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The Displacement Effect of Compulsory Pension Savings on Private Savings

Evidence from the Netherlands, Using Institutional Differences across Occupations

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The displacement effect of compulsory pension savings on private savings. Evidence from the Netherlands, using institutional differences across occupations

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Abstract

We study the displacement effect of mandatory occupational pension saving on private household wealth in the Netherlands, separately for wage-employed and self-employed. We use rich administrative data on （pension） wealth and income and apply a range of identification strategies, from IV regressions to propensity score matching and difference-in-differences analyses, to determine the displacement effects. To the best of our knowledge, for the first time, we merge pension funds balance sheet data to the micro data of their members. We set up a quasi-natural experiment, based on the differential impact of the financial crisis on the separate pension funds in the Netherlands, and we find that those whose pension fund did not need to apply a recovery plan accumulated about 3,500 euro less household wealth over de period 2007-2010. Our preferred regression analyses on couples show a displacement effect of -33% for wage-employed and a higher one of -61% for self-employed. Self-employed are arguably more aware of their pension accrual, or lack thereof, because they are responsible for the payment of their pension premiums. Also, the self-employed are on average less risk-averse than wage-employed, and can thus be expected to hold less precautionary savings.

Keywords: Displacement effect, pension wealth, savings, occupation, balance sheet data.

JEL Classification: D91, E21

1 Introduction

A mandatory retirement system, for instance in the form of social security, occupational pension or any other compulsory scheme, can affect private savings through the displacement effect, and by inducing early retirement (Feldstein, 1974). The effects on early retirement have been extensively documented by e.g. Gruber and Wise (1999, 2008). Our paper further investigates the displacement effect of obligatory pension savings on private (discretionary) savings. More information on the displacement effect – and the heterogeneity thereof – can be of guidance to policy makers who are looking for ways to help vulnerable groups better prepare for retirement or to make the pension system more robust in light of an ageing society.

Many studies have appeared on this subject, resulting in a wide range of estimates for the displacement effect. This large variety in outcomes reflects the heterogeneity among the research subjects. The studies vary, for example, in the periods, the countries and the pension schemes (public and/or private) they examine. But this type of research is also often plagued by biases and measurement error. Especially pension wealth is notorious for its elusiveness. So, part of the deviation in estimates will stem from the different data sets and estimation strategies that have been used. Each strategy and study has specific strengths and draw-backs.

Our paper adds to the existing literature on several accounts. We explore new rich administrative datasets on pension participation and on pension wealth in the Netherlands, and take into account the differences in institutions related to occupational choice and income levels. This allows us to assess the displacement effect also for the self-employed and compare this to the displacement effect for the wage-employed. Based on possible differences in awareness of the accumulation of pension rights and in risk aversion between these groups, we would expect to find higher displacement effects for self-employed than for wage-employed. We also link balance sheet data of pension funds to our micro data, for workers in several binding labor agreements, which allows us to set up a quasi-natural experiment. We use standard estimation techniques, but we also explore instrumental variables, propensity score matching and difference-in-differences techniques to identify the (heterogeneity in the) displacement effect and check the robustness of our findings.

The results of our quasi-natural experiment indicate that those whose pension fund did not need to apply a recovery plan accumulated about 3,500 euro less household wealth over de period 2007-2010. Our preferred regression analyses further show an average displacement effect for couples of -33% for wage-employed and of -61% for self-employed. Propensity score matching and difference-in-differences analyses confirm the existence of substantial displacement effects, though not all estimates are significant.

We will start with discussing some of the more recent and influential papers on the displacement effect in Section 2. We include several papers on Dutch data, because our empirical analysis is focused on the Netherlands, due to data availability and the possibility to exploit a quasi-natural experiment. We present a structural model in Section 3. Section 4 contains a description of our data sources and in Section 5, on the empirical implementation, we describe our identification strategies. Section 6 shows our primary results and we conclude in Section 7.

2 Literature overview

Attanasio and Brugiavini (2003) provided one of the first micro-based studies of the displacement effect, which they identify using the 1992 Italian pension reform. They exploit the variability in exogenous changes in pension wealth across groups of Italian households to identify the effect that pension wealth has on saving rates. Based on estimated pension wealth they find a displacement effect of -35% on average, but close to -100% for workers aged between 35 and 45. Attanasio and Rohwedder (2003) perform a comparable analysis using UK pension reforms over the period 1975-1981, with comparable results. They find substantial displacement effects (−55% to −75%), primarily among the older and higher income households. They state that the lower displacement among the poorer and younger households might be caused by liquidity constraints.

Engelhardt and Kumar (2011) study the 1992 wave of the US Health and Retirement Study to estimate the displacement effect. They reduce measurement error by constructing an instrumental variable, based on employer-provided pension wealth and Social Security wealth, and find a displacement effect of about −60%, while their original OLS estimate is +23%. Half of the difference is due to bias from measurement errors in pension wealth in the OLS estimate. The other half is due to nonlinearities and unobserved heterogeneity. They also find that displacement is higher at the higher wealth quantiles.

