not an integer (cohorts born between 1947 and 1957 have to retire with 65 years and *x* months; the cohorts 1959 – 1963 have to retire with 66 and *x* months) while the

that the percentage of people reporting an ERA of 66 years increases from less than 1% in 2005 to about 4% for both men and women (columns 4 and 8). The increase is however much more pronounced among the cohorts with a SRA after the reform of 66 years (columns 2 and 6), while it is almost not existent among the cohorts with a new SRA of 67 (columns 3 and 7). Similarly, we can observe a general decline over time in the percentage of individuals with an ERA of 65 years (from almost 50% in 2005 to little more than 30% in 2009 for both men and women). The decline is however much more pronounced among the cohorts whose new SRA is 66 or 67, while the percentage of respondents reporting an ERA of 65 years remain almost constant among those, whose new SRA is still around age 65. The respondents appear therefore to adjust meaningfully their answers.

Table 5: *Percentage of respondents reporting specific ERAs*

	Men					Women			
	SRA = 65	SRA = 66	SRA = 67	Total		SRA = 65	SRA = 66	SRA = 67	Total
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
		2005					**2005**		
ERA 60	16.2%	22.2%	12.4%	15.6%	ERA 60	29.8%	26.1%	24.5%	26.4%
ERA 65	50.3%	48.9%	45.4%	47.6%	ERA 65	44.8%	50.6%	49.7%	48.5%
ERA 66	0.0%	0.0%	1.2%	0.6%	ERA 66	0.0%	0.0%	1.3%	0.6%
ERA 67	0.0%	5.3%	12.5%	7.2%	ERA 67	1.5%	2.5%	3.2%	2.6%
Observations	115	75	175	365	Observations	138	122	216	476
		2006					**2006**		
ERA 60	14.2%	10.2%	11.2%	11.9%	ERA 60	20.6%	23.2%	13.5%	17.7%
ERA 65	44.6%	33.1%	30.6%	35.0%	ERA 65	41.3%	33.9%	32.8%	35.5%
ERA 66	1.2%	7.7%	2.9%	3.4%	ERA 66	1.2%	0.0%	0.0%	0.4%
ERA 67	4.2%	18.2%	28.6%	19.6%	ERA 67	4.1%	19.1%	28.2%	19.3%
Observations	82	54	136	272	Observations	110	81	171	362
		2007					**2007**		
ERA 60	6.5%	6.9%	8.4%	7.7%	ERA 60	17.3%	15.5%	9.2%	12.5%
ERA 65	48.5%	25.1%	20.0%	27.5%	ERA 65	43.9%	44.9%	22.3%	32.4%
ERA 66	4.3%	15.1%	0.7%	4.5%	ERA 66	6.4%	1.6%	0.0%	1.9%
ERA 67	5.6%	30.0%	37.0%	28.5%	ERA 67	5.6%	18.4%	39.1%	26.5%
Observations	70	53	130	253	Observations	93	73	161	327
		2008					**2008**		
ERA 60	8.7%	9.1%	10.0%	9.5%	ERA 60	19.3%	13.1%	11.4%	13.7%
ERA 65	48.9%	32.0%	24.2%	30.9%	ERA 65	35.2%	51.2%	28.3%	35.1%
ERA 66	5.1%	13.7%	1.6%	4.7%	ERA 66	8.6%	1.4%	1.4%	3.2%
ERA 67	5.0%	12.2%	28.8%	20.5%	ERA 67	3.4%	13.2%	34.8%	22.2%
Observations	59	47	124	230	Observations	88	69	146	303
		2009					**2009**		
ERA 60	8.1%	6.7%	5.2%	6.1%	ERA 60	14.8%	11.2%	8.9%	10.7%
ERA 65	51.0%	27.7%	26.6%	32.0%	ERA 65	41.8%	34.4%	23.8%	30.3%
ERA 66	3.8%	16.8%	0.0%	4.2%	ERA 66	3.4%	11.2%	0.0%	3.5%
ERA 67	7.0%	13.3%	39.2%	27.1%	ERA 67	2.6%	24.3%	41.2%	28.8%
Observations	55	44	107	206	Observations	64	66	127	257
		All Waves					**All Waves**		
ERA 60	11.8%	11.9%	9.6%	10.7%	ERA 60	21.6%	18.9%	14.0%	17.1%
ERA 65	48.6%	34.6%	30.0%	35.6%	ERA 65	41.8%	43.7%	32.3%	37.4%
ERA 66	2.3%	9.7%	1.3%	3.3%	ERA 66	3.4%	2.4%	0.6%	1.7%
ERA 67	3.6%	15.4%	28.4%	19.5%	ERA 67	3.3%	14.1%	28.0%	18.4%
Observations	381	273	672	1326	Observations	493	411	821	1725

ERAs can be reported only as an integer, we have to make some assumptions on the way the respondents round their answers. Table 3 is based on the assumption that individuals round their SRAs to the lowest integer. Individuals whose SRA is 65+x months, therefore, are classified as "*Retire at 65*", while those whose SRA is 66+x months are classified as "*Retire at 66*". The results are robust to different classification schemes.

