Demotivating Workers: Retrenchment of pension rights and negative reciprocity

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Abstract

We document the importance of negatively reciprocal inclinations in labor relations, by showing that a retrenchment of pension rights, which is perceived as unfair, causes a larger reduction in job motivation the stronger workers' negatively reciprocal inclinations are. We exploit unique matched survey and administrative data on male employees in the public sector in the Netherlands who faced a major unexpected pension reform in 2006. We compare job motivation of employees who were born in 1950, and therefore face a substantial retrenchment of their pension rights, to job motivation of slightly older employees who remain entitled to more generous pension benefits. Job motivation is significantly lower among negatively reciprocal workers who were affected by the reform. The negative effect on job motivation is larger for negative reciprocal workers born very close after the cut off date of January 1, 1950, and for those with many untreated colleagues, and therefore arguably perceive the policy change as being more unfair. We also find that the treatment effect is stronger among workers who are more likely to hold their employer accountable for the drop in their pension rights, that is, those who work for the national government.

Keywords: reciprocity, job motivation, retrenchment of pension rights.

JEL codes: D63, J2.

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1 Introduction

Experimental economists and psychologists have provided ample evidence from controlled laboratory studies showing that reciprocity is a key driver of human motivation (Bowles, 2008).[1] Theory predicts that reciprocity also affects labor market outcomes (see e.g., Akerlof, 1982; and Rabin, 1993). Important implications are, for example, that positively reciprocal employees increase their effort above the required level when being treated generously by their employer, and that negatively reciprocal workers retaliate upon their employer for unfair treatment, e.g. by reducing effort.

Previous empirical work on the role of reciprocity in employment relationships has largely focused on the impact of positive reciprocity on workers' effort response in gift-exchanges. Convincing evidence on an in-kind response by workers (i.e. higher effort provision) to friendly actions of employers (i.e. a higher wage payment) has been found in stylized labor markets of laboratory experiments (e.g., Fehr et al., 1993; and Brown et al., 2004).[2] Evidence from field experiments is somewhat less conclusive. Despite the overwhelming evidence for the existence of reference-dependent fairness concerns (see Fehr et al., 2009), it is still contested among researchers whether employers' generous treatment of workers causes increased effort provision.[3] Some complementary correlational evidence for the relevance of gift-exchange in actual labor markets is provided by Dohmen et

[1] Numerous studies have shown that individuals reciprocate trust in trust games (Berg et al., 1995). Moreover, it has been documented that individuals (in bargaining games) are willing to reject unfair offers even at a personal cost (e.g. Güth et al., 1982; Camerer and Thaler, 1995), and that individuals who participate in public good games are prepared to punish others who violated certain norms of cooperation or fairness (e.g. Fehr and Gächter, 2000).

[2] Several field experiments in non-labor market contexts (e.g., Falk and Zehnder, 2007; and Falk, 2007) have recently shown that reciprocal motives have a significant impact on human behavior outside stylized laboratory environments.

[3] Gneezy and List (2006) find only a short-lived positive effect of an unexpected salary raise on work effort in a gift exchange game. Kube et al. (2010) find that wage cuts have a detrimental and persistent impact on productivity, while an equivalent wage increase does not affect productivity. Cohn, Fehr and Goette (2009) conducted a field experiment in which wages were increased and find that workers who felt underpaid at the baseline wage reacted to the wage increase by raising effort strongly, while workers who felt paid fairly at the baseline wage did not increase their effort. Bellemare and Shearer (2009) provided a bonus unrelated to past productivity in a field experiment in a tree-planting firm and find that this gift had a significant and positive effect on productivity. Finally, in contrast to these experiments, in which the generous worker treatment was in terms of higher wages or boni, Kube et al. (2011) demonstrate that non-monetary gifts have a much stronger impact on workers' effort provision than monetary gifts.

al. (2009). They analyze survey data and show that measures of positively reciprocal dispositions of respondents in the 'German Socio-Economic Panel Study' (SOEP) are significantly correlated with higher wages and working harder.

Few studies have focused on the impact of unfair treatment on workers' motivation and effort provision. An important exception in this respects is the interesting case study by Krueger and Mas (2004). They document that a labor strife at a U.S. tire production site coincides with the production of substantially lower quality tires, which arguably results from reduced effort and care of workers during the strife. The results therefore indicate that harmful reciprocations are important in actual labor market settings.

In this paper, we use a regression discontinuity design (see Imbens and Lemieux, 2008; Lee and Lemieux, 2010) to analyze the impact of a legislative change that curtailed the pensions of Dutch public sector employees born in 1950 (and later), but did not change the pension benefits of public sector employees born in 1949 (and earlier) on job motivation. Since the government initiated the change, public sector employees born in 1950 are likely to perceive their employer to be directly responsible for the deterioration of their pensions.[4] The retrenchment of their pension rights constitutes a breach of an informal agreement because the prospect of early retirement with high pension benefits was emphasized as an attractive job characteristic in the recruitment of public sector workers since the second half of the 1970s. One could conjecture that such a breach of an implicit contract triggers retaliation for deterrence in the employer-employee relationship that is induced by pure self-interest. We would therefore expect that the treated employees (i.e., those who were born just after December 31, 1949) are on average less motivated for their job than workers in our control group, who are slightly older (i.e., those born just before January 1, 1950) but otherwise similar. Such a finding would be important by itself as

[4]The abolishment of the favorable tax treatment was not limited to the public sector but did also apply to workers in the private sector. However, the major difference with the private sector is, that in the public sector the national government is not only the employer in the sectoral bargaining process, but also the initiator of the pension reform.

it would corroborate the findings by Krueger and Mas (2004), and emphasize the role of negative reciprocity in labor relationships.

In our study, however, we press forward by pinpointing the role of social motives as drivers of harmful reciprocity. In particular, our data on individuals' reciprocal inclinations allow us to assess the role of social motives as a driver of reciprocity. Besides facing the breach of an informal contract, workers born in 1950 who compare their pension rights to the rights of only slightly older workers who still enjoy the more generous pension rights of the old regime, or to their own status quo before the policy change, are likely to perceive the policy change as an unfair treatment. If social motives drive negative reciprocity we should expect that negatively reciprocal inclinations of workers catalyze the decline in job motivation after being treated unfairly. We therefore hypothesize that workers' reactions to the 'unfair' treatment are heterogeneous and depend on their negative reciprocal inclinations: among the treated workers, those with strongly negatively reciprocal inclinations are expected to show a stronger reaction to the unfair treatment than their treated colleagues who have only weak negatively reciprocal inclinations.

We test our hypotheses using unique matched survey and administrative pension fund data on male employees in the Dutch public sector who were born either in 1949 or 1950.[5] In the survey, we include 6 questions that have been validated in a controlled laboratory study by Perugini et al. (2003) to measure positive and negative reciprocity.[6] We then compare job motivation, a key determinant of work effort (see Bowles et al., 2001), of employees in the treatment group who suffer from the retrenchment of pension rights (i.e., those born in 1950) to job motivation of employees in the control group (i.e., those born in 1949), and assess whether the treatment effect depends on employees' degree of negative reciprocity. We find that the exogenous decrease in pension benefits is associated with

[5]These data were also used by De Grip et al. (2011) who found a strong negative effect on mental health of treated workers, and by Montizaan and Vendrik (2011), who study the impact of a reduction in pension wealth on life satisfaction and job satisfaction. Both studies do not consider heterogenous effects that depend on negatively reciprocal motivations.

