

The Role of Wealth in the Start-up Decision of New Self-employed: Evidence from A Pension Policy Reform

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Abstract

We use administrative micro panel data from the Netherlands to study transitions of workers from wage-employment to self-employment in relation to pension wealth. To isolate the causal effect of wealth on the transition into self-employment, we use a pension system reform in 2006 as a quasi-natural experiment. With the onset of the reform, wage-employees born on or after 1 January 1950 faced a substantial reduction of their pension wealth. Our main empirical results indicate that this exogenous wealth change has a significant negative effect on the decision to self-employment transition. This study therefore underlines the importance of isolating exogenous changes in wealth when examining self-employment transition and suggests that the effects of pension wealth in the self-employment choice may not be neglected.

JEL codes: J26, J62, L26, C36

Keywords: self-employment, exogenous wealth shock, pension reform

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1 Introduction

Descriptive evidence suggests that the present older self-employed will approach retirement with substantial wealth holdings (Statistics Netherlands, 2011). During the past decades, rising stock and real estate prices strongly affected the wealth holdings of the middle aged, including the self-employed who are substantially more likely to own homes or stocks. In many countries the self-employed may need to compensate the lack of collective (or second pillar) pension income with recourse to private wealth¹. Policy makers may thus not be concerned about retirement provisions of the self-employed if they believe that this group is inherently wealthier.

In this paper we argue that we need exogenous variation in wealth in order to examine whether there is a causal relation between accumulating substantial wealth and self-employment. To see the issue more clearly, consider the fact that a positive correlation between self-employment and wealth may come about because hard working self-employed entrepreneurs have earned more during their working lives and were able to save more, or because richer individuals are more likely to become self-employed, for instance, due to financial market imperfections. To solve the issue of potential endogeneity of wealth changes, instead of considering financial wealth or household wealth as the majority of literature do, we utilize a Dutch pension system reform in 2006 as a quasi-natural experiment to study the causal relation between wealth change and self-employment transition.

Analyzing the wealth holdings of the self-employed is a complex task. There are four main difficulties that surface due to limited data availability. First, most datasets that contain information about wealth do not properly identify the self-employed. For instance, survey definitions often refer to being self-employed at least for some time (see the National Longitudinal Surveys in the US or the DNB Household Survey for the Netherlands), while register data elicit this information from the tax form (as we do) or use very specific definitions (like in the EBB of Statistics Netherlands, see van As et al 2013). Second, when a definition of self-employed is available this group is often very small (in the Netherlands,

¹see Van der Lecq and Oerlemans (2009) for the Netherlands, but the issue is also important in the UK and Italy.

about 5% to 7% of the population under scrutiny or 10% to 15% of the labor force) although possibly increasing over time (again this is the case in the Netherlands; Bosch et al 2012). In order to have a large number of self-employed, one needs to use very large datasets such as the one we use in this study. Third, when a large enough sample of self-employed is obtained it appears to be very heterogeneous. Fourth, the heterogeneity can be endogenous with regard to wealth as some self-employed must be wealthy almost by definition (think for instance of farmers, who must own a farm) while others may not need to be wealthy (e.g., consultants).

The available literature for the Netherlands suggests that currently older self-employed are richer than wage employed (Statistics Netherlands, 2011). A number of studies, exemplified by Evans and Jovanovic (1989) and Gentry and Hubbard (2004) have documented the positive correlation between self-employment and wealth. Dunn and Holtz-Eakin (2000) and Hurst and Lusardi (2004) find a positive but small effect of financial wealth on the transition into self-employment. Hamilton (2000) finds no evidence that self-employment improves the household financial position. Nykvist (2008) and Schmalz et al. (2013) use house price changes as wealth drivers and find strong effects of house price changes on the self-employment choice. In general wealth effects on labor supply decisions are found to be small Bloemen (2010). Wealth accumulation may, on the other hand, itself be driven by successful business owners and their higher saving rates. Hence, entrepreneurship may explain the high concentration of crosssectional wealth (Gentry and Hubbard, 2004; Cagetti and Nardi, 2005).

To identify the causal effect of wealth on the choice of self-employment, in the literature labor supply decisions (including the decision to become self-employed, to work part-time or to retire) exogenous wealth shocks are utilized, such as winning a lottery (Lindh and Ohlsson, 1996; Imbens et al., 2001; Taylor, 1999) or receiving an unexpected bequest (Brown et al., 2010). Our administrative data do not allow observing any such windfalls. To solve the issue of potential endogeneity of wealth changes, we use the Dutch pension system reform in 2006 as a quasi-natural experiment to study the causal relation between wealth changes and self-employment transition. The pension system reform in

2006 leads those wage-employed born on or after 1 January 1950 to face a substantial reduction of their pension wealth, in particular during early retirement years².

There is a limited amount of literature that explicitly addresses the relation between pension wealth and labor supply. Hurst et al. (2010) point out that pension wealth is a potential reason for the difference in the size of precautionary saving motive between business owners and wage-employees. Zissimopoulos and Karoly (2007) find that having pension coverage in the current job reduces the likelihood to enter self-employment.