The reported ERAs change over time. Table 6 shows how employees modify their answers across adjacent waves. Most of the respondents (about 90%) answer the question in both wave *t-1* and *t*. Only a small fraction of respondents has a missing in two consecutive waves, although this percentage shows an increasing trend over time, particularly after 2007. The percentage of those who stop reporting their ERA is generally compensated by those who start doing so, with the only exception of 2007, where the respondents stopping reporting their ERAs outnumbered the others by almost 2 to 1.

Table 6: *Expected Retirement Ages across adjacent waves: patterns of answers, employees only.*

	Year				
	2006	**2007**	**2008**	**2009**	**Total**
reports a value in *t*-1, missing value in *t*					
Frequency	23	39	22	25	109
Percentage	3.99	7.49	4.43	5.76	5.37
ERA in t-1 > ERA in t					
Frequency	93	96	132	63	384
Percentage	16.15	18.43	26.56	14.52	18.93
ERA in t-1 = ERA in t					
Frequency	234	188	216	214	852
Percentage	40.63	36.08	43.46	49.31	42.01
ERA in t-1 < ERA in t					
Frequency	203	171	88	104	566
Percentage	35.24	32.82	17.71	23.96	27.91
missing value in t-1, reports a value in t					
Frequency	21	20	25	19	85
Percentage	3.65	3.84	5.03	4.38	4.19
missing values in both t-1 and t					
Frequency	2	7	14	9	32
Percentage	0.35	1.34	2.82	2.07	1.58
Total					
	576	521	497	434	2,028

While about 40% of the respondents report the same ERA in two consecutive waves, almost 50% revise their plans. Among those reporting a different ERA in a subsequent wave, more than 50% moved to values in a range of 2 years above or below their initial choice and only about 10% revised their expectations by more than 6 years. Interestingly, while the fraction of those increasing their ERA is higher than that of respondents who revise their ERAs downward, it shows a declining trend over time. It seems that a lot of upward revision took place before 2007. In 2008, after the bill of reform was passed, many more respondents revised their expectations downward. This pattern suggests that *i)* individuals anticipated the reform and that *ii)* they probably expected a much higher increase in the legal retirement age than it was

actually implemented. All in all, these patterns do not suggest random or erratic survey responses and increase our confidence in the data at hand.

A further issue that has attracted considerable attention in previous analyses of subjective retirement expectations is how to interpret *don't know* answers. While pioneer studies such as Bernheim (1989) simply dismiss those giving a *don't know* answer from the sample, subsequent studies found that these answers are still informative, representing rational responses by those who face greater uncertainty over their future behaviour (Disney and Tanner, 1999; Mastrogiacomo, 2004). Furthermore, when analysing the determinant of retirement expectations, Benítez-Silva and Dwyer (2002) find that those not reporting an ERA are structurally different from the other respondents and that the induced selection bias is significant.

In the SAVE survey, non-response rates to the question on expected retirement are quite low: on average, only 6% of the respondents do not answer the question. This rate is much lower than in the UK Retirement Survey or in the Australian HILDA (in both surveys about 30% of women and 20% of men report a *don't know*; Disney and Tanner, 1999; Cobb-Clark and Stillman, 2009) and more in line with missing rates in the Italian SHIW (where they are for both men and women around 5% - Mastrogiacomo, 2004).[19] Reassuringly only less than 2% of the respondents do not answer the question over two adjacent waves (table 6).

Rather than being constant over time, however, missing rates almost double in 2007 and despite a little decline, they remain at similarly higher level in the following years (Figure 3). This pattern could be interpreted as a sign of increased uncertainty, probably generated by the reform of the statutory retirement age in 2007 and by the economic crisis in the years 2008 and 2009.