[6]Perugini et al. (2003) performed comprehensive validation tests for their reciprocity scale and showed that the measure for negative reciprocity predicts behavior in punishment and dictator games.

a significant reduction in job motivation among negatively reciprocal employees. Job motivation is lowest for treated individuals in the top quartile of the distribution of negative reciprocity. Additional evidence strongly supports the idea that the causality runs from unfair treatment to an effort reduction of workers, which is mediated by the perception of the degree of unfairness and the strength of negatively reciprocal motives. For example, negatively reciprocal treated workers who are closer to the cut off date (e.g., born in the first quarter of 1950), or who work in an organization with relatively many untreated colleagues, are least motivated after the reform, indicating that these workers perceive the policy change as particular unfair. Moreover, job motivation is lower among negatively reciprocal public sector employees who work at central government institutions, most likely because they hold their employer, the government that implemented the policy change, directly accountable for the retrenchment of their pension rights.

Our findings complement the literature in important ways. First, we exploit exogenous variation in unfair worker treatment to shed light on the causal nature of the relationship between unfair worker treatment and an undesired response of workers. Second, we use a direct measure of reciprocal inclinations to test whether the response of workers is brought about by negative reciprocal motives, and we provide evidence for a causal link between negatively reciprocal inclinations and the reduction in effort. Finally, we show that heterogeneity in negatively reciprocal inclinations leads to heterogeneity in the effort response of workers who feel treated unfairly. These findings are fundamental as they indicate that reciprocity is strongly driven by social motives.

The remainder of the paper is organized as follows. In the next section, we provide more details on the exogenous shock in the public sectors' pension system in the Netherlands that generates exogenous variation in the way that workers are treated. We then describe the data in section 3 and present the results in section 4. We end with some concluding remarks in section 5.

2 Reform of the public sectors' pension system

Before discussing important details of the pension reform, we briefly provide some key features of the Dutch pension system. The Dutch pension system consists of three pillars: 1) a public old age pension that is paid to all inhabitants aged 65 and older, 2) a supplementary sectoral (or firm) pension, and 3) voluntary private pension plans. The public old age pension is essentially a pay-as-you-go system, in which current payments are financed by income taxes. Supplementary sectoral (or firm) pensions are of the defined benefit type and very wide-spread, as participation in these schemes is in general mandatory.[7] Additional voluntary pension plans are offered by private insurance companies. These pension plans typically take the form of savings plans that yield annuity payments at retirement age and are less prevalent in the Netherlands.

Early retirement before the age of 65 is primarily made possible through the sectoral pension system (i.e., the second pillar). Until 2006, contributions to sectoral pension schemes were tax deductible, which substantially boosted their financial attractiveness. This tax advantage amounted to about 25% of the net early retirement allowance (see Kooiman et al., 2004), which is partly a result of the progressive tax system (Euwals et al., 2006). Typically, contributions to the sectoral pension schemes were such that a public sector employee who had served for 40 years in the public sector could retire at the age of 62 and three months at a replacement rate of 70 percent.[8] As a result, early retirement became the norm in the Netherlands. Approximately 80% of all workers retired at the age of 62 or younger in the years before 2006.[9]

In 2006, a reform in the Dutch pension system abolished the favorable tax treatment of early retirement schemes for all employees born in 1950 or later, but not for older cohorts. The intention of the government was to provide stronger incentives for younger

[7] Most sectoral pension schemes are negotiated between unions and employer organizations at the sector or firm level and are officially laid down in collective agreements. In case of the public sector, both employers and employees contribute to the pension fund.

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

[9] See Statistics Netherlands (2009).

cohorts to retire at an older age. Those born in 1950 and thereafter suffered from a dramatic loss of early retirement options. Employees born before 1950 who had been continuously employed in the public sector since April 1, 1997 remained entitled to the generous old pre-pension rights.

In response to the policy change, the pension fund of the public sector 'Algemeen Burgelijk Pensioenfonds' (ABP) also changed its pension scheme on January 1, 2006 for workers born in 1950 or later and those who had not worked continuously in the public sector since April 1, 1997.[10] The new flexible pension system is characterized by (i) a drop in pension benefits, (ii) an increase in pension contribution payments to partly account for the drop in pension wealth resulting from (i), and (iii) stronger incentives to continue working, generated by larger penalties on pension income when retiring before commencement of the state pension at age 65 and by larger supplements for later retirement.[11] As a result, a typical employee born in 1950 or later with 40 years of tenure, now only attains a replacement rate of 64% when retiring early at the age of 62 years and three months, which is substantially lower than the replacement rate of 70% that applied to them before the reform and still applies to workers born before 1950. In order to attain a replacement rate of 70%, workers who are affected by the reform, have to postpone retirement by one year and three months.

ABP launched a campaign in the second half of 2005 to inform about the introduction of the new pension system and to explain its financial implications. A special newsletter 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 about the core characteristics of the new scheme, and a complete electronic service package for public service employers was developed. Therefore, one can assume that on January 1, 2006, most public sector employees born after 1949 and their employers were indeed familiar with the exogenous shock in their pension rights.

[10] This new scheme is called 'ABP flexible pension scheme'.

[11] Furthermore, the eligibility age for pension benefits was increased to 60 years, and workers can now decide to continue working until their 70th birthday.

The strong differential treatment of workers born around January 1, 1950, came as a surprise to public sector employees. Details of the new pension system were only communicated in the second half of 2005, so that there was not much scope for workers born on January 1, 1950 or later to offset the drop in their pension benefits, that is, by engaging in extra savings plans, because of the limited time horizon to retirement.[12]

3 Data

We use survey data that we match to administrative data for male employees in the public sector who were born in 1949 or 1950.[13] The administrative data come from the ABP, the pension fund for public sector employees. The data contain detailed information on individuals' pension rights built up at ABP, annual wage income, and tenure in the public sector.

The survey data were gathered after the introduction of the new pension system. In January 2007, all 27,871 male public sector employees who were born either in 1949 or in 1950 were invited to participate in our internet survey, asking them to provide us with their email address. The invitation letter, which was sent by surface mail, only conveyed general information about the social usefulness of the study, but did neither reveal any information about the (motivation for the) research question nor about the nature of our research strategy (e.g. we did not inform potential participants that the invitation was only sent to public sector employees born in 1949 and 1950.) We also explicitly mentioned in the letter that confidentially is ensured, so that respondents need not fear repercussions from responding in a socially undesired manner. In March 2007, we invited the 11,458 male public sector employees who had provided their contact details to fill in

[12]However, next to the abolishment of the favorable tax treatment, the government introduced the Life Course Savings program in 2006. This program allows workers born in 1950 to build up tax-free savings of approximately 14% of their annual earnings for seven years to finance early retirement at age 62 and three months. It is likely that only a very small fraction of these workers will be able to save such a high proportion of their earnings each year before retirement.

