The effects of pension rights and retirement age on training participation: Evidence from a natural experiment

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Abstract

This paper uses a natural experiment approach to identify the effects of an exogenous change in future pension benefits on workers' training participation. We use unique matched survey and administrative data for male employees in the public sector in the Netherlands who were subject to a major pension reform in 2006. We compare training participation of workers who were born in 1949 and remain entitled to generous pension rights under the old system to those who were born in 1950 and are subject to a new less generous system. We find that the exogenous shock in pension rights postpones expected retirement and has a small but positive effect on training participation of older workers.

Keywords: retirement, training, natural experiment,
JEL codes: J14, J24, J26

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1 Introduction

This study focuses on the impact of the abolishment of generous early retirement systems on training participation. Human capital theory predicts that early retirement systems have a negative effect on human capital formation. It is argued that the present value of net returns to human capital investments of older workers are lower due to the shorter period in which they can reap the benefits of their investments (see: Becker, 1975; Ben-Porath, 1967; Echevarría; 2003).[1] Lau and Poutvara (2001) integrated human capital investments and retirement decisions in a life-cycle model and showed that generous social security systems induce early retirement and therefore have an indirect negative effect on human capital investments. Their results suggest that introducing actuarial adjustments and a link between individual social security contributions and benefits postpones retirement and stimulates human capital investment.

In economic literature, the relationship between early retirement and training investments has hardly been empirically studied. One exception is the study of Fouarge and Schils (2007) who found a positive relationship between training and the age of retirement. However, the latter study is not able to establish the direction of causality between training investments and retirement expectations. A few other empirical studies have focused on related questions. Several studies analyzed the effects of shocks in life expectancy on human capital investments (Kalemli-Ozcan et al., 2000; Jayachandran and Lleras-Muney; 2007). These studies found that a drop in mortality rates, which increases the potential period in which investment benefits can be reaped, induced investments in human capital. Other studies have focused on pensions and training, and found that workers who participate in training are more likely to have pension coverage (Johnson, 1996; Dorsey and Macpherson, 1997). Because pension coverage induces early retirement

[1] Other explanations emphasize the role of skills obsolescence, learning ability of older workers and the efficiency of training over the life cycle (e.g. Becker, 1975; Heckman, 2000; De Grip en Van Loo, 2002; Behaghel and Greenan, 2007).

(see the studies of Stock and Wise, 1990; Samwick, 1998; Bingley and Lanot; 2002; Chan and Stevens, 2004), training participation may have an indirect effect on the retirement age. The results of the latter studies implicate that causality in the relationship between expected retirement and training participation may run in two directions.

In this paper we exploit a natural experiment in the Dutch public sector to examine the causal relation of an exogenous increase in the expected retirement age on training participation. The Dutch public sector was subject to a major pension reform that became effective on January 1, 2006. The reform consisted of the abolishment of the pre-pension schemes for everyone born after December 31, 1949. Workers born before 1950 and who worked in the public sector continuously since April 1, 1997 remained entitled to the more generous old pre-pension rights which means that they can retire at the age of 62 year and 3 months at a replacement rate of 70 percent. Employees born after 1949, however, are subject to a new less generous pension system which effectively lowered pension wealth.

We use unique matched survey and administrative pension fund data of male employees in the public sector who were born in these two years. The data are gathered one year after the introduction of the new pension system. The data incorporate detailed information on older employees' individual pension rights, expected sources of income after retirement and training participation. We compare training participation of workers who were born just before the threshold and remain entitled to their old generous pension rights with those who are just born after the break and are subject to the new pension system. The limited age difference between the treatment and control group in our sample and the simple and transparent age criterium determining the entitlement to the old or new pension rights guaranties the internal validity of the experiment.

The results indicate that the postponement of retirement due to the shock in pension rights has a positive impact on the training participation of older men. The effect is only visible for training investments involving more time. However, the effect is rather small,

which implies that workers probably have more restrictions to further investments in their human capital than the restricted time period in which they can benefit from these training investments. The results remain robust when reducing our sample to workers who were born more closely around January 1, 1950 and adding various control variables.

The paper is organized as follows. In the next section we discuss the exogenous shock in the public sectors' pension system in the Netherlands. In Section 3 we present our estimation strategy. The data and the final sample selection are described in Section 4. Results are presented in Section 5 and Section 6 concludes.