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[19] It should be reminded, however, that while in the UK and in the Australian survey „*don't know*" is an explicit response option, in SAVE and in the SHIW the respondents can either report a value or skip the question. The different framing might therefore explain the different answering behaviour.
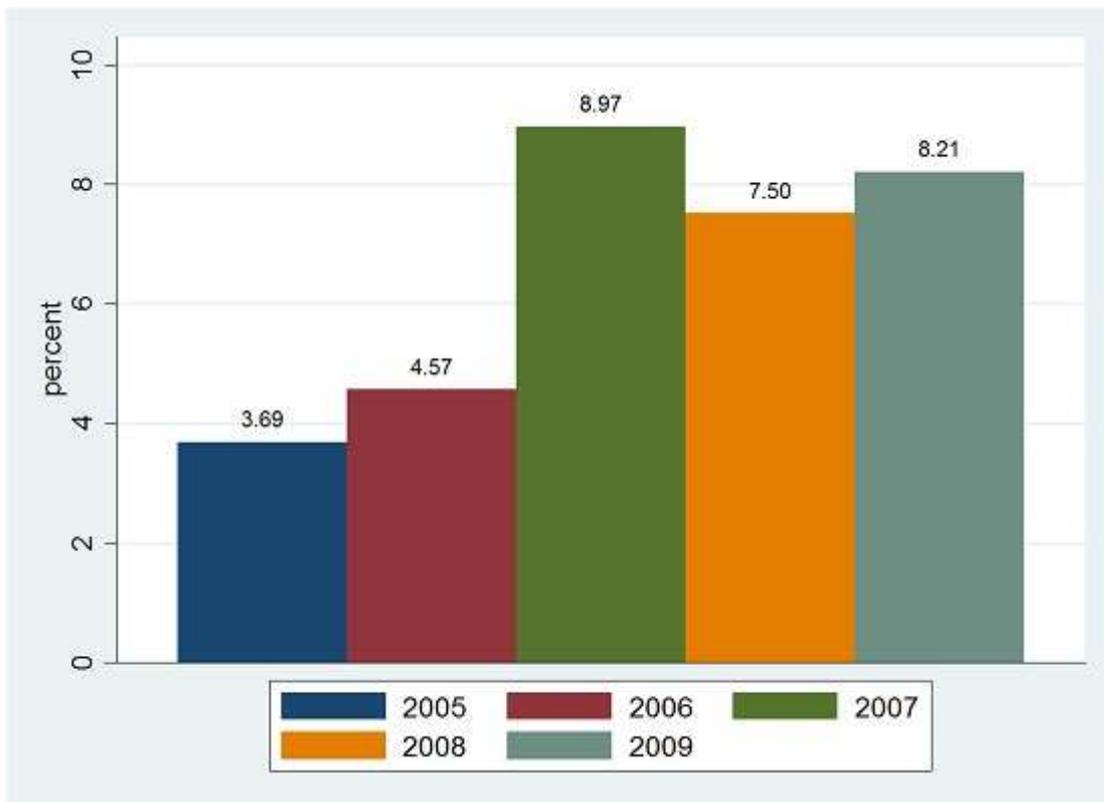
Figure 2: *Non-response rates to the question on Expected Retirement Age*

This increase of the missing rates might represent a source of bias if individuals who keep on reporting their ERAs are systematically different from those not reporting. We will test that later using an Heckman selection model.

4. The increase of the ERA

Scope of this section is to measure explicitly the effect of the reform on the ERA: did the reform 2007 induce any update of the ERA? If yes, by how many years did the ERA increase as an effect of the reform?
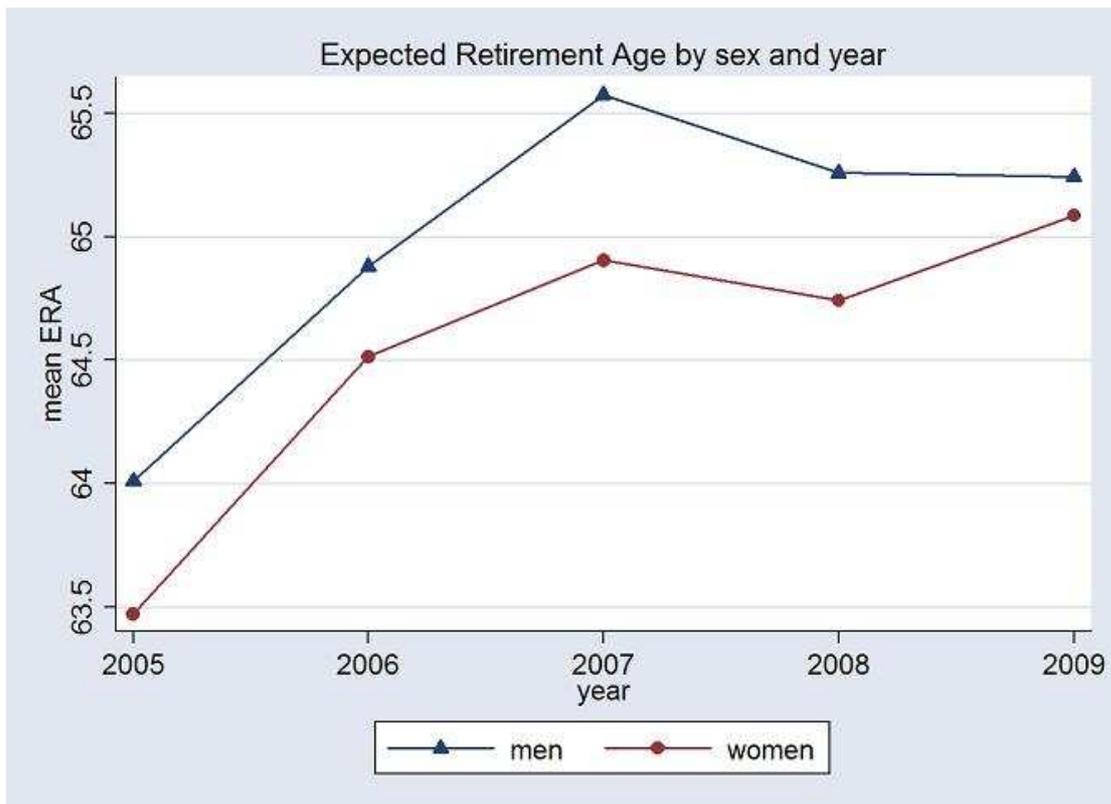
Figure 3: *ERA by gender and year*