Using a large Danish panel data set over the period 1995 to 2009, Chetty et al. (2014) show that the effects of retirement savings policies on wealth accumulation depend on whether they change savings rates by active or passive choice. They find that approximately 85% of individuals are passive savers who save more when induced to do so by an automatic contribution, but do not respond at all to price subsidies. Such subsidies lead to little action at all and, if so, than primarily by individuals who are planning and saving for retirement already and who respond by basically shifting savings across accounts, which leads to almost full displacement.

Kapteyn and Panis (2005) look at differences in the generosity of pension schemes between the USA, Italy and the Netherlands. They find that on average the replacement rate in the USA is substantially lower than in the Netherlands, but this can be compensated almost fully by annuitizing net wealth, which is substantially larger in de USA. They conclude that this is fully consistent with a life-cycle model, where the relatively large institutional pension savings in the Netherlands have displaced personal retirement savings. Hurd et al. (2012) use micro-data sets from 12 countries to construct income replacement rate and private saving measures by education level and marital status, as proxies for lifetime earnings. They estimate the displacement effect by using cross-country differences in the progressivity of the pension formula and the average generosity and find that an extra dollar of public pension displaces 22 cents of accumulated financial assets. Both studies face the challenge of comparing countries with potentially considerable institutional and cultural differences. Job and pension scheme characteristics may differ across and within countries because of institutional features, such as the Italian credit restrictions mentioned by Kapteyn and Panis (2005). Alessie et al. (2013) estimate the displacement effect for 13 European countries, including the Netherlands, based on SHARELIFE data. Their data include retrospective data on lifetime earnings. Their robust (median) regression results suggest a displacement effect of 47 (61) percent. They also explore IV estimates, which suggest full displacement, but with less precision.

Euwals (2000) and Kapteyn et al. (2005) focus specifically on the case of the Netherlands. Euwals (2000) exploits the heterogeneity in occupational pension wealth within a Dutch survey dataset from 1994 to explain differential savings. His dataset does not allow him to make an accurate quantitative estimate of the displacement effect, but he does find a significant negative impact of both social security and pension wealth on savings motives with respect to old age. Kapteyn et al. (2005) study the differential impact of the introduction of the social security system in the Netherlands on the wealth holdings of separate cohorts, in order to identify the displacement effect of social security on private wealth. They show that an increase in social security benefit by 1,000 guilders reduces net worth by 115 guilders, thus finding a displacement effect of -11.5%. One reason they mention for finding a relatively low level of displacement is the potential effect of social security on earlier retirement, which increases the need to save, and hence attenuates the effect of social security on saving.

3 The model

Our model is meant to illustrate the main factors that should be accounted for in the empirical analysis. As such, we use several simplifications that are common in the literature (see e.g. Alessie et al., 2013). For example, we assume full information about the pension system for all participants, ignore liquidity constrains and assume perfect capital markets. In accordance with Alessie et al. (2013) we start with the following general intertemporal maximization problem:

$$\max_{C_t} \sum_{t=1}^{T} (1+\delta)^{1-t} \frac{C_t^{1-\gamma}}{1-\gamma} \qquad (1a)$$

$$\text{s.t.} \quad \sum_{t=1}^{T} (1+r)^{1-t} C_t = \sum_{t=1}^{T} (1+r)^{1-t} Y_t \qquad (1b)$$

Here C_t is per period consumption, δ is the individual discount rate, γ is the coefficient of relative risk aversion, r is the interest rate and Y_t is per period income.

The Euler equation, which shows that the marginal utility of consumption should be equalized over the lifetime, is:

$$E_t({C_{t+1}}^{-\gamma}) = \frac{1+\delta}{1+r} {C_t}^{-\gamma} \qquad (2)$$

For the purpose of our study, we simplify the intertemporal problem by assuming a model with only two-periods, but we enrich the model by allowing for some uncertainty, to explore its potential impact on savings. In the first period an income is earned, such that $c_1 = y - s_c - s_f$, with s_c and s_f respectively representing compulsory and free savings. In the second period these savings are consumed, and the compulsory part of savings could be hit by some shock k, such that $c_2 = \left(s_c + s_f\right) * (1+r) + k$. The inclusion of k testifies of exogenous shocks due to the uncertainty of pension fund performance, which might result in pension cuts. These cuts have so far always been compensated, so that k can be considered as a mean preserving spread to income with $E(k) = 0$. In order to ease computations, we further assume that all savings receive the same return and equal the individual discount rate $r = \delta = 0$. Notice that the standard solution including the discounts would imply that lower assets are accumulated by those who are more impatient (with $\delta > r$).