[13]The survey and administrative data is only available for these two specific birth years. We focus on male employees only, because only a small selective group of women in these birth cohorts is working in the Netherlands.

the web-based survey. In total, 7,739 individuals completed the questionnaire in 2007. References to the nature of our research question and research strategy were avoided in the survey itself. In March 2008, we sent an e-mail invitation with a link to a second web-based survey to all individuals who had logged on to the 2007 questionnaire. This time 6,078 respondents completed the survey. In this second wave, we asked detailed questions on reciprocal motivation, job motivation and retirement expectations.[14]

In the analysis, we exclude workers who are employed in some specific burdensome occupations (such as firemen, ambulance and police personnel), in which other early retirement schemes are still in place that allow them to retire early without experiencing a substantial drop in income. In our main analysis, we also restrict the sample to those employees who had continuously worked in the public sector since 1997 (thereby excluding 260 employees, who are not eligible for the pre-reform early retirement option even if they were born before 1950).[15] Due to item-non-response on the variables of interest, the estimation sample is further reduced. It contains 4,520 men, of whom 2,373 were born in 1950 and constitute the treatment group, while the other 2,147 men, who were born in 1949, belong to the control group.

The dependent variable in our econometric analysis is a self-assessed measure of job motivation. Respondents were asked to indicate how well the following statement applies to them personally: 'At times, I have difficulties to motivate myself for my job'. Answer categories ranged from 1 ('does perfectly apply to me') to 5 ('does not apply to me at all'). Our measure of reciprocity, one of the key explanatory variables in our analysis, is

[14]Self-selection could impose a problem when the non-response differs between the treatment and control group, since the similarity of the two groups in such a situation is no longer guaranteed. For each survey wave, we checked whether there are deviations in the survey participation rate between the treatment and the control group. For each year, the differences in the participation rates are extremely small. In 2007, 30.5% of all the workers in the treatment group participated in the survey versus 31.0% among the control group. In 2008, the survey participation rates were 21.6% for the treatment group and 22.2% for the control group. Simple t-tests show that these small differences in the participation rates are statistically insignificant (t-stat = 0.97 in 2007, 1.20 in 2008). Simple probit analyses also confirm that selection into the survey in both survey waves was not related to the treatment. These probit analyses included several control variables available in the administrative data, such as the work sector, contractual work hours, birth month and yearly wage (in logs).

[15]In an robustness analysis we will include the workers who did not work continuously work in the public sector since 1997.

based on the reciprocity scale that was developed and validated by Perugini et al. (2003). They performed comprehensive validation tests, and assessed the predictive power of their reciprocity scale for ultimatum game and dictator game behavior of participants in laboratory experiments conducted in the UK and Italy. We included the six items that have the highest loadings on the principal components for positive and negative reciprocity and that were also included in the 2005 wave of the German Socio-Economic Panel Study (SOEP). See Dohmen et al. (2009) for the behavioral validity of these questions. Respondents had to indicate on a 5-point Likert scale (1 means 'does not apply to me at all' and 5 means 'does perfectly apply to me') how well they identified themselves with each of the following six statements: 1) 'If someone does me a favor, I am prepared to return it'; 2) 'If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the costs'; 3) 'If somebody puts me in a difficult position, I will do the same to him/her'; 4) 'I go out of my way to help somebody who has been kind to me before'; 5) 'If somebody offends me, I will offend him/her back'; 6) 'I am ready to undergo personal costs to help somebody who helped me before'. Statements (2), (3) and (5) refer to negative reciprocity; statements (1), (4) and (6) concern positive reciprocity. We construct our measures of positive and negative reciprocity by taking the arithmetic average of a respondent's answers to questions (2), (3), (5) and (1), (4), (6), respectively.

A relevant concern is how well these survey questions measure reciprocal inclinations of individuals in our sample. Various factors such as strategic motives, self-serving biases or lack of attention could possibly induce respondents to distort or unintentionally misreport their true reciprocal behavior (Camerer and Hogarth, 1999). We are confident, however, that our measures are valid indicators of reciprocity, albeit measured with error, for the following reasons. First, our reciprocity measures are experimentally validated. Second, previous research has demonstrated the validity of survey questions on related social preferences, e.g., 'trust' (see Fehr et al., 2003; Bellemare and Kröger, 2007; and Falk and Zehnder, 2007). Third, Dohmen et al. (2009) show that the survey measures

of reciprocity that we employ in this study are correlated with behavioral outcomes in a way that is consistent with theoretical predictions.

Table 1 presents descriptive statistics for the estimation sample (Column 1), and separately for the control group (Column 2) and the treatment group (Column 3). Column 4 shows p-values for the tests of the hypotheses that the treatment and control group are the same. We do not observe significant differences in the average responses to each of the six different reciprocity measures between the treatment and control group, indicating that the change in pension rights did not affect social preferences. The sample averages for the three items that measure negative reciprocity range from 2.6 to 3.1 and are smaller than the averages for the items measuring positive reciprocity (4.3 to 3.7). A substantial number of respondents reports that the statements on positive reciprocity apply to them perfectly, while respondents identify themselves on average less with the statements on negative reciprocity. The variance within the negative reciprocity measures is larger than within the positive reciprocity measures.[16] In Table 1, we also report summary statistics for our two reciprocity measures that are constructed by averaging agreement with the three statements concerning positive and negative reciprocity respectively. Again, there are no differences in reciprocal behavior between the treatment and the control group, according to these measures. There are also no significant between-group differences in other attributes that will be used in our analyses below, such as positive reciprocity, annual wage income, number of years in which workers have built up their pension, marital status, self-reported health status, educational attainment and the sub-sector of employment.

Figure 1 shows average job motivation for each of the 24 birth-month cohorts, and reveals that young birth cohorts are more motivated on average. But more importantly, there is a drop in job motivation around the birth date that divides public sector employees into treatment and control group. This drop in job motivation for workers who

[16]Reassuringly, the distributions of answers to the six reciprocity questions exhibit very similar patterns as the distributions of answers among respondents in the SOEP (see Dohmen et al., 2009).

were born just after 1949 suggests a causal impact of the retrenchment of pension rights on the level of job motivation. The figure also plots lines of linear regressions of job motivation on birth date for the treatment and control groups together with 95% confidence intervals. These regression lines indicate that the discontinuity around the birth date January 1, 1950 is significant. Ascribing the reduction in job motivation to the retrenchment of pension rights requires that employees in our sample are aware of the the drop in pension rights brought about by the law change. To verify this, we compare expectations of the level of pension benefits measured by the following question across the treatment and control group: 'Suppose, you would retire at the age of 62. How large would your pension benefit be as a percentage of your net wage income?' The average responses shown in Table 1 make clear that respondents who are affected by the pension reform indeed expect a significantly lower replacement rate. The mean difference in the expected retirement benefit between the treatment and control group amounts to five percentage points, which is remarkable close to the actual mean difference between those groups (6%). Therefore, we can reasonably conclude that employees are aware of the consequences of the new pension system.