2 Reform of the public sectors' pension system in the Netherlands

A. The Dutch pension system

The Dutch pension system consists of three pillars: 1) At the age of 65, all Dutch inhabitants are entitled to a state old age pension financed by contributions that are levied as part of the income tax, 2) In general, employees are entitled to a supplementary sectoral pension of the defined benefit type and 3) To some extent, individuals can voluntarily build up savings typically taken as annuities through an insurance company. Early retirement before the commencement date of the state pension is made possible through the existence of early retirement schemes. Early retirement schemes are negotiated between unions and employer organizations at the sectoral or firm level and are officially laid down in collective agreements. The pension schemes are the shared responsibility of the social partners and the administration of the early retirement schemes is delegated to pension funds. In general, for individual workers participation in sectoral pension and early retirement schemes is mandatory. Both employers and employees contribute to the

pension fund. Until 2006 early retirement schemes were facilitated by the government through a preferential tax treatment which due to the progressive tax system gave high tax advantages (Euwals et al., 2006).

B. Changes in the pension system for public workers

In 2006, a reform in the Dutch pension system took place which provides the basis of our natural experiment. In line with its policy to stimulate labor force participation of older workers, the government abolished the favorable tax treatment of early retirement schemes for all workers born after 1949. Since 2000, these workers are no longer allowed to deduct pension contributions from their gross wage. The abolishment of the tax treatment was not limited to the public sector but did also apply to workers in other sectors.

As in the other sectors, anticipation on the change in tax rules formed the input for collective bargaining on the introduction of a new pension scheme for the public sector in Summer 2005. The new scheme (ABP flexible pension scheme) was launched at January 1, 2006 by the pension fund of the public sector (ABP). Workers born before 1950 and who worked continuously since April 1, 1997 in the public sector remain entitled to the generous old pre-pension rights which means that they can retire at the age of 62 years and 3 months at a replacement rate of 70 percent. However, employees born after 1949 and workers born before 1950 who did not work continuously in the public sector in the last 10 years are subject to the new and less generous system. The new flexible pension system is characterized by a drop in pension wealth, an increase in the pension contribution payments to partly account for this drop in pension wealth and stronger incentives to continue working generated by penalties on pension income when retiring before the commencement date of the state pension and supplements when retiring later.[2]

[2]Moreover, workers can decide to work until their 70th birthday and can either retire fully or partially. Because participation in the pension system of the public sector is mandatory, workers born after 1949 were not able not evade the new pension scheme.

For younger workers, the increase in pension contributions partly repairs the decrease in pension wealth over time.[3] Opposed to young workers, public workers born just after 1949 do not have enough time to repair this drop in pension wealth. Therefore, as a consequence of both the abolishment of the tax rules and the steeper early retirement scheme, workers born just after 1949 have been confronted with a substantial decrease in pension wealth and will have to retire at a higher age to reach a replacement rate of 70%.[4] An average worker in the public sector who was born in 1950 will have a replacement rate of 64% when he or she is 62 years and 3 months old and has to postpone retirement until the age of 63 years and 4 months in order to reach a replacement rate of 70%, while workers born before 1950 are already eligible for this replacement rate at the age of 62 years and 3 months.[5]

C. Familiarity with exogenous shock in pension wealth

For the identification of our natural experiment, public sector workers have to be familiar with the consequences of the new pension system for their individual situation. To make the introduction of the new pension system known to their customers, ABP launched a campaign in the second half of 2005 to explain the implications of the new system. A special newspaper was devoted to the new pension system in which unions, employer organizations and ABP jointly explained the new flexible pension scheme. All 1.2 million ABP participants received a letter on the core elements of the new scheme and a complete electronic service pack for public service employers had been developed. Therefore, at 1 January 2006 most public sector workers born after 1949 and their employers were familiar with the exogenous shock in their pension rights. As a consequence employees could react

[3]However, because the new pension system is actuarial fair, workers born after 1949 are stimulated to postpone retirement.

[4]Traditionally, workers retire in the Netherlands when achieving a replacement rate of minimal 70%.

[5] Nevertheless, there is a small minority of older workers born after 1950 who can still retire early without experiencing a substantial drop in income. It concerns workers with burdensome jobs (fireman, ambulance and police personnel) who are eligible for special arrangements which allow early retirement against a replacement rate of at least 70% between the age of 55 and 61.

by changing their retirement date expectations, increasing investments in their human capital or changing their individual private (pension) savings.