Using a second order Taylor expansion, and simplifying out the rate of time preference and some higher level terms, we can rewrite Equation (2) into:

$$s_f = \frac{y}{2} - s_c + \frac{1}{4}\gamma \left\{ \text{Var(k)} + \text{Var}\left(y + 2\left(s_c + s_f\right)\right) \right\} \qquad (3)$$

This shows that free savings is positively related to permanent income $\frac{y}{2}$ (or $\bar{y}$, the sum of total income divided by the number of periods), negatively to compulsory savings s_c and

positively to income uncertainty – represented here by the variance term. This variance term embodies precautionary savings, which increase with a higher risk aversion parameter γ. Also, the results suggest that the mean preserving spread in income k does not affect the first moment of Equation (3) but does have an effect on uncertainty. Based on this, we propose the following estimation equation:

$$s_f = \beta_0 + \beta_1 s_c + \beta_2 \bar{y} + \beta_3 \text{Var}(y) + \beta_4 \text{Var}(k) + \beta_5 \gamma + \varepsilon \qquad (4)$$

The term β_1, the displacement effect, is precisely estimated if s_c is exogenous and accurately measured. Full displacement, where each euro increase in (mandatory) pension wealth results in a euro less saved, would imply that β_1 is equal to −1. β_2 captures the effect of permanent income, β_3 captures the effect of the variance of income over time, which proxies for income uncertainty. β_4 captures the uncertainty related to the income spread. β_5 will capture the risk aversion (γ), as a separately added term. This is a deviation from Equation (3), partly due to the limited availability of empirical proxies for it in our data, but we also implicitly account for it by showing separate estimation results for wage-employed and self-employed, who are typically different in risk preferences. Section 5 presents our empirical implementation in more detail, but first we will discuss our available data.

4 Data

Our analysis is based on the Dutch Income Panel Study with Wealth ("Inkomens Panel Onderzoek met Vermogen" in Dutch, hereafter IPO Wealth) over the period 2007 to 2010. IPO Wealth is an administrative panel dataset containing yearly records obtained from various government registers on around 270,000 individuals from almost 100,000 households, or approximately 1.5% of the entire Dutch population. This is a highly accurate and representative panel, where only migration or death could cause attrition. After merging with other micro datasets, [1] the dataset we use contains detailed information on personal wealth and income and the affiliation to the compulsory occupational pension, augmented with various background variables, such as gender, age, marital status, household composition, country of birth, municipality of residence, homeownership, wage-employment and self-employment status and

[1] We enriched the IPO data with several other administrative datasets from CBS: 1) "Witte vlekken onderzoek", which contains information about the current occupational pension fund affiliation, 2) Pensioenaanspraken and Pensioendeelnemingen, which contain information on occupational pension entitlements, 3) Zelfstandigentab, which contains information about self-employment, and 4) SSBbaankenmerkenbus, which contains information about wage-employment.

sector.[2] Finally, we also merge the data with pension-fund level balance sheet information through the corresponding binding labor agreements.[3]

Although we will make use of the information on both partners in households with couples, we make some selections of households based on characteristics of only the household head, such as the age and labor market status. We define as the household head the oldest male in the household, or the oldest female when there are no males in the household. We focus our analysis on households with a household head aged 40 to 60, because at later ages early retirement might bias the sample and at younger ages respondents have cumulated very little pension wealth.

Following the administrative data from the tax office, we define someone as self-employed if he/she has non-zero income from his/her own business. Additionally, we define those who have income from both their own company and wage-employment as hybrid self-employed, and we remove them from our dataset to get clear comparisons between pure wage-employed (WE) and pure self-employed (SE).[4] We only consider standard single and couple households (with or without children) and drop the otherwise composited households, for a clearer interpretation of household wealth and financial planning. For the same reason, we also drop those cases with one or more children above the age of 25 who are living in the household. Table 1 shows what these selection criteria mean for our available observations.

Strengths and weaknesses of our administrative data

We have chosen to use unique administrative data sources for our research project, which provide relatively large amounts of very detailed and accurate financial data on the whole household. This is an addition to previous studies on the Dutch case, which typically used survey data, from the oldest male in the household, for their analyses.[5]

Yet, using administrative data means that we lack the less tangible but also very valuable information that surveys – to a certain extent – can provide, such as information on the planned retirement age or on preferences for saving and risks. We do not observe expected or planned retirement age, so we cannot correct for it. Disney (2006) shows that, the

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[2] Information on educational attainment is not available at the administrative level, but for the age group we study, this would probably not add much to the available information on labor income (Alessie et al., 2013).

[3] For this analysis we select only those wage-employed whom we know to participate in an occupational pension scheme.

[4] About 1,500 households are hybrid self-employed, which is about 29% of all households with income from self-employment (see Table 2.1). The wealth and income levels of those hybrid household are roughly in between those of pure wage-employed and pure self-employed households.

[5] E.g. Euwals (2000) used the CentER Savings Survey, Alessie et al. (1997) and Kapteyn et al. (2005) used the Dutch Socio-Economic Panel and Alessie et al. (2013) used SHARELIFE.

more actuarially fair the pension scheme is, the more it will lead to the displacement of private assets and the less it will result in changes in the retirement age. The Dutch occupational pensions became substantially more actuarially fair since new legislation in 2006 largely abolished (the explicit or implicit subsidies on) early retirement schemes.[6] Still, other redistributive elements within the Dutch pension system have remained.