The paper is organized as follows. In the next section we introduce the data. In Section 3 we sketch the institutional frame of the Dutch pension system and the main aspects of the reform. In Section 4 we present the main estimation results, and Section 5 concludes.

2 Data and Self-employed Households

2.1 The Dutch Income Panel Study

We use the Dutch Income Panel Study (Inkomens Panel Onderzoek, IPO) from 2003 to 2011. IPO is a panel dataset containing yearly administrative records obtained from various government registers (prominently based on the data from the Dutch tax authorities and customs administration) on around 250,000 individuals and 90,000 households, or approximately 1.5% of the entire Dutch population. In this dataset, randomly selected “key persons”, supplemented with the household members of them, are drawn from the Dutch population. The key persons are tracked over time, although the household composition can change. The advantage of this dataset is that there is very low attrition: it is only caused by death and migration of the key person. New key persons are also included in the dataset from immigrants to the Netherlands and newborns every year. Being of administrative nature suggests the dataset has low measurement error in the financial and demographic variable of each observed individuals. The IPO dataset contains detailed and highly accurate information on personal income, augmented with various background

²The reform that we consider has previously been shown by Grip et al. (2012) to have large effects on mental health. We believe the present paper is the first to use the financial implications of the reform in context of self-employment choices.

variables, such as gender, age, marital status, household composition, country of birth, municipality of residence, home ownership, labor market status, and self-employment status and so on. However, it lacks education and health status as two of the potentially relevant background variables.

2.2 Definition of Self-employed Households

When constructing the sample, we adopt the following procedure. We concentrate on age groups that are typically of working age from 30 to 65 (those were born from 1940 to 1979). We define an individual as self-employed if he/she has non-missing income from his/her company. For each household, we define the household head (the reference person in a given household) as the oldest male. If a household does not contain any males, we use the oldest female person as the household head. In particular, we then use the socioeconomic and demographic characteristics of the household head as the household controls. Next, A household is defined as a self-employed household if the household head is self-employed, and a household is defined as being wage-employed if the household head is wage-employed. Table 1 reports the total number of observations for self-employed households and wage-employed households: in the final sample, there are around 8500 to 10000 self-employed households and around 45000 to 49000 wage-employed households during the period 2003 to 2011.

3 Quasi-natural Experiment for Self-employment Transition

To isolate the causal effect of wealth on the transition into self-employment, we use the Dutch pension system reform in 2006 as a quasi-natural experiment. We briefly sketch the institutional frame of the Dutch pension system and the main aspects of the reform.

3.1 The Dutch Pension System

The Dutch pension system is a three-pillar system. In the first pillar, all residents are entitled to receive a basic old age state pension at age 65. This system is of the pay-as-you-go type. In comparison with other EU countries, the basic old age state pension only represents a limited proportion of the total old age pension income. There is no distinction between gender and occupation in this first pillar. In the second pillar, the vast majority of wage-employees is covered by supplementary pensions. This is a collective and funded system, typically of the defined benefit type, and organized around private sector-specific, occupational or company-specific pension funds. The benefit of a second-pillar pension scheme depends on (past) wages, experience and whether one has been working full-time or part-time. Participation is mandatory for all employees that are associated with a covered company/sector or occupation. With a few exceptions, self-employed workers are not covered by sectoral or occupational second-pillar pension arrangements. Important for our analysis is the fact that many of the second-pillar arrangements allowed for generous early retirement possibilities; the age of labor force withdrawal within such schemes averaged to about 60 years. In a third pillar, individuals can build up voluntary pension savings through contracts with insurers, banks or investment companies. However, due to the fact that the second pillar supplementary pension is well-developed, not many wage-employees buy a third pillar pension product. These are more attractive to the self-employed and employees in sectors without a collective pension scheme. However for self-employed these are part of their disposable wealth, while the second pillar of self-employed is not disposable.

3.2 Changes in the Dutch Pension System

The reform of the Dutch pension system in 2006 provides a basis for a quasi-natural experiment to examine the causal impact of exogenous wealth change on the self-employment transition rate. With the aim to increase the labor force participation rate of older workers, on July 5th 2005, the Dutch government abolished the preferential tax treatment of early retirement in the second pillar pension schemes for all wage-employees born on 1 January 1950 or later in both public and private sector, and announced that the new pen-

sion scheme would be launched on January 1 2006. The wage-employees born until 31 December 1949 are still entitled to the older, more generous pension system, if they have been continuously working since 1 April 1997. However, employees born on 1 January 1950 or later, or those born before that date and who did not work continuously in the last 10 years are subject to the less generous new pension system. The most important features of the new pension system are a reduction of pension benefits and an increase in pension contribution payments.³ Not only the timing of the pension reform, but also the strong distinct treatment between wage-employees born until 31 December 1949 and from 1 January 1950 onwards came as a surprise to the public. Therefore, the pension system in 2006 provides the treatment group (wage-employees born on 1 January 1950 or later) and the control group (wage-employees born until 31 December 1949). Expect the reform of the Dutch pension system in year 2006, there are no other significant changes in the Dutch pension system between 1996 and 2011: mostly changes are in the hands of pension funds, there are few comprehensive nationwide systemic reforms of the pension system. The brief history of the changes in the Dutch pension system is documented in Appendix A.