4 Estimation results

4.1 Job motivation, treatment and negative reciprocity

We start our analysis by estimating OLS regressions in which we relate job motivation to a treatment dummy that takes the value 1 if the employee was affected by the retrenchment in pension rights (i.e. born in 1950), the measures of negative and positive reciprocity, two interaction terms between the measures of reciprocity and the treatment dummy, and a set of control variables (including age annual wage income (in logs), number of years in which workers have built up their pension, marital status, self reported health status, educational attainment and the employment sub-sector). Since we have a sharp discon-

tinuity in pension rights and observe only a small age difference between the treated and the controls, this is equivalent to a regression discontinuity approach (Van der Klaauw, 2002). Our coefficient of interest is the coefficient on the interaction between negative reciprocity and the treatment dummy. This coefficient captures differential responses in job motivation by treated workers depending on their negatively reciprocal inclinations. Column 1 of Table 2 shows that the treatment effect is indeed heterogenous with respect to reciprocal behavior. The coefficient of the interaction effect is negative and statistically significantly different from zero, indicating that the negative treatment effect is significantly stronger for the negatively reciprocal workers.[17] A one standard deviation increase in the negative reciprocity scale (0.79) reduces the job motivation of treated workers with 0.101. The size of this effect is roughly the same as the effect of marital status on job motivation, and is equivalent to having an annual wage that is 0.5% lower. We also find, as can be expected, that the interaction between positive reciprocity and the treatment variable has no effect on the level of job motivation. The table shows that negative reciprocity generally reduces job motivation of all workers significantly, while positive reciprocity has no significant impact. Employees with bad health and those who increased their pension savings in the past year are less motivated while job motivation is positively correlated with wage income and being married.

Columns 2-4 of Table 2 shows that our key result, namely that the reduction in job motivation of workers whose pension rights are curbed depends on the level of their negatively reciprocal inclinations, is robust to the inclusion of higher order age polynomials. Column 5 further shows that this result is robust to the inclusion of interaction terms between our measures for negative or positive reciprocity and age. Table A1 in the Appendix shows that this result is also robust to the estimation technique: ordered probit

[17]We also estimated the impact of unfair treatment on job motivation for the different quartiles of the distribution of negative reciprocity. The comparison of the treatment dummy across the different quartiles confirms that the treatment effect is heterogenous with respect to reciprocal behavior: the difference in job motivation is highest and statistically significant among treated workers in the upper quartile of the negative reciprocity distribution, and lowest among the least negatively reciprocal treated workers.

estimates that deal with the discreteness of job motivation lead to exactly the same conclusion. Furthermore, Table A2 in the Appendix shows that the interaction effect between the three separate individual negative reciprocity items and the treatment dummy on job motivation is significant for all the three items.[18]

4.2 Perceived unfairness of policy change

Until now, we have implicitly presupposed that the perceived unfairness brought about by the retrenchment in pension rights is the same among all treated workers. However, there might be differences in perceived unfairness. We would expect that those who feel to be treated most unfairly among the negative reciprocal react stronger to the policy change. Unfortunately, we do not have a direct measure of perceived unfairness, but it is plausible to assume that workers who were born only shortly after the treatment threshold perceive the policy change as more unfair. They compare their pension rights to the rights of those who are born just a few days earlier but still enjoy the more generous pension rights of the old regime. Accordingly, we expect that strongly negatively reciprocal workers in this specific group will be more de-motivated than workers who were born later in 1950. We test this conjecture by comparing job motivation of workers born in different quarters in 1950.[19] The treatment group in Column 1 of Table 3 consists of workers who were born in the first quarter of 1950 and the control group consists of those born in the fourth quarter if 1949, while the treatment group in Column 2 consists of workers born in the second, third or fourth quarter of 1950. The bandwidth selection in Column 1 corresponds to the optimal bandwidth which we derived by implementing the procedure of Imbens and

[18] In additional robustness checks we investigated whether our results are sensitive to the construction of our reciprocity measures. We estimated ordered probit models including alternative measures of negative and positive reciprocity which are constructed based on principal component analysis on the six underlying items, and find that the interaction effect between negative reciprocity and the treatment remains highly significant.

[19] We also checked, whether the effect of the interaction between the treatment dummy and negative reciprocity can be attributed to the seasonality of birth, by performing additional estimations on a sample of workers born in the first quarter of 1949 or in the first quarter of 1950. We find that the interaction effect between reciprocity and the treatment dummy remains strongly significant and therefore seasonality of birth is not likely to be the main determinant of the significant interaction effect.

Kalyanaraman (2010). This procedure enables the calculation of the optimal bandwidth for regression discontinuity designs through the minimization of an expected squared error loss criterion.[20]

The table shows that our results are robust to applying a smaller bandwidth and confirms our expectation that negatively reciprocal workers who were born on or just after January 1, 1950, are stronger de-motivated than workers who were born later in the year. The coefficient of the interaction term between negative reciprocity and the treatment variable is substantial and significant in Column 1, while the coefficient is smaller for workers born in later quarters of 1950. However, the difference between the coefficients in both regressions is not statistically significant.

It is also intuitive to assume that the extent to which other colleagues in their organization suffer from the reform affects the perceived fairness of the policy change. Since workers tend to compare the rewards of their effort to the rewards that other colleagues receive (see Fliessbach et al., 2007), we conjecture that treated employees suffer more from the reform the higher the fraction of untreated employees working in their organization is (see also Clark and Senik, 2010). To construct a proxy for the degree of social comparison, we rely on administrative data to calculate for each organization in the public sector the fraction of untreated employees who were born in 1949 and the total number of workers in the organization.[21] We then run separate regressions for workers in organizations in which the share of untreated workers is below the median, and for those in organizations in which the share is at or above the median. Table 4 shows that the size of the coefficient of the interaction term between the treatment dummy and the negative reciprocity measure is almost twice as large for the group of workers who are confronted with a higher share of colleagues who are not affected by the reform. This

[20]The idea behind the Imbens and Kalyanaraman procedure is that the optimal bandwidth should increase when the variance in outcomes increases at the cut-off, or when the density of the forcing variable (age) is smaller, or when the shape of the curves on both sides of the cut-off becomes increasingly symmetrical.

[21]Unfortunately, we do not have administrative data on the age distribution of the total workforce in organizations. We can therefore only look at the fraction of untreated employees who were born in 1949.

finding corroborates the hypothesis that the perception of being treated unfairly causes negatively reciprocal employees to retaliate upon their employer by providing less effort.

4.3 The employer-employee relation

Employer's accountability for unfair treatment is a pre-condition for directed retaliation of workers. We should therefore expect that negatively reciprocal workers who hold their employer responsible for unfair treatment to purposefully retaliate upon their employer. It is very likely that public sector employees hold their employer responsible for the retrenchment of pension rights, because the government, which is regarded as the corporate management of the public sector, initiated the pension reform by abolishing the favorable tax treatment. This accountability in management was an important reason for focusing on public sector employees. Nevertheless, it seems perspicuous to conjecture that the extent to which employees hold their employer responsible might differ across the different sub-sectors in the Dutch public sector.[22] Since it was the national government that initiated the policy reform, it is plausible to conjecture that civil servants who work for the national government most strongly assign the blame for the unfair treatment directly to their own employer. Consequently, we expect that the treatment effect is larger among negatively reciprocal workers in the government departments.