Table 1: Selection criteria and available number of observations

Selection criteria	***N***
Number of households from IPO Wealth panel	95,016
Selection on age of household head: 40-60	41,090
Selection on labor market status household head: WE and/or SE	33,793
Selection on labor market status household head: WE or SE *(=dropping hybrids)*	32,259
Selection of standard households, loss due to merging datasets, etc. [a]	28,511
o/w WE couple households	*20,616*
o/w WE single households	*4,085*
o/w SE couple households	*3,402*
o/w SE single households	*408*

Notes: [a] We drop households composed of more than one family and those with children above 25 still living in the household. We also drop the top and bottom 1% for household wealth, household occupation pension wealth and household income. Additionally, there is some loss of observations due to merging with other datasets.

The saving propensity and relative risk-aversion of individuals is also not observed in our data. We partly correct for the between-group heterogeneity by separating the analyses by institutional setting (WE vs SE), which is correlated with these preferences. We will also use dummies for having stocks, for having third pillar pension savings and for homeownership, to approximate relative risk-aversion and saving preference within the groups.

Household wealth

The primary dependent variable in our analyses is household wealth (in euro). Table 8 in Appendix 1 lists the composition of private wealth, at the household level. Financial wealth is the sum of checking accounts and savings accounts, bonds and stocks, minus financial liabilities. The net value of housing wealth and business equity are available too. Additionally, we make extrapolations for the savings in private commercial (third pillar) pension products, based on the available historical information on the premiums paid to these products (over

[6] Since 2006 there has been a strong increase of the average effective retirement age for wage-employed from 61 year in 2006 to 64 year in 2014. Meanwhile, the average effective retirement age for self-employed remained almost stable at slightly above 66 year over that period. (Statistics Netherlands, January 2015)

the period 1998 to 2010), and add this to the household assets. The total household wealth is defined as the value of assets net of liabilities.

Accumulated occupational pension wealth

The primary independent variable in our analyses is the accumulated occupational pension wealth (in euro) at the household level. Statistics Netherlands gathers information from pension funds and insurance companies on occupational pension entitlements for everyone in the Netherlands between the age of 15 and 64. The data set contains information on the gross pension annuity that participants receive at retirement age (which was still 65 for the period we study), both as accrued at the reference date and as accrued at the retirement age, assuming the current job and wage remain unchanged. These two annuity values are also what pension funds typically communicate to their participants yearly, in what is called the 'Uniform Pension Overview' (UPO). We converted the annuity at retirement as accrued at the reference date into a net present value at the reference date and use this as our proxy for net pension wealth.[7]

Not all pension funds provide Statistics Netherlands with information on the pension entitlements they manage. Based on aggregate data from the Dutch Central Bank, the available data amounts to 70 percent of the total pension annuity accrual. Statistics Netherlands imputed the missing data, based on individuals' income history and years of accrual. We have studied both the imputed and the non-imputed data, but because our descriptive statistics (see below) suggest that CBS over-imputed the entitlements of those in the white spot – probably based on apparent missing years of accrual – we prefer the non-imputed data.[8]

Because first pillar entitlements in the Netherlands are not income related (see Appendix 2) and the full benefit level only varies between single and couple households – which we study separately – we ignore this in our analyses.[9] On average, only first generation immigrants (especially those with a non-western background) miss a substantial part of first pillar pension build-up. We control for this by using several dummies on country of origin. Future changes in relationship status or country of residence would impact the benefit level, but we cannot control for that. The effect of the currently expected level of first pillar pension wealth should be picked up fully by the constant and our immigration dummies in our regression

[7] We use a discount rate of 1.5% and take the progressiveness of the Dutch tax system (for income on top of the flat-rate first pillar pension benefits) and gender differences in life expectancy into account. The sensitivity of our results to alternative assumptions about the discount rate are limited, as we will show for the results of IV-estimate for wage-employed couples in Section 2.6.2.

[8] We used the imputed data for robustness checks. The impact on the estimation results appears limited. If anything, the displacement effects seem slightly larger with the imputed pension data.

[9] As of 2013 the retirement age is being increased yearly, which has a differential wealth impact per birth cohort, but in the period we study the official retirement age was still 65 for everyone.

analyses and should not impact the relationship between occupation pension wealth and total private household wealth.

Current pension scheme participation

For several alternative identification strategies, which will be explained in the next section, we also want to look at the current pension scheme participation status of the households we study. The pension scheme participation status – and thus also the accumulated amount of pension wealth – strongly depends on occupational choice. This is why we need to examine the displacement effect for wage-employed and self-employed separately. Yet, while most Dutch wage-employed are affiliated to the compulsory occupational pension system (we call this group WEP: Wage-Employed with compulsory Pension) and most self-employed are not (we call this group SEN: Self-Employed with No compulsory pension), this relationship is not 100%. Both groups include a substantial minority with a divergent pension regime.