For our research, it is also important that wage-employees understand the reduction of pension benefit caused by the pension system reform. In order to make all participants acquainted with the new pension system, in the second half of 2005, there was an introduction campaign launched by all pension funds to explain the new pension system. A variety of methods, like special news bulletins, letters sent by employers, electronic service packages were used to explain the difference between the old and new pension systems. Therefore, it is reasonable to believe that on January 1st 2006, wage-employees born on 1 January 1950 or later in both public and private sectors were aware of the reduction of their pension wealth caused by pension system reform.⁴

³For example, for a wage-employee in the public sector born in 1950 with labor market entry in 1975 and continuous participation, with current earnings of 60,000 euro per year, the replacement rate drops from 69% to 66% due to the pension system reform in the early retirement period.

⁴This also has been verified empirically, see Grip et al. (2012).

3.3 Approximation of the Reduction in Replacement Rate Caused by the Reform

The pension benefit is based on old-age pension benefits and on early retirement pension benefits. We calculate the approximate replacement rate at age 65 before and after the pension system reform, respectively, according to the calculation rules provided by ABP (the public sector pension fund). The underlying assumption for our approximation is that all wage employees are full-time workers. The individuals replacement rate crucially depends on employees birth year, tenure, and current income from employment. In our dataset, we cannot observe individuals tenures directly. To approximate it, we select the larger of the values of an individuals tenure on the current job and the observed number of years of pension accumulation. To eliminate variation in employees income, we use the average income from employment in the last five years as a proxy for the current income from employment.⁵ We multiply the difference between the calculated replacement rate before and after the reform with the current income to estimate the annual pension wealth reduction after age 65. Then, we sum up all the annual pension wealth reductions between age 65 and 100 to obtain expected total pension wealth reduction due to the reform, taking into account inflation and tabulated survival probabilities. Pension wealth and yearly income are deflated to euro in year 2011 by the Dutch Consumer Price Index.

Our calculations are based on the situation in 2006, but we do not take into account the changes in the pension system after 2006: for example, raising the eligibility age of the state pension and cuts in pensions benefits due to the financial crisis. Although ABP is the pension administrator for the public sector, in the private sector the wage-employees born on 1 January 1950 or later face similar pension benefit drops due to the reform. Therefore, we use the rules of ABP to calculate the replacement rate of wage employees in both public sector and private sector.

⁵The calculation rules requires that yearly income from employment larger or equal to euro 27000, so I drop those whose proxy for the current income is less than 27000 euro.

4 Econometric Analysis

4.1 Specifications

We define the dependent variable, $y_{it} = 1$ if an individual is wage-employed (WE) in year $t-1$ and self-employed (SE) in year t ; otherwise, $y_{it} = 0$ if an individual is wage-employed in both year $t-1$ and t . According to whether one has income from his/her own company and whether one has income from wage-employment, we define two types of self-employment: we define an individual to be self-employed if one has non-zero income from his/her own company; with a strictest criterion, we define an individual to be full-time self-employed if one only has non-zero income from his/her own company while has zero income from wage-employment. Figure 1 plots the relationship between age and self-employment (if one has non-zero income from his/her own company) transition rate. The overall pattern is that the probability of entering self-employment decreases with age. From Figure 1, one may also conclude that the self-employment transition rates differ by years. Compared with other years, the self-employment transition rate is extremely high for young wage-employees in 2008.

We assume that the treatment group (wage-employees born on 1 January 1950 or later) and the control group (wage-employees born until 31 December 1949) have experienced the same trend before the pension reform started in 2006. Figure 2 plots the self-employment transition rates for the period 2003 to 2011. From Figure 2, one can see that the self-employment transition rates of the treatment and control groups are quite similar before the pension reform year 2006, suggesting that the common trend assumption is satisfied. Furthermore, since the average age of the treatment group is younger than that of the control group, the self-employment transition rate of the treatment group is also higher than that of the control group.

For selected year 2005 (before the reform) and 2006 (after the reform) only, Table 2 presents basic descriptive statistics for the treatment group and the control group respectively. Those wage-employees who are affected by the reform in 2006 have significant higher self-employment transition rate than that of before reform (year 2005). Because of the

pension system reform, the replacement rate of the treatment group drops by 0.028 on average in year 2006, and expected total pension wealth decreases by around 32400 euro. We also find that the lag income from wage-employment in 2006 is significantly higher than that of 2005 for the treatment group. The t-test for equal means indicates that there is no significant difference within the treatment group between 2005 and 2006 when it comes to other control variables that are not directly affected by the pension reform and time evolution for the treatment group. Similar evidences also hold for the control group, except that there are small significant changes in terms of household size and number of income earners between 2005 and 2006.