3 Empirical strategy

For identifying the causal effect of the abolishment of early retirement schemes on human capital investments, we make use of a natural experiment. A known discontinuity in the treatment assignment is used to identify the treatment effect. In our application, assignment to the treatment in pension rights depends in a deterministic way on the birth date of public worker i (b_i) with a known discontinuity at the birth date of 1 January 1950 ($\bar{b}$). The assignment rule to the pension reform treatment has the following form

$$d_i = \begin{cases} 1 & \text{if } b_i \geq \bar{b} = 1 \text{ January 1950,} \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

where d_i is the assignment indicator. The probability of receiving training can be stated as

$$E(t_i) = F(\alpha + \beta d_i), \tag{2}$$

where $\alpha = E(t_{0i})$ is the training probability without an exogenous change in pension rights and $\beta = E(t_{1i}) - E(t_{0i})$ is the difference in training probability caused by the treatment effect.

There is no indication that persons close to $\bar{b}$ are subject to discontinuities other than the difference in pension rights. Therefore, comparing the training investment behavior

of workers who were born in 1949 and remain entitled to their old generous pension rights with those who were born in 1950 and are subject to the new pension system will give unbiased estimates of the treatment effect (see Hahn et al., 2001) for a discussion of regularity conditions at the threshold for selection):

$$\beta = t^+ - t^-, \tag{3}$$

where $t^+ = lim_{b \downarrow \bar{b}} E(t|b)$ and $t^- = lim_{b \uparrow \bar{b}} E(t|b)$. We estimate the treatment effect with regression models of the form

$$T_i = \alpha + \beta ER_i + \eta P_i + \theta Y_i + \tau M_i + \epsilon_i \tag{4}$$

where T_i indicates training participation of worker i and D_i is the treatment dummy variable which is 0 if workers were born in 1949 or 1 if workers were born in 1950.

We control for the number of years in which workers have built up their pension P_i. Y_i is the yearly wage income, M_i stands for marital status and ϵ_i is a random error. We also include additional control variables (X_i). Among others, we controlled for 11 alternative potential pension income sources, employees' discount rates, education attainment and the sub-sector of the employees. Because workers could anticipate for 5 months on the change in the pension system, it is also necessary to account for the possibility that workers restored part of their pension wealth by increasing their personal pension savings. Therefore, we include an indicator for extra pension savings. Furthermore, we analyze both the full sample and sub-samples of workers born within the range of 6 and 9 months around 1 January 1950.

4 Data

A. Matched survey and administrative data and comparison groups

We use detailed matched survey data and administrative data for male employees in the public sector which have been collected in two stages one year after the introduction of the new pension system.[6] In the first stage, all 27,871 male public workers who were born in 1949 or 1950 have been sent a request to participate in the study and to give their email address. In the second stage, the workers who gave permission, have been sent an email with the link to the survey in March, 2007. In the survey, detailed questions were asked on the expected retirement age, training participation and expected sources of income after retirement other than the pension benefits provided by the public sectors' pension fund. In total, 8,526 individuals started with answering the questionnaire of which 7,739 completed it successfully.[7]

The survey data has been matched to administrative data of the pension fund of the government sector (ABP) which provides information on individual pension rights built up at the ABP, annual wage income, tenure in the public sector, size of the organization employed in, and the number of working hours.

We restricted the analysis to employees who have worked for at least 10 years continuously in the public sector because workers born before 1950 who did not work continuously in the public sector during the last 10 years are also subject to the new pension system. This restriction is made to avoid complications concerning unobserved characteristics of workers which simultaneously may affect training participation and the eligibility

[6]The focus on male employees follows from the fact that in general male workers with the age of 56 or 57 are the main wage earner in the Netherlands while female workers have disrupted careers. Moreover, only a small selective group females of these birth cohorts is still working.

[7]The likelihood of selectivity bias due to questioning through internet is negligible because at least 91% of the public workers aged 55 years or older has an internet connection at home (TNS nipo, 2006). Moreover, a large number of respondents filled in the questionnaire at work.

for pension rights.[8] Moreover, we excluded workers who are employed in some specific occupations such as military, fireman or ambulance nurse, because these employees are entitled to other early retirement arrangements which also partly changed since January 1, 2006 and therefore might disturb the treatment effect of the introduction of the new pension system. The final sample consists of 7,019 men of which the 3,692 men who were born in 1950 form the treatment group and the 3,327 men who were born in 1949 belong to the control group.