Among wage-employed there is a largely invisible group in both official statistics and academic studies, who do not participate in a mandatory pension scheme (we call this group WEN: Wage-Employed with No compulsory pension). This group is so invisible that in the Netherlands it is called the *white spot* ("witte vlek"), as it leaves no mark on paper. To distinguish between WEP and WEN, we use unique data from the Dutch statistical bureau (CBS) on the white spot in the Netherlands over the period 2007-2010. On average, their data showed that in 2010 about 9% of all male employees aged 25-64 did not participate in an occupational pension scheme. The white spot is relatively larger among those with an income that is over about twice the median income (15%), those working in the commercial service sector (15%) or those working at a small company (21% for companies with less than 10 employees, 6% for companies with over 100 employees).[10]

At the same time, a proportion of self-employed, who are often mentioned for their lack of affiliation to the occupational pension system, do actually participate in a mandatory professional or industry pension fund (we call this group SEP: Self-Employed with compulsory Pension). For instance medical specialists, general practitioners, physiotherapists, notaries and a group of painters and carpenters (see Appendix 2 for more details). We identify the SEP by using the code on the industry in which the self-employed is active (the SBI-code). Participation in the industry pension fund for painters, carpenters and glaziers is explicitly obliged for those self-employed active in a specific sector (SBI-code 4334). For the other groups of SEP their profession is precisely enough defined for us to be sufficiently confident that the professional pension fund obligation applies to them.

[10] Mooij, M. de, A. Dill, M. Geerdinck and E. Vieveen (2012). *Witte vlek op pensioengebied 2010.* Centraal Bureau voor de Statistiek, Den Haag/Heerlen

Descriptive statistics

Table 9a in Appendix 3 compares (for couples) the means and medians of a number of wealth and income related variables between WEP and WEN and between SEP and SEN over the year 2010. Table 9c shows our available set of control variables, for both the household head and the partner. Both tables also report the total number of observations for each of the four groups in our dataset. First, we notice that in our dataset there are around 9% wage-employed who are *not* affiliated to the occupational pension system, and around 7% self-employed who *are* affiliated to the occupational pension system in the year 2010. Overall, about 14% of the households in our dataset have a self-employed household head.[11]

When we focus on the wage-employed, the statistics show that WEN have accumulated more household wealth than WEP, primarily in the form of household financial wealth. WEN also build up slightly more third pillar pension wealth. As we would have expected, WEP have a higher net present value of occupational (second pillar) pension wealth than WEN. This difference is substantially larger for the non-imputed pension wealth data than for the imputed pension wealth data, which suggests an over-imputation for the WEN, as we mentioned above. Still, the non-imputed household occupational pension wealth for WEN is almost half of that for WEP and the difference might be smaller than expected. This partly represents the dynamics in pension participation status over time. Not all WEN have always been without pension accrual, and not all WEP have always been accruing pensions before. Another important explanation is that we look at pension wealth at the household level. The occupational choice and pension scheme participation status of the partner often differs from those of the household head. They are positively correlated, but certainly not collinear, as Table 9c shows. About half of the WEN household heads has a partner who does participate in an occupational pension scheme.

WEP households earn a lower (gross and net) income than WEN households, but when we look at total compensation, which includes an approximation for pension accrual, they earn almost the same on average.[12] There are several significant, but mostly small, differences in personal and household characteristics between WEP and WEN. WEN can be found in many sectors, but they are relatively concentrated in the information and communication sector (13%), the finance related sector (19%), and the business services sector (22%) and they are almost absent in the sectors public service and education and health care.

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[11] The percentage of SE is relatively large in our dataset because we only included those WE for whom CBS could determine the pension participation status with enough certainty.

[12] We approximate total compensation, including pension accrual, by multiplying personal income above the first pillar pension (AOW) exemption by 1.25, because total (employer + employee) pension premiums typically amount to around 20% of this part of income. We also differentiate between an exemption for full-time (13,000 euro) and for part-time (10,000 euro) workers.

When we next focus on the self-employed, we find that SEP earn a substantially higher net household income on average than SEN. This is even more so when we look at total compensation, including pension accrual. SEP also have more household wealth than SEN, but that difference is substantially smaller, which already suggests some compensating wealth accumulation by SEN. Especially the housing wealth of the SEN is relatively large, compared to their income. The groups also differ significantly in a number of other personal and household characteristics, as Table 9c shows. Corresponding to the professional pensions funds for self-employed we discussed before, SEP are only found in construction (38%), business services (7%) and health care (55%). When the household head is self-employed, the partner more often is self-employed too. Also, there is a strong positive correlation between the pension participation status of a SE household head and a SE partner within households.

A comparison between wage-employed and self-employed shows that on average the self-employed are substantially wealthier, but only the SEP stand out with a relatively very high household income. The SEP are also the oldest group on average, but these differences are much smaller. Partners are on average two to three years younger than the household head, which reflects the average age difference between men and women within a couple.

All in all, the descriptive statistics indicate that especially SEP and SEN are two quite heterogeneous, non-random groups. This means it is unlikely that we can fully control for possible selection effects in the displacement effects with the available covariates. That is why we will also specifically analyze the self-employed active in the construction sector, where compulsory pension accumulation is arguably more random and the two groups are more comparable. The descriptive statistics in Table 9b on the 577 SEN and the 95 SEP in the construction sector confirm this. While overall there are large and significant differences in household wealth between SEP and SEN, within the construction sector these differences are small and none is significant. The levels are close to those of all SEN, which means that with this selection we basically exclude a few exceptional (very wealthy) groups of households among the SEP. The other variables show that occupational pension wealth is substantially higher for the SEP, as was to be expected. The SEP in construction also have a somewhat higher average income than the corresponding SEN, and there is a slightly higher chance that the partner is also SEP (not shown in the table).