4.2 Estimation Results

First we use dummy for treatment (dummy for year is larger or equal to 2006 and cohort is younger or equal to 1950) as explanatory variable. Column (1) - (2) and Column (3) - (4) in Table 3 use pooled OLS regression and fixed-effects regression for self-employment transition respectively. After we condition on everything, the general conclusion emerging from the estimation results is that the exogenous pension wealth reduction has a significant negative effect on individual's decision to enter self-employment. Particularly, the consistent significant results of the transition into full-time self-employment imply that the pension reform in 2006 decreases the probability of entering full-time self-employment and entirely quitting wage-employment by 0.15 percentage point. Although the absolute value of this estimate is quite small, but one should notice that the self-employment transition rate is not very large either (see Figure 2).

Instead of using the dummy for treatment, Column (1) - (2) in Table 4 repeats the same pooled OLS analyses as Table 3 while using the approximated reduction in replacement rate due to the pension reform as explanatory variable. Similar to Column (1) - (2) in Table 3, we find that the exogenous reduction in replacement rate only has a significant negative effect on full-time self-employment transition. One may argue that the approximated reduction in replacement rate contains non-ignorable measurement error. Indeed, the approximation of individuals job tenure may lead to biased estimates of the reduction

in replacement rates. Therefore, Column (3) - (4) in Table 4 also performs two-stage least-squares (2SLS) estimation, in which the reduction in replacement rate is instrumented by the dummy for treatment.⁶ Once instrumenting the reduction in replacement rates, we find that the exogenous reduction in replacement rate still has a significant negative effect on individual’s decision to entirely quit wage-employment and enter the full-time self-employment: 0.01 unit reduction in replacement rate decreases the probability of entering self-employment by 0.05 percentage point (based on the estimation result of 2SLS estimation).

Table 5 repeats the same analyses of Table 4 while using the expected total reduction in pension wealth due to reform as explanatory variable. Similar findings are confirmed again by the results in Table 5. The consistent significant estimates between Column (2) and Column (4) for full-time self-employment transition implies that exogenous reduction in the expected total pension wealth has a significant negative causal effect on one’s decision to entirely quit wage-employment and the enter full-time self-employment: one hundred thousand euro reduction in expected total pension wealth decrease the full-time self-employment transition rate by 0.65 percentage points (based on the result of 2SLS estimation). When pension wealth drops, wage-employed tend to stay longer in wage-employment to refill it.

5 Conclusions

In this paper, we identify the causal effect of pension wealth on the self-employment choice. To solve the issue of potential endogeneity of wealth changes, instead of analysing the relation between self-employment transition and financial wealth change or housing wealth change as the majority of literature do, we utilize the Dutch pension system reform in 2006 as a quasi-natural experiment to study the causal relation between wealth change and self-employment transition.

Our evidence, supported by the identification strategy of an unexpected and broad policy reform, and the use of a very rich administrative data set, provide support for

⁶The F-statistic for the relevance of the instrument is 1533.4, indicating the instrument is relevant.

the one-way causal effect interpretation: exogenous changes in pension wealth have a significant negative effect on one's decision to entirely quit wage-employment and enter self-employment. When pension wealth drops, wage-employed tend to stay longer in wage-employment to refill it. There are a number of papers that put financial market imperfections (liquidity constraints) at the heart of the explanation of the cross-sectional correlation between self-employment and wealth. Our paper therefore underlines the importance of isolating exogenous changes in wealth, and suggest that as a type of indisposable wealth before retirement, the role of pension wealth, should not be neglected when studying the self-employment transition.

References

- Bloemen, H (2010). Income Taxation in an Empirical Collective Household Labour Supply Model with Discrete Hours. *Tinbergen Institute Discussion Papers 10-010/3*.
- Brown, Jeffrey R., Courtney C. Coile, and Scott J. Weisbenner (2010). The Effect of Inheritance Receipt on Retirement. *The Review of Economics and Statistics* 92(2), 425–434.
- Cagetti, Marco and Mariacristina De Nardi (2005). Entrepreneurship, frictions, and wealth. (WP-05-09).
- Dunn, Thomas and Douglas Holtz-Eakin (2000, July). Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links. (5622).
- Evans, David S and Boyan Jovanovic (1989). An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy* 97(4), 808–27.
- Gentry, M and R Hubbard (2004). Entrepreneurship and Household Saving. *The B.E. Journal of Economic Analysis & Policy* 4(1), 1–57.
- Grip, Andries De, Maarten Lindeboom, and Raymond Montizaan (2012, 03). Shattered Dreams: The Effects of Changing the Pension System Late in the Game. *Economic Journal* 122(559), 1–25.
- Hamilton, Barton H. (2000, June). Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment. *Journal of Political Economy* 108(3), 604–631.
- Hurst, Erik and Annamaria Lusardi (2004, April). Liquidity Constraints, Household Wealth, and Entrepreneurship. *Journal of Political Economy* 112(2), 319–347.
- Hurst, Erik, Annamaria Lusardi, Arthur Kennickell, and Francisco Torralba (2010). The Importance of Business Owners in Assessing the Size of Precautionary Savings. *The Review of Economics and Statistics* 92(1), 61–69.