Figure 3 shows that on average the ERA increased over time for both genders; for women, however, the increase is even more pronounced so that over time the gap in the retirement expectations between men and women is almost closed by 2009.
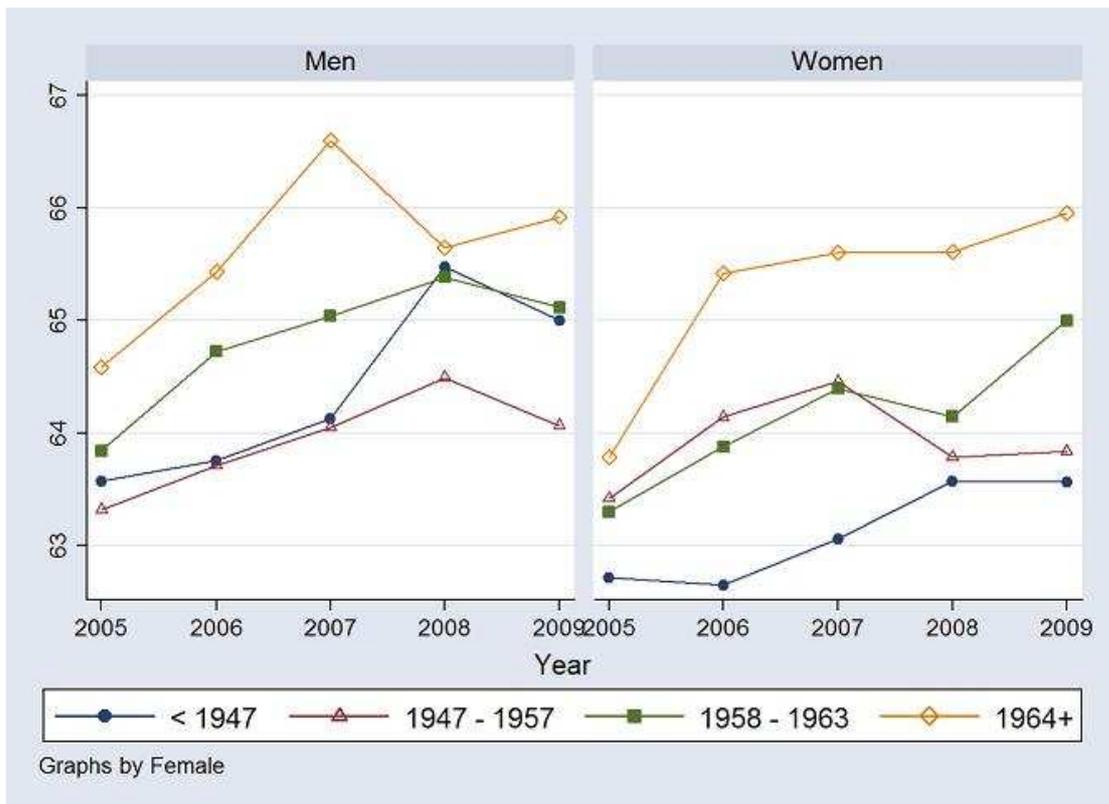
Figure 4: *ERAs over time by gender and birth cohort*

Moreover, we observe that younger cohorts (born 1964 or later) expect to retire on average significantly later than middle-aged (born between 1958 and 1963) or older cohorts and over time the increase in their ERAs is stronger. However, expectations so far have not been adjusted to the full extent, but remain at best roughly one year below the statutory retirement age. The upward trend is furthermore more accentuated for younger cohorts than for older cohorts (Figure 4).

This evidence, however, cannot be causally interpreted, as the trend might be driven by other factors, not related with the reform 2007. For example, individuals may be simply revising their expectations upward because they get older: Benítez-Silva and Dwyer, 2002 for example find that individuals tend to postpone their ERA as they get closer to their retirement age. So, the fact that the individuals in our sample simply get older over time (we have indeed a panel), may drive the upward trend. More generally, it could be that an upward trend in the ERA was already in place (maybe as an effect of previous reform of the pension system, which -as sketched in section 2, abolished some of the most frequently used possibilities to claim early retirement).

To single out the effect of the reform on expectations, we rely therefore on a difference-in-differences (DD) approach. In the following we focus only on the younger cohorts (born 1064 and later) which are fully affected by the reform (that is, they have to retire at 67 years), so that for all the individuals considered in the regressions the SRA shifted by the same amount of years. The basic idea of the DD

estimator is to compare over time the outcomes of individuals who are affected by the reform with the outcomes of individuals who are not affected: the change in the outcome of the untreated group should identify any temporal variation in the outcome that is not due to the policy. Therefore, once we control for all the possible observable characteristics that may determine a difference in the outcome, any remaining difference in the ERA between the two groups is due to the reform. In doing so, we are assuming that any unobservable difference between treated and control group remains constant over the period under analysis (time-invariance assumption). The critical assumption underlying this estimator is that the control group represents the "right" counterfactual for the treated, that is, they should perfectly mirror the evolution in the ERAs of the "treated" in the case the reform had not taken place. It is therefore extremely important to choose the control group very carefully.