5 Empirical implementation

Above, we presented our model and the available data, here we will describe the empirical implementation. In the next section we will present the results of several regression analyses using the following equation, based on Equation (4) in Section 3:

$$HW_i = \beta_0 + \beta_1 PW_i + \boldsymbol{X}_i'\boldsymbol{\beta}_x + \varepsilon_i \qquad (5)$$

Here, HW_i is total household wealth (excluding the occupational pension wealth), PW_i is total occupational pension wealth at the household level and $\boldsymbol{X}_i'$ is a list of control variables, including an approximation of permanent income and its variance and of pension fund performance uncertainty, Var(k) [13], and dummies for the ownership of risky assets that are meant to proxy for γ.

Estimating the displacement effect using an equation like Equation (5) is standard practice in the literature (see e.g. Alessie et al., 2013). The thus found displacement effect can be less than the individual would have preferred, due to e.g. liquidity constraints. There are also several reasons why the true displacement effect is (substantially) underestimated in many empirical studies. Alessie et al. (1997), following an earlier draft of Gale (1998), discuss important sources of bias that plague the analysis of the relationship between pension wealth and assets in such a regression model. Almost all of these biases drive β_1 towards zero or even to be positive. They can be divided into two main categories.

We are interested in the effect of occupational pension wealth on private household savings, but the accumulation of occupational pension wealth is not random. Thus, the first important source for bias are omitted variables. For example, those with a relatively high preference for saving might build up a large amount of private household wealth, but also choose a job with a relatively generous pension scheme. We do not observe such preferences. Also, those with a relatively high life expectancy or with plans to retire early might combine relatively high household wealth with high pension wealth. This way pension wealth and assets seem to be less negatively correlated than is actually the case, or even seem to be positively correlated.

The second important source for bias arises from imperfect measurement. Narrow measures of non-pension wealth (e.g. excluding housing wealth) tend to lead to lower displacement estimates. Pension wealth itself is notoriously difficult to measure and, furthermore, should be measured net of taxes. And because an occupational pension is essentially deferred income, those with pension accrual actually make more money in total than those without pension accrual but a comparable net pay-check. So, controlling for income should be based on total compensation (including a correction for pension accrual) and not on current earnings only. Overall, these measurement errors tend to lead to an underestimation of the displacement effect. Here, our available administrative data on pension wealth – though still not perfect –

[13] We proxy Var(k) by looking at the variance in the difference between the actual and the required funding ratio of pension funds over the period 1994-2010, based on the pension fund participation in 2010. When an individual is not affiliated or could not be linked to a pension fund in 2010, the funding ratio information is missing, so we multiply this coefficient by a specific dummy indicating the availability of this information.

arguably outperform the survey data that is normally used. Also, we do correct for taxes and for pension accrual in our income data.

Institutional background and identification strategy

Because occupational pension wealth accumulation is not random, we have to take heterogeneity in saving propensity and risk preferences into account as much as we can. Both these preferences and pension scheme participation are strongly linked to occupational choices. Due to institutional differences, self-employed in the Netherlands are substantially less likely to participate in a pension scheme. Comparing participants and non-participants into occupational pensions would therefore be uninformative of the displacement effect itself. We would largely be comparing wage-employed with self-employed, who also differ in terms of risk attitude. Indeed, self-employed are found to be less risk-averse than wage-employed (Hartog et al., 2002) and can thus, ceteris paribus, be expected to accumulate less precautionary savings. Also, there is reason to believe that the wage-employed – especially those who currently do not participate in an occupational pension scheme – might not be fully aware of their (lack of) pension accrual, while self-employed will probably be aware that they do not accrue any pension entitlements if they do not act on it themselves. And those self-employed who do participate in a pension scheme will probably have a clearer image of how much they contribute, because there is no employer who makes the payments for them or adds an employer contribution. Card and Ransom (2011) and Bottazzi et al. (2006) find that, the more informed and aware people are, the higher the displacement effect. This is another reason to perform separate analyses on the displacement effect of self-employed and wage-employed. That way we can also show the potential heterogeneity across these groups. The fact that not all wage-employed accumulate pension wealth and not all self-employed do not, ensures sufficient variability within the groups to perform such separate analyses.

Robustness checks and additional identification strategies

Performing several types of analyses on the displacement effect of wage-employed and self-employed separately, but on identical datasets, is a relevant extension to the literature. Still, our displacement estimates might suffer from differences in saving preferences *within* the occupational groups. Indeed, individuals are likely to select themselves into specific occupations according to their preferences for savings, also within the groups of wage-employed and self-employed. To correct for some further potential selection effects, we will perform several additional analyses as robustness checks, such as differentiation by income quintiles, IV analysis and a focus on a specific sector (construction) where compulsory pension participation by the self-employed can be assumed to be relatively random. The details on these checks will be discussed further in Section 6 of our paper.