- Imbens, G.W., D. Rubin, and B. Sacerdote (2001). Estimating the effect of unearned income on labor supply, earnings, savings and consumption: Evidence from a survey of lottery players. (99.34).
- Van der Lecq, F. and A. Oerlemans (2009). Zelfstandigen Zonder Pensioen. *NEA-paper 24, Tilburg: Netspar*.
- Lindh, Thomas and Henry Ohlsson (1996, November). Self-Employment and Windfall Gains: Evidence from the Swedish Lottery. *Economic Journal 106(439)*, 1515–26.
- Nykvist, Jenny (2008). Entrepreneurship and Liquidity Constraints: Evidence from Sweden. *Scandinavian Journal of Economics 110(1)*, 23–43.
- Schmalz, Martin C., David A. Sraer, and David Thesmar (2013). Housing Collateral and Entrepreneurship. (19680).
- Statistics Netherlands, CBS (2011). Report. *Statistics Annual Report*.
- Taylor, Mark P (1999). Self-Employment and Windfall Gains in Britain: Evidence From Panel Data. (2084).
- Zissimopoulos, Julie M. and Lynn A. Karoly (2007). Transitions to self-employment at older ages: The role of wealth, health, health insurance and other factors. *Labour Economics 14(2)*, 269–295.

Appendix A

This part documents the brief history of the changes in the Dutch pension system. Except 2006, there is no significant changes between 1996 and 2011: mostly changes are in the hands of pension funds, there are few comprehensive nationwide systemic reforms of the pension system.

Between 1947 and 1957, the history of the modern Dutch pension system starts typically with the official introduction of the basic old age state pension. When the basic old age state pension was introduced, only about 10% of the employees had a second pillar pension. Immediately after the second world war this percentage increased, as participation was made binding at collective labor agreement (CAO) level, and now about 90% of the employees is covered. In 1952, the second pillar system has increased in generosity over the years: it firstly allowed to retire after only contributing for 25 years. In 1980's, the early retirement scheme was introduced and becomes popular, topping in the years prior to the reform in 2006. Furthermore, increasing returns on stocks at the end of the 80's beginning and of the 90's also allowed pension funds not to request their participants to regularly pay premiums. The system becomes over years more generous, and the basic old age state pension benefit is linked to wage-inflation. Since 1991, the basic old age state pension is indexed differently due to the rising costs. In 1996, as real wages had dropped because of the oil crisis, by then the basic old age state pension indexation was reintroduced, but this time subject to ad hoc yearly revisions. Back then it was also decided that as of 2015 the basic old age state pension for couples will be reduced, notwithstanding the income of the younger spouse. In 2005, pension funds costs started rising when early retirement became popular as a reaction to the high level on unemployment in the mid 90's. Also the returns of the funds started worsening due to the difficulties on the financial markets. As a result in 2005 most funds have increased premiums and started shifting from a final wage system to an average wage system. The significant reform used in the paper took effect in 2006, when the early retirement scheme is made fiscally unattractive. The law of 2007 that checks the solvability of pension funds has been sharpened, and the law of 2008 was passed to make the uniform pension overview compulsory. In 2011, a law was passed

that gives De Netherlands Bank (DNB) the task to monitor the "lost pensions". This is a problem due to the merging of pension funds, and the fact that one can build entitlements with different funds.

Appendix B

Year	Self-employed Household		Wage-employed Household		All Household
	Number	Percentage	Number	Percentage	Number
2003	8571	10.3%	45933	55.2%	83212
2004	8448	10.1%	46757	55.9%	83644
2005	9044	10.7%	46887	55.7%	84188
2006	9074	10.8%	47396	56.4%	84039
2007	9408	11.2%	48316	57.4%	84137
2008	9983	11.8%	48487	57.5%	84357
2009	9809	11.5%	48532	57.1%	84941
2010	9963	11.9%	47326	56.4%	83894
2011	10119	12.0%	48644	57.4%	84594

Table 1: Total number of observations for self-employed households and wage-employed households

	Treated group: cohort \geq 1950					Untreated group: cohort \leq 1949				
	Year 2006		Year 2005		p-value	Year 2006		Year 2005		p-value
	Mean	St.Dev	Mean	St.Dev		Mean	St.Dev	Mean	St.Dev	
Self-employment transition rate	0.0123	0.0001	0.0103	0.001	0.013	0.006	0.002	0.003	0.001	0.045
Reduction in replacement rate due to reform	0.0275	0.0001	0.000	0.000	0.000	0	0	0	0	/
Reduction in expected total pension wealth / 10^5	0.324	0.002	0.000	0.000	0.000	0	0	0	0	/
Lag income from wage-employment	58500	315	57167	274	0.015	62531	872	63957	1067	0.315
Age	44.0	0.048	43.1	0.047	0.000	59.2	0.036	58.5	0.036	0.000
Tenure	16.9	0.049	15.9	0.048	0.000	25.5	0.20	24.8	0.184	0.008
Household size	3.559	0.01	3.574	0.01	0.257	2.329	0.018	2.381	0.017	0.034
Number of persons with income in a household	2.108	0.006	2,107	0.006	0.890	1.947	0.016	1.989	0.015	0.063
Indicator for relocation	0.051	0.002	0.052	0.002	0.417	0.023	0.003	0.029	0.003	0.161
Indicator for living in high urbanization	0.124	0.002	0.124	0.002	0.989	0.124	0.007	0.124	0.006	0.946
Indicator for immigrant	0.123	0.002	0.124	0.002	0.756	0.118	0.007	0.117	0.006	0.903
Indicator for unmarried	0.150	0.003	0.151	0.003	0.791	0.056	0.005	0.055	0.004	0.924
Indicator for married	0.787	0.003	0.788	0.003	0.799	0.839	0.007	0.836	0.007	0.715
Indicator for widowed	0.004	0.0005	0.004	0.0005	0.996	0.014	0.002	0.018	0.002	0.328
Indicator for divorced	0.059	0.002	0.057	0.002	0.393	0.094	0.006	0.088	0.005	0.412
Number of observations	17763		18002			2887		3001		