B. Descriptives

For the validity of the natural experiment, it is essential that the individuals in the treatment and control group do not have different characteristics except the deviation in pension rights. Descriptive statistics for the whole sample, the treatment group and control group are presented in Table 1. It becomes clear that the differences between the treatment and the control group are indeed extremely small. There is no difference in the organization size, the individual discount rate, marital status or the income of the partner between the two groups. Moreover, the individuals in both groups have similar levels of education and are equally distributed over sub sectors and birth months. The number of years individuals build up pension rights at the public sectors' pension fund and the yearly wage income are slightly higher for the control group. However, this reflects the limited age difference between the control and the treatment group. The table also shows that approximately 23% of all workers in our sample increased their pension savings since 2006. As can be expected, the additional savings level is slightly higher for the treatment group.

Insert Table 1 about here

[8]This group of workers is too small to serve as an additional control group.

C. Exploratory analysis

Table 2 provides an exploratory analysis of the changes in retirement expectations and the treatment effect. The table shows that on average workers born in 1949 expect to retire at the age of 62 years and 6 months while workers born in 1950 anticipate to retire when they are 63 year and 4 months old. Moreover, the expected replacement rate at the age of 62 years is 72.0% for the control group and 66.2% for the treatment group.

Insert Table 2 about here

Figure 1 and 2 present a scatter plot of the differences in the mean expected retirement age and mean expected pension benefits per birth month and show that these deviations between the treatment and control group emerge precisely around the threshold of January 1, 1950 (i.e. month 13). Therefore, it seems reasonable to conclude that workers are indeed familiar with the consequences of the new pension system for their individual situation. Moreover, the sample averages in Table 1 indicate that workers appear to have reasonably accurate retirement expectations, although workers in the treatment group more often indicate that they do not have a good overview of their pension rights. It is striking that the mean expected retirement age in the treatment group is 63 years and 4 months which corresponds closely to a replacement rate of 70% for an average public sector employee. On average, workers in the control group expect to retire only 2 months after they become eligible for the early retirement benefit based on the pre-pension system to which they are still entitled. For both the control group and the treatment group, the expected retirement benefit at the age of 62 years is only 2%-points above the benefit which they on average would actually get.

Insert Figure 1 and Figure 2 about here

The variable of interest in our analysis is employees' training participation. The train-

ing participation indicator measures whether workers participated in a training course which was useful for their present job in 2006. Table 1 shows that training incidence is about 3 percent higher in the treatment group. This indicates that the exogenous shock in pension rights may have affected human capital investments. However, compared to the high training incidence in the treatment group as well as the control group, this difference is rather limited.

The high level of training participation reflects that many individuals followed relatively small courses. About 50% of the whole sample participated in a course which lasted shorter than an average workweek of 40 hours. A potential weakness of our training indicator is that positive effects of a short training course on productivity are more likely to wear out in a short time period and that the opportunity cost are low. Therefore, participation in short courses may not yet have been affected by the expected time to retirement.

5 Estimation results

A. Expected time to retirement and training participation without accounting for reversed causality

In this section, we first estimate the effect of the expected time to retirement on training participation in 2006 without using the treatment dummy variable as an instrument. The expected time to retirement is calculated by subtracting the age of the individual in 2006 from the expected retirement age. Table 3 reports the estimation results.

Insert Table 3 about here

Column 1 gives LPM estimates without adding controls. Columns 2 and 3 present LPM estimates and and marginal effects based on a probit estimation including controls.

Additional included control variables are education and sub sector fixed effects, dummy variables indicating the presence of 11 other potential income sources when retired, extra pension savings since 2006 and the size of the organization where the workers are employed. The individual discount rate is based on two questions which measure the extra amount of money individuals wish to receive if payment of price winnings is delayed with one year.[9]

Consistent with human capital theory, we find a significant positive relationship between the expected time to retirement and training participation. This suggests that restrictions on the time period in which employees continue to work have a negative effect on human capital investments. However, the effect is quite small (1.4%). Nevertheless, the size of the impact of the expected time to retirement remains constant in the different specifications. Columns 4 and 5 show that these results remain robust when reducing our sample to workers born within a more restricted range of 6 and 9 months around the treatment threshold. The size of the coefficient of the treatment effect does not change when restricting the sample to workers born more closely around the threshold. Although the standard errors are slightly larger, the coefficient of expected time to retirement remains significantly different from zero.

Concerning the other variables, we find that additional pension savings in 2006 have no significant effect on training participation. Also, the number of years in which pension contributions have been paid and the annual wage income have no significant effect on training participation. Oppositely, workers who are married or have lower discount rates participate more often in training.