Estimating the impact of the reform separately for workers employed in the national government departments and workers in the remaining sub-sectors of the public sector, we find that the size of the coefficient of the interaction between the treatment term and our indicator for negative reciprocity is much larger for employees in the government departments than in other sectors, as a comparison of OLS estimates in Columns 1 and 2 of Table 5 reveals. This confirms the conjecture that employees who can directly

[22]The 15 sub-sectors are: national government departments, defence (only civilian personnel), provinces, municipalities, judiciary, primary and secondary education, intermediate vocational education, higher vocational education, universities, research and scientific policy sector, teaching hospitals, district water boards, water, energy and public utilities, voluntary members (including ABP and public transport) and a remaining category.

associate the unfair treatment to the behavior of their own employer, show stronger negative reciprocal behavior through a reduction of their job motivation.

4.4 Robustness

4.4.1 Retirement expectations

Despite the campaign which was launched by the public sector's pension fund in the second half of 2005 to explain the implications of the new system, and that treated workers, on average, expect to have lower pension rights than untreated workers, there are still substantial differences in the retirement benefits which individuals expect to receive if they were to retire at age 62. For example, 23.5% of the treated workers are likely to have overoptimistic expectations since they expect to receive a pension benefit against a replacement rate which is higher than 70%. As a consequence, it is conceivable that the treatment effect does not only depend on reciprocal motivation, but also on the capability of the treated workers to properly assess the consequences of the new pension system for their own pension rights: we expect that only workers who recognize that they are confronted with a substantial drop in their pension rights retaliate against their employer.

Table 6 shows the results of separate regression analyses for workers with overoptimistic expectations about the pension benefit at age 62 (pension benefit equal or above the median for each subgroup) and for those who are more likely to have a more realistic overview of their pension rights (pension benefit below the median benefit). The table confirms our hypothesis that job motivation is most reduced among treated negative reciprocal workers who have realistic expectations about the pension benefit which they would receive if they were to retire at age 62, and therefore are better aware of the consequences of the policy reform for their pension rights.

4.4.2 Alternative productivity indicators

We have looked at job motivation as a proxy of work effort as it is difficult to measure work effort directly. Alternatively one could argue that reduced work effort should be reflected in reduced productivity and therefore pledge for an direct assessment of the input of negatively reciprocal individuals among the treated on productivity. It is difficult, however, to measure individual productivity in the public sector. In a recent paper, De Grip et al. (2011) show that the unexpected drop in pension rights increases the likelihood of becoming depressed, using the same data that we use in this paper. Since depression determines productivity by causing mistakes at work, faulty products as well as increased sickness absence (see OECD, 2008), the mental health variable may serve as a useful alternative indicator for productivity. Moreover, we can assume that workers who are more frustrated by the reform due to their negative reciprocal tendencies also become more depressed.[23] Column 1 of Table 7 reports the estimation results of a LPM regression on the depression indicator. We find that workers in the treatment group who are strongly negatively reciprocal are indeed more depressed (the coefficient of the interaction dummy equals 0.012 with a standard error of 0.005) than less negatively reciprocal workers, thus confirming our results on job motivation.

Another useful indicator for work effort is the percentage of time workers spent on performing routine tasks. One would expect that negatively reciprocal workers who hold their employer responsible for their adverse treatment will develop shirking behavior and decrease their effort by performing less demanding tasks. We measure the time spent on routine tasks by using the following question which was asked in the 2008 survey: 'When you divide your working time in routine tasks and tasks from which you can learn, how

[23]For measuring mental health, De Grip et al. (2011) used the CES-D8 indicator of depression which is derived from the Center for Epidemiologic Studies Depression Scale The CES-D8 consists of eight items of which six negatively phrased statements that reflect the presence of depressive symptoms and two positively phrased statements that reflect the absence of depressive symptoms. To create the variable used in our analyzes, we first dichotomized (yes/no) responses and reversed the coding of the positively phrased items to achieve a count variable from 0 to 8, where higher values suggest worsening depressive symptoms. In the next step, we constructed a dummy variable which indicates if workers are depressed. Following De Grip et al. (2009) we used the suggested score of 4 and above, which indicates probable clinical depression.

much percent of your time do you spend on routine tasks?' On average, workers report that they spend 71% of their working time on routine tasks. Column 2 of Table 7 reports the estimation results of an OLS regression and shows that, consistent with our results for job motivation and depression rates, that negative reciprocal workers with reduced pension rights spend more time on routine tasks, although the interaction effect is only weakly significant.[24]

4.4.3 Workers with career breaks

The results of further robustness checks shown in Table 8 buttress our findings. In this analysis, we include workers with career breaks after April, 1997. Although it is conceivable that the career interruptions of these workers are caused by unobserved individual characteristics which may also be related to reciprocal behavior, the inclusion of these workers introduces an additional treatment group. Remember that the legislative change also curtailed the pensions of those who were born in 1949 if these workers did not work continuously in the public sector since April, 1997. Column 1 presents estimation results for workers who were born only in 1949. The treatment dummy equals 1 for workers who were born in 1949, but who are not entitled to the old pension rights since they did not work continuously since April, 1997, whereas the dummy is 0 for all workers in 1949 who remain entitled. The estimation results show a significant and negative coefficient of the interaction between the treatment variable and negative reciprocity. Therefore, also for this specific treatment group, we find that primarily negatively reciprocal workers with curtailed pension rights are strongly de-motivated.

Column 2 contains estimation results for the full 1949 and 1950 sample, and includes two treatment dummy variables. The first treatment dummy equals 1 for workers who were born in 1949 and who are not entitled to the old pension rights, and is coded 0 oth-

[24]The percentage of time spend on routine tasks was also measured in 2010. In an additional control analysis, we matched these data to the 2008 survey and found again a weakly significant positive interaction effect between the treatment dummy and negative reciprocity. Most interestingly, the interaction effect on the percentage of routine tasks is much stronger for individuals who work for the national government and therefore can directly associate the unfair treatment to the behavior of their own employer.

erwise. The second treatment dummy equals 1 if workers were born in 1950 and equals 0 for those born in 1949. The estimation results show that both interactions between the treatment dummy variables and negative reciprocity are negative and significantly different from zero. The negatively reciprocal workers of the 1949 treatment group appear to be slightly more de-motivated than those who are in the 1950 treatment group. However, the difference in size of the two coefficients is insignificant at the 5%-level.

5 Conclusion

In this paper, we have shown that reciprocity is an important determinant of job motivation. Using a natural experiment, we find that a decrease in pension rights is associated with lower job motivation among negatively reciprocal employees. Moreover, negatively reciprocal workers who are born in the first three months of 1950 are more de-motivated than those who were born later in 1950, plausibly because the former perceive the differential tax treatment as more unfair because their age hardly differs from the age of those who are not affected by the reform. Moreover, we observe that the coefficient of the interaction term between the treatment dummy and negative reciprocity is substantial larger for workers who are confronted with a higher share of colleagues with similar characteristics who are not covered by the reform. We also find that negatively reciprocal workers who are employed in the national government and can directly associate the unfair treatment to the behavior of their own employer, have a lower job motivation than those who are employed in other sub sectors of the public sector. The results we find are robust to the use of alternative estimation methods or different indicators of productivity.