The institutional aspects of the reform 2007 offer two possible control groups. As the reform affects only employees born after 1947, a first comparison group could be found in the cohorts of employees born before 1947. Two aspects, however, are cause of concern. First, it could be that ERAs of older individuals, who are closer to their retirement, are more stable over time, while ERAs of younger individuals, with many years to go before retirement and who are facing a much higher degree of uncertainty, might evolve with a different pace. Second, as we are analysing a panel dataset, selectivity of the older individuals might represent a problem. Indeed, we might expect that the sample of older employees becomes from year to year biased toward individuals with a higher preference for working (and therefore with higher ERAs on average) as individuals with a lower taste for working will choose to retire, dropping out of the sample. These two factors question the validity of the time-invariance assumption and therefore the validity of our identification strategy.

Our analysis, therefore, uses a different control group, namely the self-employed. The idea here is to compare the outcomes of employees fully affected by the reform (born after 1964) with those of self-employed belonging to the same cohorts. As the individuals in both groups belong to the same cohorts and are therefore at the same stage of their life-cycle, we get rid of the first problem (i.e. the different time horizon that younger and older cohorts have when reporting their ERA). Furthermore, we have no reason to assume that in one group the panel selectivity should be different as in the other. The two groups have of course different underlying preferences for leisure, but the difference should stay constant over time and any observed difference in the evolution of their ERAs over time should be due to the fact that employees are affected by the reform and self-employed not.

Another choice that has to be made concerns the cut-off point, that is the years that correspond to the „*before*" and „*after*" period. Here we also made 2 different choices:

we consider first the period 2005-2006 as „*before*" and the years 2007-2009 as „*after*" (Table 6, Model 1). Then we run the same regressions using 2005 as „*before*" and 2007-2009 as „*after*" (Table 6, Model 2 and 3). The second specification is more appropriate if the discussion of the reform before the bill was approved prompted individuals to react in anticipation. Indeed, as the analysis in section 4 and Figure 3 and 4 highlight, individuals revised their ERAs a lot already in 2006.

To check for possible biases in the estimates due to panel attrition we include in the regressions selectivity dummies. They take value 1 if the respondent participates in year t and at least once more after year t (t= 2005, …, 2008), otherwise the dummy is equal to zero.[20] If the selectivity dummies are jointly significant, there is an attrition bias problem. It is worth to stress here that the inclusion of the dummies does not explicitly correct for the attrition bias.

Finally, we take care of possible biases in the estimates induced by a non-random distribution of missing answers to the ERA question estimating a two-step Heckman selection model. To do so we need an exclusion restriction, that is we need one or more variables affecting the probability of not answering the question on the ERA without directly affecting the reported ERA. In the analysis we use several indicators taking value 1 if the respondent did not answer the following questions: expectations concerning respondent's income, health and life expectancy; probability of an increase in own income; probability to be unemployed in the next 12 months; ownership of assets for the old-age. The idea behind the choice of these variables is that individuals who are not able to formulate expectations in these areas are facing higher uncertainty and are therefore more likely to be insecure also about their ERA. At the same time, there is no apparent reason to support the fact that not being able (or willing) to answer questions on expectations or asset ownership should affect the ERA if reported.

The choice of the various explanatory variables is mainly driven by the consideration of the factors driving actual retirement behaviour as described in section 3. Besides controlling for the usual socio-demographic characteristics (gender, age, marital status and educational level)[21] we include also: household financial situation; employment status and employment history of the individual; self-assessment of current health status, expectations and satisfaction with the current job.

Table 7 reports the results of the estimations. Reassuringly, the reported ERAs vary with individual covariates in a reasonable manner: expectations appear to be

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[20] In the following regressions, the reference group is therefore made up of all the individuals observed only in the survey 2005 (all the selectivity dummies equal to zero).

[21] In line with several studies focussed on Germany, we use two set of variables to measure educational achievements. The first includes variables measuring the highest secondary school leaving certificate; the second set includes variables measuring post-secondary and tertiary school achievements.

influenced by the same factors affecting actual retirement behaviour (see section 3). So, for example, we find a positive effect of education on the expected retirement age: individuals with the German *Abitur* (the highest secondary school leaving certificate, earned after 13 years of schooling) expect on average to retire 8.5 months later than individuals with the lowest certificate (*Hauptschulabschluss*, earned after 8 years of schooling). Similarly, having a university degree shifts the ERA by almost one year. Individuals with past unemployment spells also expect to retire later: the longer are the spells, the later the ERA. This is a reasonable result: as the increase in the SRA practically trims future pension benefits, individuals with a less continuous employment history have to work longer to compensate for the reduction in their future pensions. This result speaks therefore in favour of the effectiveness of the reform in changing individual expectations. The ownership of real estates or of assets which are specific for the old-age (such as occupational pension plans or private old-age provisions) seems to have a negative effect on ERA, although none of the coefficient is significant at conventional levels. Similarly, individuals living in households with a higher net monthly income appear to have lower ERAs. Finally, we find that women expect to retire earlier than men, the difference being almost one year. The fact that relatively young women are still planning to enter retirement earlier than men might be cause of concern. Women tend to have less continuous employment histories and are more often employed only part-time, so that they tend to accrue lower pension benefits. Furthermore, as women have on average a higher life expectancy, an early entry into retirement means that, unless they provide more privately for their old-age, they will have to live for longer time on a meagre pension.

The coefficient of interest is that on the interaction term between the dummy for the period "after" the reform and the dummy identifying the treatment group.