These additional checks are essentially variations on our standard OLS analyses and will alleviate – but not entirely solve – the issue of within group heterogeneity. We further explore separately the issue of within group heterogeneity, using propensity score matching, and the issue of causality, using difference-in-differences.

Propensity Score Matching

As to the issue of within-group heterogeneity: we would ideally want to look at identical individuals (also in terms of saving preferences), exposed or not to compulsory savings, in order to elicit their displacement effect. If saving preferences are determined by observable characteristics, one could use observables to match individuals of different subgroups. Matching in this way can also help to circumvent potential problems in measuring pension wealth. Though we make use of the newest and best available administrative data on accumulated occupational pension wealth, these data still have limitations and contain measurement error (see Section 4 for more details). As an alternative approach, we will use the current pension scheme participation status as identification strategy for the displacement effect. As described above, we identify four groups in our data: wage-employed and self-employed with and without an occupational pension. Through these four groups, the displacement effect can be elicited twice: once from the difference in wealth holdings of WEP and WEN, and once from the difference in wealth holdings of SEP and SEN.

For this purpose, we will view those participating in the mandatory occupational pension system as being exposed to a 'treatment', relative to a 'control group' that does not have to participate in compulsory savings. So, we will have two sets of a treatment and a control group, one for wage-employed and one for self-employed. In order to spot identical individuals within these sets, we resort to matching techniques. If we then take the difference between the private wealth holdings of a wage-employed who is treated (WEP) and that of a matched wage-employed who is not treated (WEN), we are able to estimate the additional savings of the treated wage-employed. The underlying assumption is that a wage-employed, a programmer for instance, has similar preferences not withstanding whether he/she is employed in, for example, a large telecom company that offers an occupational pension fund or a small IT company that does not offer an occupational pension fund. By 'similar' we mean preferences that can be picked up by observable characteristics, such as age. The same applies to the difference in savings between self-employed with and without occupational pension savings.

So, next to performing OLS estimations based on a continuous variable on pension wealth, we will perform propensity score matching analyses based on a dichotomous variable on occupational pension participation. Yet, the pension scheme participation status of a particular person can – and sometimes does – change over time. Job mobility can imply that someone starts or stops accumulating occupational pension wealth. This means that pension scheme

participation as an alternative measure for pension wealth to determine the displacement effect is not perfect either. But it can serve as a useful robustness check.

Difference-in-differences

The issue of causality needs to be addressed differently. For this purpose we need additional data, which includes exogenous variation in our primary independent variable, pension wealth. Within our observation period (2007-2010), we observe a strong reduction in the funding ratios in almost all pension funds. The funding ratio of many pension funds became so low that the Dutch central bank (DNB) required them to develop a recovery plan to increase the funding ratio again within a few years. Funds in such cases must refrain from indexation (i.e. no inflation correction of pension benefits) and additionally can choose to raise premiums, demand additional employer contributions and/or cut pension entitlement.[14] The obligation to start a recovery plan effectively means a negative wealth shock for participants in these funds, compared to funds that were still performing relatively well. Because the impact differs by pension fund, this gives us the opportunity to check the displacement effect through the potential differences in private wealth accumulation between those who are member of funds in underfunding relative to those who are not.

We have obtained information on the actual and the required funding ratios of 19 of the biggest Dutch pension funds over the period 2007-2010, and whether or not they implemented a recovery plan in these years. We were able to link this to our dataset through the corresponding labor agreement (CAO) identifiers.[15] We established in each year if the pension fund of each individual had a recovery plan or not.[16]

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[14] Actually, none of these pension funds cut their pension benefits until 2013, when some were finally forced to do make such cuts due to continually low funding ratios. This is well beyond our observation period. All funds in a recovery plan needed to freeze their indexation, which arguably made the biggest difference for the development of their funding ratios during our observation period.

[15] The individual pension fund affiliation is not available in the datasets of Statistics Netherlands, so we linked respondents to pension funds through their labor agreement identifier, as described by Eberhardt and Bosch (2014), Bijlage Achtergronddocument Pensioenpremiedatabase, CPB. They mapped how the biggest Dutch pension funds are connected to the top 110 Dutch labor agreements. The 19 pension funds we were able to incorporate in our analysis serve between 70 and 75% of the active Dutch pension scheme participants. We were able to link about 45% of our WEP to one of these funds.

[16] This implies that this analysis only focuses on those wage-employed who actively participate in a pension scheme (WEP) within the observation period. Those who do not participate in a particular year (WEN), but once did participate and still have entitlements with a pension fund, can be affected by the recovery plan status, but we cannot take this into account. We also restrict our analyses to those individuals who do not change pension fund within our observation period, for more confidence in the calculation of the pension wealth shock people experienced and for minimizing the influence of other possible life events on our results.

Table 2 shows the pension funds, the average actual and required funding ratios and the numbers of active and observed participants, by year and recovery plan status. In total we were able to use the pension plan recovery status for 32,665 wage-employed household heads over these four years (NxT) in our analyses. Overall, 15 funds needed a recovery plan within our observation period, that came into effect in either 2008, 2009 or 2010.