B. Treatment effect on training participation

The analysis so far did not exploit the exogenous policy shock. As a consequence, the

[9]Borghans and Golsteyn (2006) show that proxies for discount rates based on these questions resemble discount rates based on more extensive methods quite closely.

previous results are subject to potential causality problems. The question is whether anticipation on early retirement affects training or that training investments induces later retirement. It can be expected that workers in the treatment group have large incentives to invest in their human capital. Several studies have found sizable private returns to training. Bassanini et al. (2005) found, using the European Community Household Panel, that the private return to training on the log hourly wage is approximately 3.7% in the Netherlands.[10] This means that an average worker will have a yearly return of 1,665 euro. The extra return to employees born in 1950 compared to the non-treated group due to the expected postponement of their retirement is approximately 1,388 euro. In total, the return to training for workers born in 1950 until retirement will be equal to about 12,300 euro while workers who are born in 1949 have a return of 9,300.

This section discusses estimates of the treatment dummy variable on training participation as described in equation 4. Table 4 reports the estimates for the complete sample and the sub samples of those born within a smaller range around January 1st, 1950. Considering the estimates for the complete sample, we find a small but significant treatment effect. The treatment effect is about 3.2%, which is slightly higher than in the previous estimations.[11] When the sample is reduced to workers born within a range of 6 months around the treatment threshold, however, we find that the treatment effect is not statistically different from zero. The sample is too small to identify the treatment effect. Within the range of 6 months around the treatment threshold, we find a weakly significant effect.

[10] Leuven and Oosterbeek (2002) find cross sectional returns to training in the Netherlands of about 10% although this decreases considerably after restricting the comparison group of non-participants. However, the results of this study are based on a very small sample.

[11] We have tested whether our estimations are biased due to selectivity. It could be argued that more motivated workers were also more prepared to respond to the questionnaire. It is possible that workers born just after 1949 did not wish to cooperate because of their frustration over the change in the pension system. In that case, our previous estimations of the treatment effect may be biased. However, our results remain robust when estimating probit models accounting for sample selection on training participation following the approach of Van de Ven and Van Praag (1981). Moreover, we do not reject the null hypothesis of no selection bias

Insert Table 4 about here

As has been mentioned earlier, it is likely that we underestimate the treatment effect due to the fact that many individuals only participated in small training courses which in general have only short term effects on productivity. Therefore we perform additional analyzes on participation in small and large courses. We constructed an indicator for participation in short training courses which is coded 1 if workers participated in a training course in 2006 which lasted 48 hours or less and 0 otherwise.[12] Likewise, large courses are defined as training courses on which workers spent more than 48 hours. The estimation results are presented in Table 5. According to expectations, we find no effect of the exogenous change in pension rights on participation in small training courses. On the other hand, there is a significant treatment effect on participation in large training courses. Surprisingly, the treatment effect (2,7%) is somewhat smaller than in the previous estimations on our initial indicator for training participation. Notable is that also the discount rate has only a negative effect in the estimation on participation in small courses while the yearly wage income and work hours only have an effect on participation in large courses.

Insert Table 5 about here

6 Conclusion

Human capital theory predicts that early retirement systems have a negative effect on human capital formation because they reduce the period in which the benefits of the investments can be reaped. In this study, a natural experiment was used to identify the effects of an exogenous change in pension wealth on older workers' training participation.

[12] Workers spent on average 48 hours on training courses. 48 hours correspond to 6 workdays.

For this purpose, we used matched survey and administrative data for male employees in the public sector in the Netherlands which was subject to a large pension reform in 2006. We compared workers who are born just before the threshold of January 1, 1950 and remain entitled to their old generous pension rights with those who are just born after the break and are subject to the new system.

Because workers could also react on the change in pension rights by increasing their private pension savings, we also corrected for other potential income sources after retirement and extra pension savings since the introduction of the new pension system. However, accounting for the increase in pension savings and additional income sources did not affect the treatment effect.

Using simple LPM regressions, we found a positive relationship between the expected time to retirement and training participation. Because causality cannot be established in these regressions, we proceeded with estimations which exploited the experimental character of the data. We still found a positive treatment effect on training participation for the whole sample. However, the size of the treatment effect is rather small in our estimations, which may indicate that workers have more restrictions to further investments in their human capital than the restricted time period in which they can benefit from these training investments. Moreover, we only find a treatment effect for workers' participation in large training courses.