Table 2: Means of variables and mean-comparison tests for the treatment group and the control group for year 2005 (before the reform) and year 2006 (after the reform)

	(1)	(2)	(3)	(4)
	OLS		Fixed-effects	
	Trans. into SE	Trans. into full-time SE	Trans. into SE	Trans. into full-time SE
	Trans. into SE	Trans. into full-time SE	Trans. into SE	Trans. into full-time SE
Dummy for treatment	-0.0016	-0.0015***	-0.0037***	-0.0015***
Dummy for cohort ≤ 1949	-0.0087**	-0.0020	/	/
Dummy for year ≥ 2006	0.0046***	0.0015***	0.0048***	0.0010**
Age	-0.0007	0.00002	0.0079***	0.0011***
Age squared	$8.26 * 10^{-6}$ *	$3.76 * 10^{-7}$	$-6.57 * 10^{-5}$ **	$-8.36 * 10^{-6}$ **
Lag income from wage-employment / 10^5	0.0025***	0.0006**	-0.0050***	-0.0016***
Tenure	-0.0001***	-0.00003***	/	/
Household size	0.0008***	0.0001	0.0008*	0.00004
Number of income earners	-0.0002	0.0000	-0.0003	-0.0001
Dummy for relocation	-0.0001	0.0003	-0.0010	-0.0004
Dummy for living in high urbanization	-0.0005	0.0001	0.0001	0.0006
Indicator for immigrant	-0.0011**	0.00004	/	/
Indicator for unmarried	-0.0021**	-0.0003	-0.0043	-0.0026**
Indicator for married	-0.0030***	-0.0009**	-0.0064***	-0.0012*
Indicator for widowed	-0.0047***	-0.0015***	-0.0078	-0.0020
GDP increase rate	0.0003	0.0001	0.0004	0.0001
Constant	0.0271**	0.0005	-0.2066***	-0.0272***

Note: Transition into self-employment: self-employment income = 0 in year $t - 1$ and self-employment income $\neq 0$ in year t . Transition into full-time self-employment: self-employment income = 0 in year $t - 1$, and self-employment income $\neq 0$ and wage-employment income = 0 in year t . Dummy for treatment=1 if cohort ≥ 1950 and year ≥ 2006 , dummy for treatment = 0 otherwise. The total number of observation is 171997.

Table 3: Regression results of self-employment transition rate. Explanatory variable: dummy for treatment

	(1)	(2)	(3)	(4)
	OLS		IV	
	Trans. into SE	Trans. into full-time SE	Trans. into SE	Trans. into full-time SE
Reduction in replacement rate	-0.0213	-0.0135*	-0.0539	-0.0509***
Dummy for cohort \leq 1949	-0.0074*	-0.0007	-0.0074*	-0.0008
Dummy for year \geq 2006	0.0037***	0.0005*	0.0044***	0.0012***
Age	-0.0010**	-0.0002	-0.0010	-0.0003
Age squared	$1.09 * 10^{-5}$ **	$2.69 * 10^{-6}$	$1.18 * 10^{-5}$ **	$3.74 * 10^{-6}$ *
Lag income from wage-employment / 10^5	0.0026***	0.0007***	0.0029**	0.0010**
Tenure	-0.00015***	-0.00003***	-0.00014***	-0.00002***
Household size	0.0008***	0.0001	0.0008**	0.0001*
Number of income earners	-0.0002	0.0000	-0.0002	$-1.75 * 10^{-6}$
Dummy for relocation	-0.0001	-0.0003	-0.0001	-0.0003
Dummy for living in high urbanization	-0.0005	-0.0001	-0.0005	-0.0001
Indicator for immigrant	-0.0012**	0.0000	-0.0012*	-0.00001
Indicator for unmarried	-0.0021**	-0.0003	-0.0021*	-0.0003
Indicator for married	-0.0030***	0.0009***	-0.0030***	-0.0009***
Indicator for widowed	-0.0047***	0.0015***	-0.0047*	-0.0015*
GDP increase rate	-0.00003	0.00003	-0.00001	-0.00001
Constant	0.0314*	0.0046	-0.0050*	0.0011

Note: Transition into self-employment: self-employment income = 0 in year $t - 1$ and self-employment income \neq 0 in year t . Transition into full-time self-employment: self-employment income = 0 in year $t - 1$, and self-employment income \neq 0 and wage-employment income = 0 in year t . The reduction in replacement rate is instrumented by dummy for treatment. The F-statistic for the relevance of the instrument is 1553.4. The total number of observation is 171997.