The regression confirms the fact that much of the adjustment in the ERAs happened already in 2006: indeed, when we use 2007 (Model 1) as cut-off point to define our before/after time span, we find no significant difference between the treatment and control groups in the period after the reform. On the contrary, when 2006 is selected as threshold, the interaction term becomes significant.

We find that, on average, individuals belonging to the cohorts that are fully affected by the reform increased their ERAs over time more than individuals in the control group. In the period after the reform the average increase in the ERAs of employees born after 1964 over that of self-employed belonging to the same birth cohorts, the average increase is about 1 year and almost 9 months. The null hypothesis that the coefficient on the interaction terms is equal to 2 (that is, the number of years by which the expectations of the individuals fully affected by the reform should be increased if these individuals fully incorporated the new SRA in their expectations) cannot be

rejected by a Wald test.

The selectivity indicators are jointly significant (χ^2= 21.63; p-value= 0.0002). However, as we do not have year dummies in the model but only a *before/after* indicator, the selectivity dummies might be capturing some time trends. Indeed, if we add the time dummies (Model 3) the selectivity indicators are not significant anymore (χ^2= 7.18; p-value= 0.1266). At least among the youngest respondent, attrition does not seem to be a major problem.

There is mild evidence of selectivity due to missing answer to the ERA question: the null hypothesis that no correlation exists between the selection equation and the equation of interest can be rejected at 10% confidence level. The predictions indicate that missing answers are associated with individuals with lower ERAs. In fact, while a simple OLS model (Table7, Model 4) predicts an ERA of 63.2 year for the reference group, the predictions of the Heckman model return an average ERA of 62.5 years (Table 7. Model 2). Also the estimated effect of the reform is smaller once we correct for selectivity, although the magnitude of the reduction is quite small.

Table 7: *Determinants of the ERAs, with and without correction for sample selection*

Variable	Heckman			OLS
	Model 1	Model 2	Model 3	Model 4
	Cut-off = 2007	Cut-off = 2006	Cut-off = 2006	Cut-off = 2006
age	-0.042**	-0.043**	-0.043**	-0.039*
Post Reform	0.754	0.536	0.533	0.465
Employee	-0.410	-1.417	-1.417	-1.483
Employee*Post Reform	0.513	1.741**	1.739**	1.771**
Female	-0.844**	-0.874**	-0.884**	-0.927**
partner	-0.364	-0.426	-0.445	-0.435
Female*partner	0.361	0.392	0.414	0.441
East Germany	-0.375	-0.361	-0.348	-0.370
Mittlere Reife	0.511*	0.546*	0.548*	0.498
(Fach-)Abitur	0.777**	0.716*	0.706*	0.651
Vocational training	0.777**	0.779**	0.776**	0.711**
University degree	0.954**	0.963**	0.973**	0.943**
Currently unemployed	0.328	0.371	0.390	0.338
Past unemployment (< 6 months)	0.666***	0.637**	0.628**	0.607**
Past unemployment (6 months to 2 years)	0.719**	0.667**	0.654**	0.684**
Past unemployment (more than 2 years)	0.757**	0.671**	0.649**	0.649**
Financial wealth (/1000)	0.003	0.004	0.004	0.003
Financial wealth squared	0.000	0.000	0.000	0.000
Occupational pension? J/N	0.050	0.023	0.019	0.025

Private old-age provision? Y/N	0.000	-0.060	-0.054	-0.063
Real Estates? Y/N	-0.167	-0.105	-0.103	-0.142
Household net monthly income (/100)	-0.026	-0.024	-0.023	-0.032
Household income squared	0.000	0.000	0.000	0.000
Self-rated health: fair to bad	-0.105	-0.161	-0.171	-0.104
Inheritance expected	-0.062	-0.066	-0.064	-0.086
Worsening of health condition expected	-0.122	-0.093	-0.082	0.015
Improving income expected	-0.037	-0.047	-0.042	-0.078
Unemployment expected	-0.015	0.009	0.005	0.057
Subjective life expectancy (years)	0.056***	0.055***	0.055***	0.050***
Expected replacement rate state pension	-0.015*	-0.014*	-0.014*	-0.014*
Expected replacement rate: dont'know	-0.760	-0.690	-0.686	-0.702
Unsatisfied with current job	-0.251	-0.220	-0.225	-0.158
s05	-0.363	0.444	0.445	0.408
s06	0.575**	-0.694***	-0.987**	-0.777***
s07	0.284	0.231	0.853	0.256
s08	-0.415**	-0.473***	-0.624	-0.466***
Year 2006			0.298	
Year 2007			-0.619	
Year 2008			0.156	
Year 2009			(omitted)	
Constant	62.324***	62.494***	62.462***	63.201***
Joint significance selectivity indicators				
Chi-2	18.26	21.63	7.18	5.81
p-value	0.0011	0.0002	0.1266	0.0001
Test of independent equations (rho = 0)				
p-value	0.1191	0.0623	0.0591	-

*Legend: * p<.15; ** p<.1; *** p<.05*
Note: Reference group: Self-Employed, Male, West Germany, Hauptschule, No vocational training, employed, no past unemployment spells, good to very good self-rated health.