Our findings complement earlier experimental evidence. In accordance with an ultimatum game, the drop in motivation can be interpreted as the sanctioning of unkind or hostile actions (e.g. Güth et al., 1982; Camerer and Thaler, 1995). Our evidence shows that negatively reciprocal individuals do not only sanction actions which they perceive as unkind or hostile in laboratory settings, but behave in the same manner when they

feel that they are treated unfairly by their employer. Consequently, the intended effects of pension reforms that aim to increase labor fore participation can be distorted by the decreasing job motivation of negatively reciprocal workers who feel that they are treated unfairly. Therefore, it is crucial to think of reform designs that provide less scope for being perceived as unfair by particular groups. In the specific example of tax legislation that affects pension rights, an alternative design that entails less discontinuous differences in pension rights would arguably cause less disruption in terms of negatively reciprocal responses.

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Table 1
Descriptive statistics

	Entire sample	**Born in 1949**	**Born in 1950**	**P-value**
Take revenge for a serious wrong	3.06	3.06	3.06	0.78
	(1.04)	(1.04)	(1.05)	
Retaliate for being put in a difficult position	2.54	2.54	2.54	0.89
	(0.85)	(0.84)	(0.86)	
Reciprocate insult with an insult	2.60	2.60	2.62	0.85
	(0.91)	(0.90)	(0.91)	
Reciprocate a favor	4.29	4.31	4.27	0.08
	(0.64)	(0.63)	(0.64)	
Exert effort to help somebody who is kind	4.11	4.11	4.11	0.80
	(0.62)	(0.62)	(0.62)	
Undergo personal costs to help someone who was helpful before	3.73	3.73	3.72	0.15
	(0.70)	(0.69)	(0.71)	
Negative reciprocity (averaged)	2.73	2.74	2.73	0.96
	(0.79)	(0.78)	(0.79)	
Positive reciprocity (averaged)	4.04	4.05	4.04	0.13
	(0.51)	(0.50)	(0.51)	
Expected retirement benefit at age of 62 (in % of net present wage)	69.02	71.66	66.62	0.00
	(11.67)	(11.67)	(11.14)	
Extra pension savings in previous year (1 if savings increased)	0.25	0.22	0.27	0.00
	(0.43)	(0.41)	(0.44)	
Yearly wage (in euros)	53,132	53,132	53,131	0.30
	(16,420)	(15,957)	(16,938)	
Log size of organization	7.13	7.13	7.13	0.59
	(1.78)	(1.79)	(1.77)	
Marital status	0.92	0.92	0.91	0.08
	(0.28)	(0.27)	(0.29)	
Bad health (self reported on 5-point Likert scale)	2.06	2.07	2.05	0.45
	(0.72)	(0.72)	(0.72)	
Number of observations	4,520	2,147	2,373	

Sample standard deviations are in parentheses below sample averages. Job motivation is based on the following 5-level Likert item: 'At times, I have difficulties to motivate myself for my job'. Answers categories ranged form 1 ('does perfectly apply to me') to 5 ('does not apply to me at all'). The measure of negative reciprocity is the individual's agreement to the three statements on the willingness to take revenge for a serious wrong, to retaliate for being put in a difficult position and to respond to an insult with an insult. The measure of positive reciprocity reflects the agreement to statements on the willingness to return a favor, to exert effort to somebody who was kind and to undergo personal costs to help someone who was helpful before. Both measures are based on the average of the three underlying items. Answers for the six reciprocity questions are on a scale between 1 to 5 where 1 means 'does not apply to me at all' and 5 means 'does apply perfectly to me'. The expected retirement benefit at age of 62 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?' The yearly wage income is based on administrative data of the public sector's pension fund.

Table 2

Negative reciprocity, treatment and job motivation: OLS estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)
Interaction treatment and negative reciprocity	-0.129***	-0.128***	-0.128***	-0.128***	-0.165**
	(0.042)	(0.042)	(0.042)	(0.042)	(0.082)
Interaction treatment and positive reciprocity	-0.026	-0.025	-0.025	-0.025	-0.033
	(0.065)	(0.065)	(0.065)	(0.065)	(0.130)
Negative reciprocity	-0.093***	-0.094***	-0.094***	-0.094***	-0.037
	(0.031)	(0.031)	(0.031)	(0.031)	(0.113)
Positive reciprocity	-0.000	-0.001	-0.001	-0.001	0.011
	(0.048)	(0.048)	(0.048)	(0.048)	(0.176)
Treatment dummy	0.427	0.300	0.301	0.272	0.433
	(0.272)	(0.278)	(0.278)	(0.285)	(0.545)
Number of years contributed to the pension fund	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Log yearly wage	0.202**	0.202**	0.203**	0.204**	0.202**
	(0.086)	(0.086)	(0.086)	(0.086)	(0.086)
Log size of organization	0.004	0.004	0.004	0.004	0.004
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Marital status	0.100*	0.103*	0.104*	0.104*	0.104*
	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)
Bad health	-0.408***	-0.407***	-0.407***	-0.407***	-0.407***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Age (divided by 365)		-0.121**	-0.143	0.007	0.016
		(0.056)	(0.120)	(0.329)	(0.471)
Age^2			0.011	-0.201	
			(0.054)	(0.436)	
Age^3				0.070	
				(0.143)	
Interaction age and negative reciprocity					-0.038
					(0.072)
Interaction age and positive reciprocity					-0.008
					(0.111)
Constant	2.255**	2.443**	2.446**	2.446**	2.238*
	(0.969)	(0.972)	(0.972)	(0.973)	(1.213)
Observations	4,520	4,520	4,520	4,520	4,520
R-squared	0.098	0.099	0.099	0.099	0.099

The measures of negative and positive reciprocity used in the estimations are constructed by taking the average of the three underlying items. Additional control variables in the estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.

Table 3

Treatment effect on job motivation: Results for different birth cohorts

	(1)	(2)
VARIABLES	**I 1950 vs IV 1949**	**II-IV 1950 vs IV 1949**
Interaction treatment and negative reciprocity	-0.189**	-0.141**
	(0.081)	(0.070)
Interaction treatment and positive reciprocity	-0.087	0.020
	(0.130)	(0.111)
Negative reciprocity	-0.066	-0.072
	(0.061)	(0.061)
Positive reciprocity	-0.023	-0.026
	(0.098)	(0.099)
Treatment dummy	0.723	0.227
	(0.546)	(0.469)
Number of years contributed to the pension fund	-0.001	-0.006
	(0.005)	(0.004)
Log yearly wage	0.115	0.143
	(0.171)	(0.124)
Log size of organization	0.004	0.031
	(0.030)	(0.021)
Marital status	-0.070	0.159**
	(0.129)	(0.081)
Bad health	-0.474***	-0.400***
	(0.047)	(0.032)
Constant	3.831**	2.787*
	(1.905)	(1.464)
Observations	1,124	2,199
R-squared	0.129	0.109

OLS estimates. In Column 1, workers born in the first quarter of 1950 are compared to workers in the control group who were born in the fourth quarter of 1949. Column 2 compares workers born in the second, third or fourth quarter of 1950 with those born in the fourth quarter of 1949. Additional control variables in both estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.