Table 4: Regression results of self-employment transition rate. Explanatory variable: reduction in replacement rate (instrumented by dummy for treatment)

	(1)	(2)	(3)	(4)
	OLS			IV
	Trans. into SE	Trans. into full-time SE	Trans. into SE	Trans. into full-time SE
Reduction in expected total pension wealth / 10^5	-0.0013	-0.0028**	-0.0068	-0.0065***
Dummy for cohort ≤ 1949	-0.0008	-0.0077*	-0.0016	-0.0083**
Dummy for treatment year ≥ 2006	0.0003	0.0038***	0.0014***	0.0046***
Age	-0.0002**	-0.0010**	-0.0004**	-0.0011**
Age squared	$2.45 * 10^{-6}$	$1.14 * 10^{-5}$ **	$4.85 * 10^{-6}$ **	$1.30 * 10^{-5}$ **
Lag income from wage-employment / 10^5	0.0007	0.0031	0.0021	0.0042
Tenure	-0.00003***	-0.0002***	-0.00002*	-0.0001***
Household size	0.0001	0.0008**	0.0001**	0.0008*
Number of income earners	-0.000003	-0.0002	-0.000003	-0.0002
Dummy for relocation	-0.0003	-0.0001	-0.0003	-0.0001
Dummy for living in high urbanization	-0.0001	-0.0005	-0.0001	-0.0004
Indicator for immigrant	0.00004	-0.0012**	0.00001	-0.0012*
Indicator for unmarried	-0.0003	-0.0021**	-0.0003	-0.0021**
Indicator for married	-0.0009**	-0.0030***	-0.0010***	-0.0030***
Indicator for widowed	-0.0015***	-0.0047***	-0.0015*	-0.0047*
GDP increase rate	0.00003	0.00002	0.00003	0.00001
Constant	0.0053	0.0323*	0.0060*	0.0329**

Note: Transition into self-employment: self-employment income = 0 in year $t-1$ and self-employment income $\neq 0$ in year t . Transition into full-time self-employment: self-employment income = 0 in year $t-1$, and self-employment income $\neq 0$ and wage-employment income = 0 in year t . The reduction in expected total pension wealth is instrumented by dummy for treatment. The F-statistic for the relevance of the instrument is 1477.2. The total number of observation is 171997.

Table 5: Regression results of self-employment transition rate. Explanatory variable: reduction in expected total pension wealth (instrumented by dummy for treatment)