It has to be noted that the average ERA is still well below the SRA. Using the coefficient of Model 2, the average ERA after the reform is 62.8 years for employees with the lowest secondary school degree and no further qualification. Even for the better educated (those with an *Abitur* and a university degree) the average ERA after the reform is 64.5 years, about 2,5 years less than the SRA. However, the results of our estimates show that the ERAs of those individuals are about 2 years higher than it would have been under the old institutional settings.

5. The role of information

Here we want to look if individuals who are better informed about the pension system (how does it work and how much does it cost) have also different ERAs or a different adjustment pattern.

We use two special questions asked in the questionnaire 2009. We cannot capture any causality between information about the pension system and adjustment in the ERA, as we do not know which was the level of knowledge before the reform 2007 and it could be the case that individuals' knowledge about the pension system improved as an effect of the reform, if for example due to the great debate in the media about the increase in the SRA individuals became more interested or mindful about the public pension system. However we can observe if there is a correlation between information and retirement plans.

The questions used in SAVE 2009 have been already asked in another survey (see Boeri et al., 2001 for further details) carried out in spring 2000 in Germany and in other three European countries. A that time in Germany 21% of the employees did not answer the question on the contribution rate, while of those who answered, 45% reported a too low contribution rate (between 0 and 16% of gross income), 42% gave a correct answer (the true contribution rate at that time was 19.3%; the authors considered correct all the answers in a range between 16% and 25%) and 13% expect the rate to be too high (more than 25%) (see Boeri et al., 2001, Table 5). In the same survey it turns out that only 40.5% of the respondents know how the PAYG system work, while the remaining 59.5% thinks that at least a part of their contributions goes into a fund to pay their own future pensions (see Boeri et al. 2002, Table 2).

In our sample we have that almost 6% of the employees did not answer the question about the functioning of the PAYG system. Of those who answer, 47% got it right: it astonishes that after so many reforms of the pension system, and so many public discussions, still the majority of the employees does not know how the system works.

Concerning the question about the costs of the pension system, 57% of the employees reported a number; 31.5% chose the option "don't know" while 11.5% completely skipped the question. Of those employees who answered, 47% got it correct (the true contribution rate at that time was 19.9%; we considered correct all the answers in a range between 18% and 22%) and 14% underestimated it but only a little bit (range between 15% and 18%). Still 30% of the respondents gave an answer between 0 and 15% (Table 8). The average estimated contribution is 17.8%, 2 percentage point below the true contribution rate, but still more than 1 percentage point above the estimate obtained in 2000, when the respondents underestimated the true contribution rate by 3 percentage points (Boeri et al. 2001).

Table 8: *Cost of the pension system: distribution of the answer on the contribution rate*

Contribution rate	Percentage of answers
[0 - 15%)	30.04%
[15% - 18%)	14.41%
[18% - 22%]	46.59%
(22% - ∞	8.96%

Older individuals are better informed about the pension system than younger individuals: the percentage of correct answers to both questions increases with age as well as with educational attainments (especially post-secondary and tertiary education).

Although a simple univariate analysis does not reveal a strong relation between the ERA and the degree of information about the pension system,[22] we still find evidence that a conspicuous lack of knowledge is correlated with lower reported retirement ages. When looking at the question on the functioning of the PAYG, we find the lowest ERAs among those who did not answer the question and among those who got it completely wrong (thinking that the contributions are completely used to finance their own pensions). Similarly, respondents who think the contribution rate is between 0 and 15% have also lower ERAs on average.[23]

Next we show the results of a multivariate analysis. We correct for selection due to missing answers to the ERA question using a two-step Heckman procedure as we did in the previous section. Here we include all the employees (not only those born after 1964) and we control for the degree of affectedness by the reform. As the two knowledge questions have been asked only in 2009, we restrict our analysis only on those respondents who remained in the panel until 2009. To be parsimonious, rather than using different indicators for past unemployment spells of different length, we simply use a dummy variable equal to 1 if the respondent has no unemployment spells. Model 1 in table 9 represents our baseline regression. In Model 2 we add a dummy equal to 1 if the respondent in 2009 gave the correct answer to the question on the functioning of the PAYG system and a dummy equal to 1 if the respondent did not answer the question. In model 3 we add three dummies for respondents who answered the question on the contribution rate within different ranges and an additional dummy for those who skipped the question. In model 4, finally, we put all

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[22] This lack of a strong relationship is probably due to the fact that several factors are mixed together and cannot be disentangled with a simple bivariate analysis: so for example we have that older individuals knows better the pension system, but have also lower ERAs.