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Table 1
Descriptive statistics

Variable description	**Entire sample**	**Born in 1949**	**Born in 1950**
Number of pension years	28.64	29.22	28.10
	(8.68)	(8.57)	(8.75)
Extra pension savings since 2006 (1 if savings increased)	0.23	0.21	0.26
	(0.42)	(0.41)	(0.44)
Yearly wage income (in euros)	48,620	48,835	48,419
	(18,379)	(18,485)	(18,278)
Size of organization (number of employees)	5,236	5,332	5,199
	(9,764)	(9,850)	(9,684)
Individual discount rate	0.40	0.41	0.39
	(0.45)	(0.46)	(0.43)
Marital status	0.91	0.92	0.90
	(0.29)	(0.27)	(0.30)
Income partner (1 if partner has own income)	0.74	0.73	0.75
	(0.44)	(0.44)	(0.43)
Number of observations	7,019	3,327	3,692

Sample standard deviations are in parentheses below sample averages. The number of pension years and the yearly wage income are extracted out of administrative data of the pension fund (ABP) for the public sector. The number of pension years variable indicates how many years individuals build up pension rights at the ABP. The individual discount rate is based on two questions which measure the extra amount of money individuals wish to receive if payment of price winnings is delayed with one year.

Table 2

Pension rights and training for the treatment group and the non-treated

Variable description	**Entire sample**	**Born in 1949**	**Born in 1950**
Expected time to retirement (years)	63.11	62.70	63.50
	(1.75)	(1.62)	(1.78)
Expected retirement benefit at age of 62 (in % of net present wage)	68.94	72.02	66.18
	(12.36)	(11.95)	(12.10)
Good overview of pension rights (1 if good overview)	0.59	0.64	0.56
	(0.49)	(0.48)	(0.50)
Training in 2006 (1 if trained)	0.56	0.54	0.57
	(0.50)	(0.50)	(0.50)
Number of observations	7,019	3,327	3,692

Sample standard deviations are in parentheses below sample averages.

Table 3

Expected time to retirement and training participation in 2006 without accounting for reversed causality*

Dependent variable: Training participation in 2006	**LPM Complete sample**	**LPM Complete sample**	**Probit[a] Complete sample**	**LPM 6 months**	**LPM 9 months**
Expected time to retirement	0.014	0.014	0.014	0.013	0.013
	(0.003)	(0.004)	(0.004)	(0.006)	(0.005)
Pension years		0.001	0.001	-0.000	0.001
		(0.001)	(0.001)	(0.002)	(0.002)
Extra pension savings		0.013	0.014	0.044	0.005
		(0.020)	(0.021)	(0.029)	(0.023)
Yearly wage income (divided by 10000)		0.005	0.005	-0.001	0.002
		(0.006)	(0.007)	(0.009)	(0.007)
Work hours		0.431	0.455	0.405	0.330
		(0.226)	(0.237)	(0.324)	(0.262)
Marital status		0.062	0.064	0.071	0.051
		(0.027)	(0.028)	(0.038)	(0.031)
Discount rate		-0.030	-0.031	-0.022	-0.044
		(0.016)	(0.017)	(0.023)	(0.019)
Constant	.454	-.270	-2.040	-0.113	-0.110
	(0.228)	(0.243)	(0.645)	(0.345)	(0.282)
Number of observations	6,942	4,348	4,348	2,163	3,267

Standard errors in parentheses

[a] Marginal effects. *The number of pension years and the yearly wage income are extracted out of administrative data of the pension fund (ABP) for the public sector. The number of pension years variable indicates how many years individuals paid pension contributions to the ABP. The individual discount rate is based on two questions which measure the extra amount of money individuals wish to receive if payment of price winnings is delayed with one year. Other control variables included in the model are: education, size of the organization employed, sub sector fixed effects and dummy variables indicating the presence of 11 other potential income sources when retired. The most relevant other income sources are: pension from another pension fund, income of partner and savings.