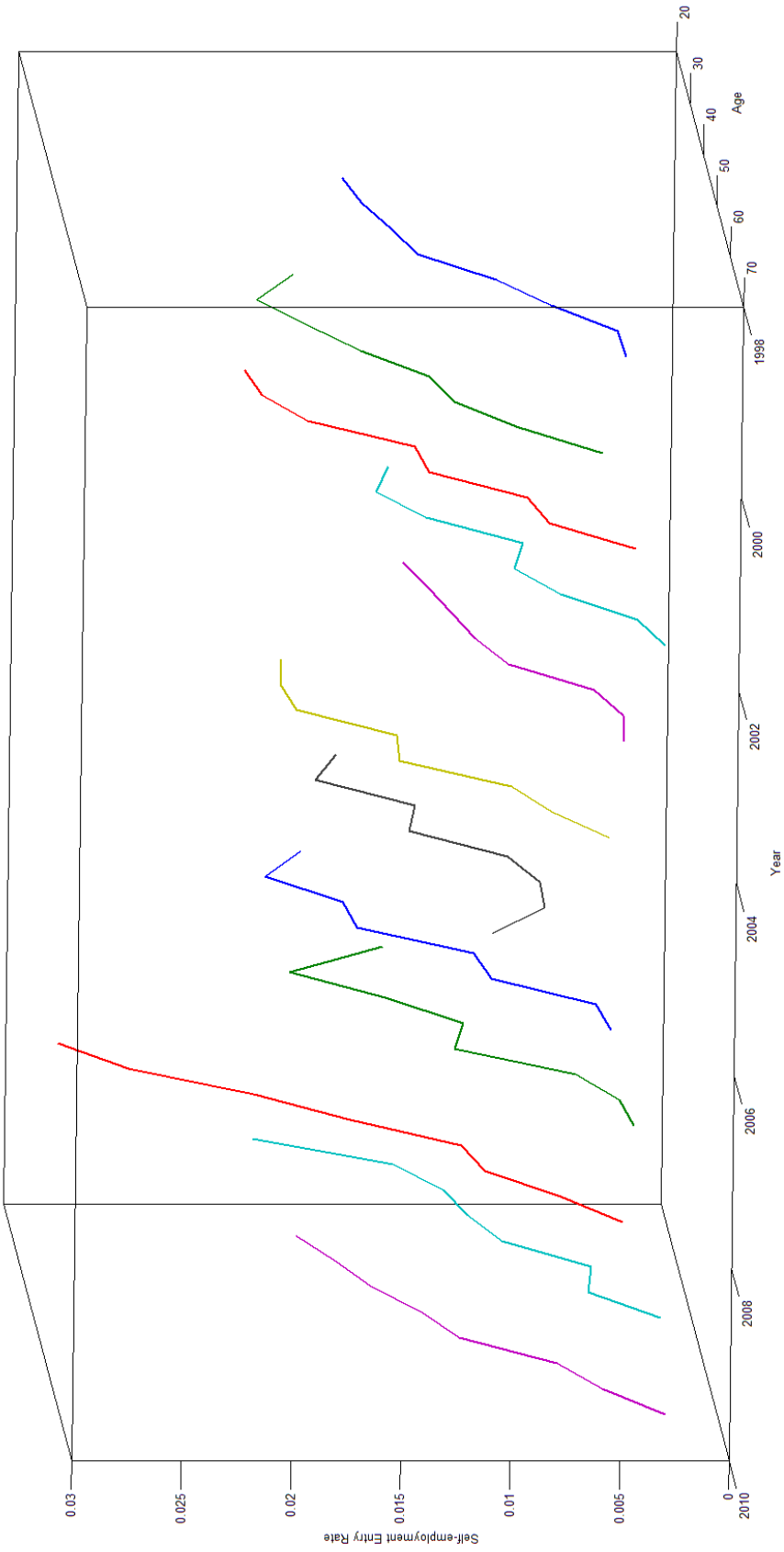


Figure 1: Self-employment transition rates by age and year

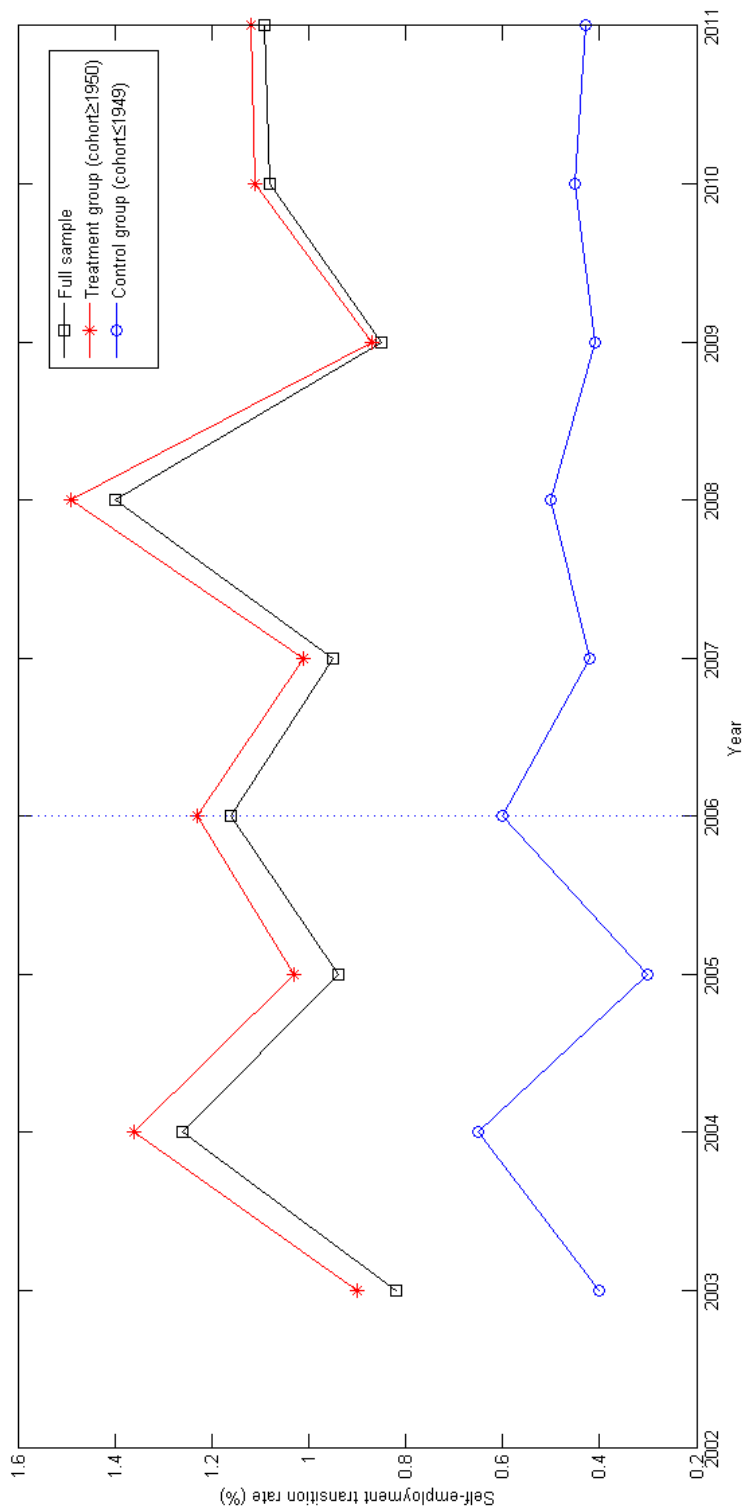


Figure 2: Self-employment transition rates of treatment group and control group