Table 4

Treatment effect on job motivation: social comparisons

VARIABLES	(1) Percentage untreated above median	(2) Percentage untreated under median
Interaction treatment and negative reciprocity	-0.180***	-0.097*
	(0.062)	(0.058)
Interaction treatment and positive reciprocity	-0.040	0.015
	(0.096)	(0.089)
Negative reciprocity	-0.091**	-0.092**
	(0.043)	(0.045)
Positive reciprocity	0.041	-0.051
	(0.067)	(0.069)
Treatment dummy	0.508	0.042
	(0.419)	(0.379)
Number of years contributed to the pension fund	-0.001	-0.005
	(0.004)	(0.004)
Log yearly wage	0.159	0.232**
	(0.133)	(0.116)
Log size of organization	-0.014	0.027
	(0.021)	(0.022)
Marital status	0.138	0.088
	(0.092)	(0.077)
Bad health	-0.354***	-0.455***
	(0.034)	(0.031)
Age (divided by 365)	-0.097	-0.153**
	(0.082)	(0.077)
Constant	2.716*	2.672**
	(1.452)	(1.325)
Observations	2,205	2,315
R-squared	0.085	0.123

All columns show results which are based on OLS estimates. We use administrative data on the total number of workers in the organization in which each employee is working to construct proxies for the incidence of social comparisons in the organization. We determine whether treated workers who were born in 1950 are working in an organization in which the group of untreated workers who were born in 1949 is comparatively large (percentage untreated above or under median). Additional control variables in the estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.

Table 5

Treatment effect on job motivation: Heterogenous sector effects

VARIABLES	(1) National government	(2) Other sectors
Interaction treatment and negative reciprocity	-0.263***	-0.094**
	(0.096)	(0.047)
Interaction treatment and positive reciprocity	-0.038	-0.018
	(0.146)	(0.072)
Negative reciprocity	-0.063	-0.096***
	(0.072)	(0.034)
Positive reciprocity	0.086	-0.034
	(0.110)	(0.053)
Treatment dummy	0.666	0.190
	(0.619)	(0.312)
Number of years contributed to the pension fund	0.005	-0.005*
	(0.007)	(0.003)
Log yearly wage	0.196	0.267***
	(0.191)	(0.091)
Log size of organization	0.014	-0.008
	(0.030)	(0.014)
Marital status	0.038	0.120*
	(0.130)	(0.066)
Bad health	-0.369***	-0.419***
	(0.053)	(0.025)
Age (divided by 365)	-0.250**	-0.095
	(0.124)	(0.063)
Constant	1.673	2.009**
	(2.139)	(1.005)
Observations	961	3,559
R-squared	0.095	0.099

OLS estimates. Educational levels fixed effects are included as control variables. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.

Table 6

Treatment effect on job motivation: retirement expectations

VARIABLES	(1) Expected pension benefit at age 62 low	(2) Expected pension benefit at age 62 high
Interaction treatment and negative reciprocity	-0.139**	-0.096
	(0.061)	(0.066)
Interaction treatment and positive reciprocity	0.055	-0.036
	(0.096)	(0.100)
Negative reciprocity	-0.086**	-0.120**
	(0.038)	(0.055)
Positive reciprocity	-0.014	-0.001
	(0.059)	(0.083)
Treatment dummy	0.029	0.225
	(0.414)	(0.428)
Number of years contributed to the pension fund	0.000	-0.009**
	(0.004)	(0.004)
Log yearly wage	0.297**	0.100
	(0.116)	(0.131)
Log size of organization	-0.011	0.019
	(0.021)	(0.021)
Marital status	0.074	0.149*
	(0.086)	(0.083)
Bad health	-0.407***	-0.411***
	(0.032)	(0.033)
Age (divided by 365)	-0.081	-0.154*
	(0.079)	(0.081)
Constant	1.275	3.518**
	(1.321)	(1.483)
Observations	2,192	2,248
R-squared	0.107	0.105

All columns show results which are based on OLS estimates. Additional control variables in the estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***< 0.01$, $**< 0.05$, $*< 0.10$.

Table 7

Negative reciprocity, treatment and alternative productivity indicators

	(1)	(2)
VARIABLES	**Mental health**	**Routine tasks**
Interaction treatment and negative reciprocity	0.022***	1.331*
	(0.008)	(0.775)
Interaction treatment and positive reciprocity	0.009	-1.504
	(0.012)	(1.192)
Negative reciprocity	-0.009	0.986*
	(0.006)	(0.572)
Positive reciprocity	0.016*	1.238
	(0.009)	(0.883)
Treatment dummy	-0.066	1.180
	(0.051)	(5.134)
Number of years contributed to the pension fund	0.001	0.259***
	(0.000)	(0.050)
Log yearly wage	-0.008	-15.538***
	(0.016)	(1.584)
Log size of organization	0.001	-0.254
	(0.003)	(0.270)
Marital status	-0.044***	-2.308**
	(0.011)	(1.081)
Bad health	0.068***	0.376
	(0.004)	(0.421)
Age (divided by 365)	0.012	-0.922
	(0.010)	(1.034)
Constant	-0.063	126.700***
	(0.172)	(17.868)
Observations	4,431	4,513
R-squared	0.076	0.106

OLS estimates. The dependent variable in Column 1 is based on the CES-D8 indicator of depression which is derived from the Center for Epidemiologic Studies Depression Scale The CES-D8 consists of eight items of which six negatively phrased statements that reflect the presence of depressive symptoms and two positively phrased statements that reflect the absence of depressive symptoms. To create the variable used in our analyses, we first dichotomized (yes/no) responses and reversed the coding of the positively phrased items to achieve a count variable from 0 to 8, where higher values suggest worsening depressive symptoms. In the next step, we constructed a dummy variable which indicates if workers are depressed. Following De Grip et al. (2011) we used the suggested score of 4 and above, which indicates probable clinical depression. Column 2 reports the estimation results of an OLS regression on the self reported percentage of routine tasks. This measure is based on the following question which was asked in the 2008 survey: 'When you divide your working time in routine tasks and tasks from which you can learn, how much percent of your time do you spend on routine tasks?' Educational levels are included as control variables. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.