Table 4

Exogenous change in pension rights and training participation in 2006*

Dependent variable: Training participation in 2006	**LPM Complete sample**	**LPM Complete sample**	**Probit[a] Complete sample**	**LPM 6 months**	**LPM 9 months**
Treatment effect	0.032	0.032	0.033	0.026	0.029
	(0.012)	(0.015)	(0.016)	(0.021)	(0.017)
Pension years		0.000	0.000	-0.001	0.000
		(0.001)	(0.001)	(0.002)	(0.002)
Extra pension savings		0.012	0.012	0.043	0.004
		(0.020)	(0.021)	(0.029)	(0.023)
Yearly wage income (divided by 10000)		0.004	0.005	-0.002	0.001
		(0.006)	(0.007)	(0.009)	(0.007)
Work hours		0.456	0.478	0.442	0.334
		(0.223)	(0.223)	(0.321)	(0.259)
Marital status		0.064	0.065	0.076	0.055
		(0.027)	(0.028)	(0.038)	(0.031)
Discount rate		-0.031	-0.032	-0.023	-0.044
		(0.016)	(0.017)	(0.023)	(0.019)
Constant	.538	-.186	-1.809	-0.050	-0.014
	(0.009)	(0.240)	(0.636)	(0.341)	(0.277)
Number of observations	6,972	4,422	4,422	2,194	3,328

Standard errors in parentheses

*Marginal effects. The number of pension years and the yearly wage income are extracted out of administrative data of the pension fund (ABP) for the public sector. The number of pension years variable indicates how many years individuals contributed to their pension. The individual discount rate is based on two questions which measure the extra amount of money individuals wish to receive if payment of price winnings is delayed with one year. Other control variables included in the model are: education, size of the organization employed, sub sector fixed effects and dummy variables indicating the presence of 11 other potential income sources when retired. The most relevant other income sources are: pension from another pension fund, income of partner and savings.

Table 5

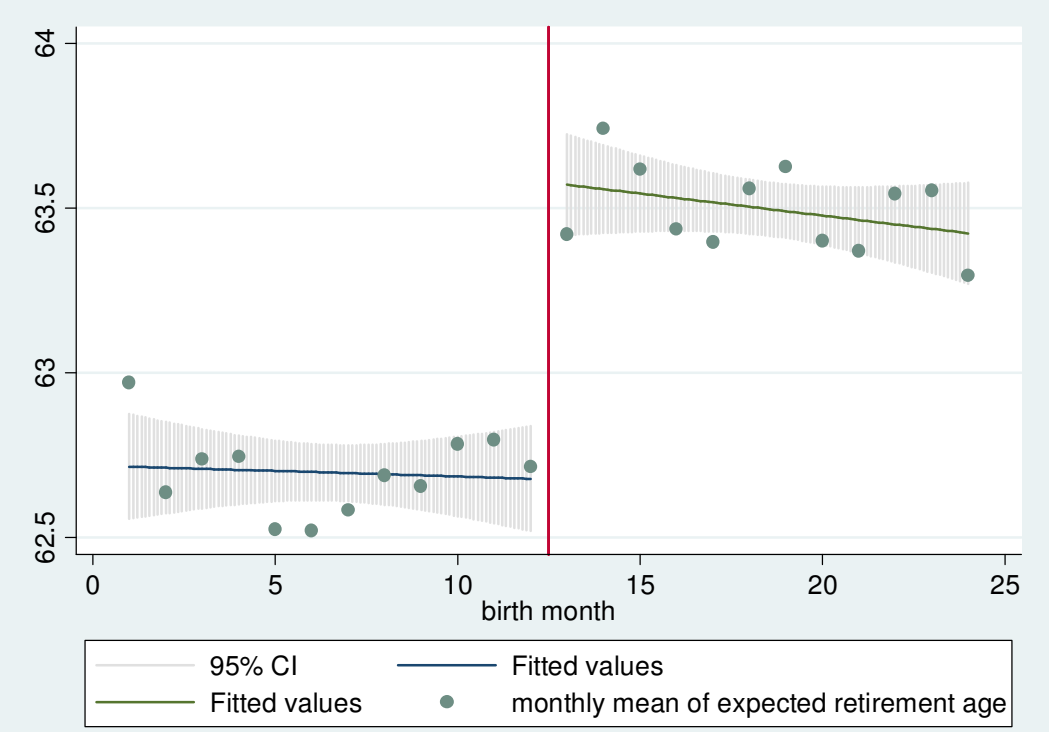
Exogenous change in pension rights and participation in small and large training courses*