[23] Results available upon request

the indicators together.[24]

Table 9: *Effect of knowledge of the pension system on ERA*

Variable	Model 1	Model 2	Model 3	Model 4
Year 2006	0.8852***	0.7880***	0.7970***	0.7909***
Year 2007	1.3604***	1.3216***	1.3432***	1.3325***
Year 2008	1.1694***	0.9417***	0.9641***	0.9513***
Year 2009	1.3593***	1.2515***	1.2800***	1.2665***
New SRA: 65 + x	0.5408**	0.7493**	0.7072**	0.7511**
New SRA: 66 + x	0.9941***	1.2686***	1.2790***	1.2861***
New SRA: 67	1.7088***	2.0576***	2.0487***	2.0818***
Female	-0.5773*	-0.5686	-0.6306	-0.545
partner	0.2154	0.1072	0.098	0.0959
Female*partner	-0.1509	-0.1016	-0.0094	-0.0984
East Germany	-0.1787	-0.2728	-0.2089	-0.2231
Mittlere Reife	0.0949	0.3286	0.3174	0.2974
(Fach-)Abitur	0.3961	0.2943	0.272	0.2718
Vocational training	0.3103	0.3638	0.3288	0.3466
University degree	1.0202***	1.3903***	1.3329***	1.3470***
Currently unemployed	0.1179	0.2433	0.2234	0.2434
No unemployment spells	-0.2978*	-0.3174	-0.2854	-0.2968
Financial wealth (/1000)	-0.0037	-0.0042	-0.0048	-0.0048
Financial wealth squared	0	0	0	0
Occupational pension? J/N	-0.0813	-0.1508	-0.1557	-0.1752
Private old-age provision? J/N	0.0048	-0.0563	-0.0691	-0.0576
Real Estates? J/N	-0.104	-0.1911	-0.2118	-0.2096
Household net monthly income (/100)	-0.0211***	-0.0197**	-0.0189*	-0.0203**
Household income squared	0	0.0000*	0.0000*	0.0001*
Self-rated health: fair to bad	-0.2910*	-0.1654	-0.1915	-0.1685
Inheritance expected	-0.0286	0.1824	0.1291	0.1657
Worsening of health condition expected	-0.2282	0.105	0.1425	0.1085
Improving income expected	-0.0483	-0.0486	-0.0903	-0.0604
Unemployment expected	-0.0123	0.1284	0.1245	0.1091
Subjective life expectancy (years)	0.0596***	0.0568***	0.0549***	0.0566***
Expected replacement rate state pension	-0.0112*	-0.0076	-0.0084	-0.0081
Expected replacement rate: dont'know	-0.4488	-0.0452	-0.0596	-0.0249

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[24] Even if the questions have been asked only in one year, we make use of all the waves available. The dummy has to be interpreted therefore as a control for individuals that in 2009 gave a certain answer.

Unsatisfied with current job	-0.1734	-0.1417	-0.1326	-0.1419
Functioning of PAYG: right		0.3114		0.2934
Functioning of PAYG: missing		-1.0436**		-0.9640*
contribution rate: 0 - 15%			-0.4654*	-0.4484*
contribution rate: 15 - 18%			-0.1128	-0.0311
contribution rate: > 22%			-0.0005	-0.0137
contribution rate: don't know			-0.5380**	-0.4204
Constant	59.0105***	58.4512***	59.0731***	58.7631***

We find that even after controlling for the educational attainments of the respondents a conspicuous degree of disinformation on the functioning and on the costs of the pension system is significantly related with a lower expected retirement age. More specifically, the ERA is about one year lower for respondents who do not answer the question on the functioning of the PAYG system. Reporting a very low contribution rate (in the range between 0 and 15%) reduces the ERA by another 5 months so that altogether those respondents who in 2009 do not know how the pension system works and who strongly underestimate the costs of the system plan to retire about 1,5 years earlier than better informed individuals.

6. Summary and conclusions

This paper contributes to the literature that examines individuals' retirement decisions and the effect that policy changes have on them. More specifically, we wanted to quantify the effect of an increase in the legal retirement on individuals' expected retirement age. We considered the legislative reform introduced in Germany in 2007, whose institutional settings offer a nice quasi-experimental context to properly single out the effect of the policy on expectations. Furthermore we take into account possible biases induced by panel attrition and non-response to the question on expected retirement age. Finally we completed the analysis by examining the role of information about the functioning of the pension system on the ERA.

After providing extensive evidence that the answers given by the individuals convey useful information, we find that the reform succeeded in shifting the retirement expectations of the younger cohorts. Using a difference-in-differences estimator, we find that on average the ERAs of individuals born after 1963 increased in the period after the implementation of the reform by about 2 years. Although the average ERA of those individuals is still below the SRA, the shift in the expectations means that these workers are going to enter retirement later than they would have done without the

increase in the SRA. Beside that, we find that less educated individuals with a relatively continuous employment history and living in wealthier households have on average lower ERAs. This result can be positively interpreted, as those who are planning an earlier retirement seem to have the financial means to afford it.

It is widely discussed if an increase in the legal retirement age really represents a relief for the welfare state and which are its redistributional effects. As pointed out in Hanel (2010), if the postponement of the benefit claiming does not coincide with longer employment, and those who do not extend their employment have to rely on social transfers (like unemployment benefits), the gains for the welfare state may be quite small, while the income situation of those individuals may dangerously deteriorate. This paper cannot address this point directly. A future extension of our work will examine how a change in expectations affects actual households' saving behaviour, to see if individuals with limited employment opportunities but longer expectations concerning benefit claiming are also saving more for their old-age.

Finally, we find that the information of the pension system is a significant determinant of retirement expectations: not knowing how the PAYG system works, or how much does it costs is negatively correlated with individuals' ERA. Although we cannot capture any causal effect between the two variables, the fact that a correlation exists even after individuals' education is taken into account highlights the relevance of spreading specific information of the pension system in times of reforms.

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