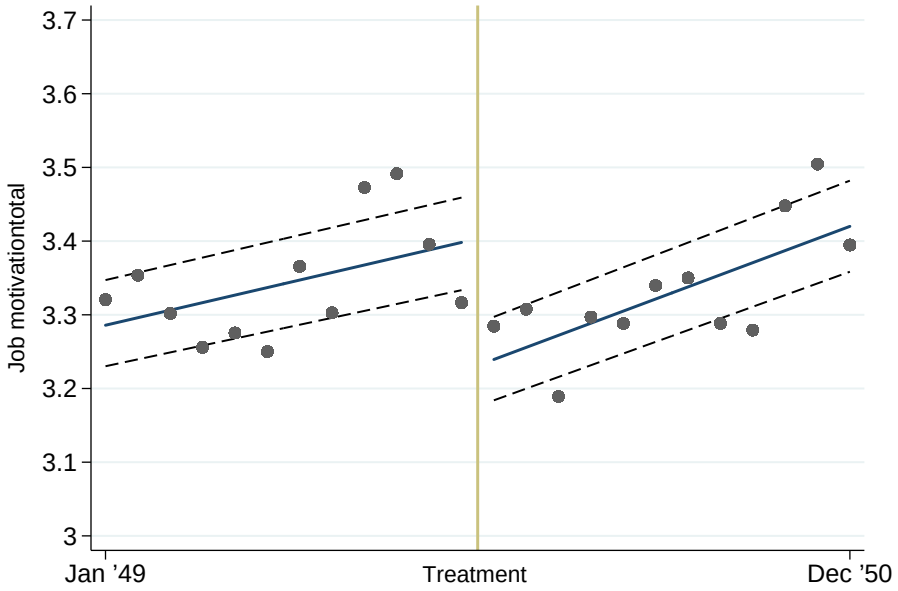
Table 8

Treatment effect on job motivation: Workers with career breaks

	(1)	(2)
VARIABLES	**1949**	**1949 and 1950**
Interaction treatment 1949 and negative reciprocity	-0.228**	-0.215*
	(0.112)	(0.113)
Interaction treatment 1949 and positive reciprocity	0.043	0.040
	(0.151)	(0.153)
Interaction treatment 1950 and negative reciprocity		-0.122***
		(0.042)
Interaction treatment 1950 and positive reciprocity		-0.022
		(0.064)
Negative reciprocity	-0.082***	-0.094***
	(0.031)	(0.031)
Positive reciprocity	-0.005	-0.001
	(0.047)	(0.048)
Treatment dummy 1949	0.550	0.480
	(0.656)	(0.663)
Treatment dummy 1950		0.292
		(0.277)
Number of years contributed to the pension fund	-0.002	-0.004*
	(0.004)	(0.002)
Log yearly wage	0.277**	0.176**
	(0.118)	(0.083)
Log size of organization	-0.028	0.001
	(0.020)	(0.014)
Marital status	0.042	0.117**
	(0.084)	(0.057)
Bad health	-0.393***	-0.407***
	(0.031)	(0.022)
Age (divided by 365)	-0.065	-0.100*
	(0.078)	(0.055)
Constant	2.025	2.714***
	(1.316)	(0.918)
Observations	2,305	4,720
R-squared	0.090	0.099

OLS estimates. Column 1 presents estimation results for workers who are born in 1949. The treatment dummy equals 1 for workers who are not entitled to the old pension rights since they did not work in the public sector continuously since April, 1997, and equals 0 for workers who remain entitled to the old pre-pension rights. Column 2 contains estimation results for the 1949 as well as the 1950 cohort. The model includes two treatment dummy variables. The first treatment dummy equals 1 for workers who were born in 1949 and who are not entitled to the old pension rights and is coded 0 otherwise. The second treatment dummy equals 1 if workers were born in 1950 and equals 0 for those born in 1949. Additional control variables in estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***< 0.01$, $**< 0.05$, $*< 0.10$

Figure 1 Job motivation



This figure shows predicted values from linear regressions for job motivation across birth dates along with a 95% confidence interval, and average job motivation for each birth month. Job motivation is based on the following 5-level Likert item: 'At times, I have difficulties to motivate myself for my job'. Answers categories ranged form 1 ('does perfectly apply to me') to 5 ('does not apply to me at all'). Our sample consists of two birth years where workers born in 1949 (first 12 months) are entitled to the old pension rules and workers born in 1950 (second 12 months) are subject to the new pension rules. The vertical line in the figure marks the threshold which divides the control from the treatment group.

Appendix

Table A1

Negative reciprocity, treatment and job motivation: Ordered Probit estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)
Interaction treatment and negative reciprocity	-0.128***	-0.127***	-0.127***	-0.127***	-0.164**
	(0.041)	(0.041)	(0.041)	(0.041)	(0.080)
Interaction treatment and positive reciprocity	-0.034	-0.034	-0.034	-0.034	-0.063
	(0.063)	(0.063)	(0.063)	(0.063)	(0.127)
Negative reciprocity	-0.096***	-0.098***	-0.098***	-0.098***	-0.040
	(0.030)	(0.030)	(0.030)	(0.030)	(0.110)
Positive reciprocity	0.016	0.016	0.016	0.015	0.060
	(0.046)	(0.047)	(0.047)	(0.047)	(0.172)
Treatment dummy	0.464*	0.342	0.343	0.324	0.563
	(0.265)	(0.271)	(0.271)	(0.277)	(0.532)
Number of years contributed to the pension fund	-0.004	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Log yearly wage	0.227***	0.227***	0.228***	0.228***	0.227***
	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)
Log size of organization	0.001	0.001	0.001	0.001	0.001
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Marital status	0.093	0.096*	0.096*	0.096*	0.096*
	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
Bad health	-0.397***	-0.397***	-0.397***	-0.397***	-0.396***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Age (divided by 365)		-0.117**	-0.145	-0.047	0.107
		(0.055)	(0.117)	(0.320)	(0.460)
Age^2			0.014	-0.124	
			(0.053)	(0.424)	
Age^3				0.046	
				(0.139)	
Interaction age and negative reciprocity					-0.038
					(0.070)
Interaction age and positive reciprocity					-0.030
					(0.108)
Observations	4,520	4,520	4,520	4,520	4,520

The measures of negative and positive reciprocity used in the estimations are constructed by taking the average of the three underlying items. Additional control variables in the estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.

Table A2

Separate negative reciprocity components, treatment and job motivation:

VARIABLES	(1)	(2)	(3)
Interaction treatment and negative reciprocity component	-0.084***	-0.039*	-0.072***
	(0.032)	(0.024)	(0.023)
Negative reciprocity component 2	-0.026		
	(0.023)		
Negative reciprocity component 3		-0.163***	
		(0.021)	
Negative reciprocity component 5			-0.093***
			(0.019)
Interaction treatment and positive reciprocity	-0.036	-0.053	-0.034
	(0.064)	(0.064)	(0.064)
Positive reciprocity	-0.014	0.015	-0.003
	(0.048)	(0.047)	(0.048)
Treatment dummy	0.258	0.182	0.206
	(0.275)	(0.269)	(0.271)
Number of years contributed to the pension fund	-0.004	-0.004	-0.004
	(0.003)	(0.003)	(0.003)
Log yearly wage	0.234***	0.189**	0.207**
	(0.086)	(0.086)	(0.086)
Log size of organization	0.005	0.005	0.004
	(0.015)	(0.015)	(0.015)
Marital status	0.085	0.104*	0.098*
	(0.059)	(0.059)	(0.059)
Bad health	-0.413***	-0.405***	-0.409***
	(0.023)	(0.023)	(0.023)
Age (divided by 365)	-0.116**	-0.120**	-0.124**
	(0.056)	(0.056)	(0.056)
Constant	2.191**	2.885***	2.599***
	(0.996)	(0.993)	(0.998)
Observations	4,539	4,533	4,526
R-squared	0.090	0.102	0.095

OLS estimates. Column 1 shows the results for the statement 'If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the costs', Column 2 for 'If somebody puts me in a difficult position, I will do the same to him/her' and Column 3 for 'If somebody offends me, I will offend him/her back'. Additional control variables in the estimations are: educational levels; sector fixed effects. Standard errors are in parentheses. $***<0.01$, $**<0.05$, $*<0.10$.