Dependent variable:	**LPM Small**	**LPM Small**	**LPM Large**	**LPM Large**
Treatment effect	0.012	0.005	0.019	0.027
	(0.011)	(0.015)	(0.009)	(0.012)
Pension years		- 0.000		0.000
		(0.001)		(0.001)
Extra pension savings		0.010		0.016
		(0.020)		(0.019)
Yearly wage income (divided by 10000)		-0.008		0.012
		(0.006)		(0.005)
Work hours		0.032		0.424
		(0.219)		(0.181)
Marital status		0.046		0.018
		(0.026)		(0.021)
Discount rate		-0.039		0.008
		(0.016)		(0.014)
Constant	-0.388	.243	0.190	-0.428
	(0.022)	(0.234)	(0.007)	(0.195))
Number of observations	6,972	4,422	6,972	4,422

Standard errors in parentheses

*Marginal effects. The dependent variable in Columns 1 and 2 is a dummy coded 1 if workers participated in training and spent 48 hours or less on training courses in 2006 and is coded 0 otherwise. The dependent variable in Column 3 and 4 is coded 1 if workers spent more than 48 hours on training courses in 2006 and 0 otherwise.

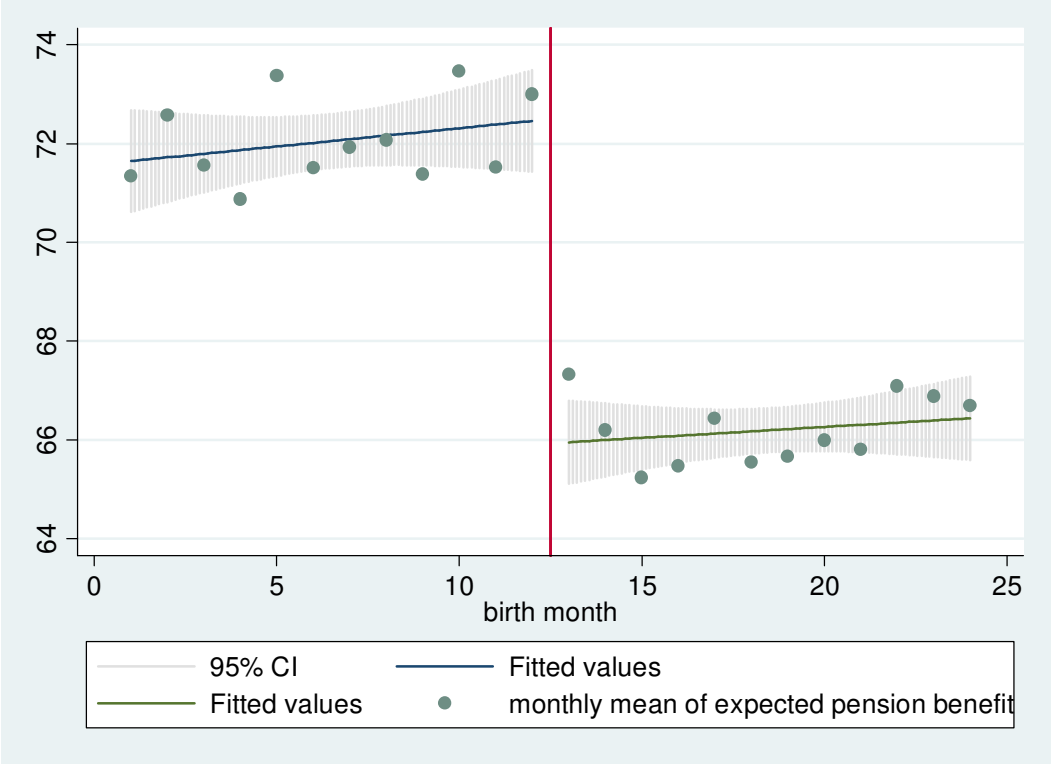
Figure 1
Expected retirement age



This figure presents the mean of expected retirement age for each birth month from January 1949 until December 1950. Our sample consists of two birth years where workers born in 1949 (month 1-12) are entitled to the old pension rules and workers born in 1950 (month 13-24) are subject to the new pension rules. The vertical line in the figure marks the threshold which divides the control and treatment group.

Figure 2

Expected pension benefit at age of 62 (in percentage of present net wage income)



This figure presents the mean expected pension benefit at age of 62 in percentage of present wage income for each birth month. The information is based on the following survey question: Suppose you would retire at the age of 62. How large would your pension benefit be (in percentage of your net wage income)? Our sample consists of two birth years where workers born in 1949 (month 1-12) are entitled to the old pension rules and workers born in 1950 (month 13-24) are subject to the new pension rules. The vertical line in the figure marks the threshold which divides the control and treatment group.