Table 2: Pension funds, funding ratios and participants, by recovery plan status (2007-2010)

		Recovery plan	
Year		*No*	*Yes*
2007	Number of pension funds	19	0
	Average actual funding ratio	150%	-
	Average required funding ratio	105%	-
	Actual - required	45%	-
	Number of active participants (x 1,000)	3,966	0
	Number of observations in our dataset	7,813	0
2008	Number of pension funds	8	11
	Average actual funding ratio	110%	99%
	Average required funding ratio	105%	105%
	Actual - required	5%	-6%
	Number of active participants (x 1,000)	564	3,406
	Number of observations in our dataset	1,945	6,842
2009	Number of pension funds	6	13
	Average actual funding ratio	123%	108%
	Average required funding ratio	113%	118%
	Actual - required	10%	-10%
	Number of active participants (x 1,000)	211	3,757
	Number of observations in our dataset	503	8,599
2010	Number of pension funds	4	15
	Average actual funding ratio	124%	108%
	Average required funding ratio	114%	117%
	Actual - required	10%	-9%
	Number of active participants (x 1,000)	95	3,917
	Number of observations in our dataset	157	8,209

Sources: DNB, CBS and authors' calculations.

No recovery plan ended during these years. The table also shows the very substantial impact of the financial crisis on the funding ratios of these pension funds. All funding ratios dropped dramatically in 2008, but those falling below a threshold needed a recovery plan. As of 2009, there is a specific required funding ratio per pension fund, taking into account the specific characteristics of the fund, e.g. with respect to their participants and investment strategy. Before 2009, there was only one fixed required funding ratio of about 105%.

These data enable us to set up a quasi-natural experiment for the variation in household wealth associated with the inclusion of the individuals' pension fund in a recovery plan. We

use a *diff in diff* approach where those subject to underfunding (indicated by the implementation of a recovery plan) are the treated group, while those with a financially healthier pension fund, are the control group. We therefore estimate:

$$HW_{it} = \beta_0 + \beta_1 D_{it}^{treatment} + \beta_2 D_{it}^{pensionfund} + \beta_3 D_t^{year} + \boldsymbol{X}'_{it}\boldsymbol{\beta}_x + \varepsilon_{it} \qquad (6)$$

Where the (interaction) dummy $D_{it}^{treatment}$ is 1 if individual i's pension fund carries out a recovery plan in year t and beyond, and 0 otherwise.[17] $D_{it}^{pensionfund}$ contains a complete set of pension fund dummies, indicating in which fund the individual i participates. D_t^{year} is a set of year dummies and $\boldsymbol{X}'_{it}$ is a vector of control variables, including (an approximation of) permanent income and its variance. In this equation β_1 represents the causal effect of having a pension fund with a recovery plan on household wealth accumulation that can be identified by the difference over time and across treated groups.

6 Empirical results

In this section we will present the results of our empirical analyses. First, we will take a look at our quasi-experiment. Second, we will show several estimation results of the displacement effect, separately for the wage-employed and for the self-employed, using several estimation techniques. Here, we begin with standard OLS regression estimates and consecutively explore Instrumental Variable (IV) analysis and Propensity Score Matching (PSM) to further specify and sharpen the results.

6.1 Difference-in-differences

We use a fixed effect (FE) model for the estimation of Equation (6).[18] Table 3 shows the displacement effect of the wage-employed couples who participate in a pension fund that did not require a recovery plan, compared to participating in a pension fund that did require a recovery plan.[19,20] Full regression results can be found in Table 10 in Appendix 4. Those with a pension fund with no underfunding accumulated on average 3,500 euro less household wealth over the period 2007-2010. Alternatively, one could state that those with a pension

[17] No recovery plan started before 2008 and none ended within the observation period 2007-2010.

[18] We also performed a random effect regression analysis. Results were comparable, with an estimated displacement effect of -€ 3,993 ($p<0.05$), but based on the Hausman test we prefer the FE estimate.

[19] In this case we present the results for the control group, whose pension fund did not need a recovery plan, because that is more in line with the other displacement effects in our paper.

[20] We also performed this analysis for wage-employed singles, but these results were not significant, possibly due to the substantially lower number of available observations.

fund in underfunding saved 3,500 euro more, in order to compensate for the negative pension wealth shock they experienced.[21]

Table 3: Estimates of the displacement effect for wage-employed (diff-in-diff), 2007-2010

Wage-employed	*Couples*
Displacement effect (diff in diff)	**- € 3,468 ****
	(1,725)
NxT	***32,665***

*Notes: Estimates represent the effect on household wealth (in euro) of participating in a pension fund that did not require a recovery plan during the period 2070-2010. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Though the results of our diff-in-diff analysis suggest a substantial displacement effect, it is not easy to translate this into a percentage, e.g. because the denominator is not straightforwardly available. We approximate the shock in pension wealth that participants experienced when their fund had to start a recovery plan by multiplying the corresponding funding ratio deficit with their accumulated occupational pension wealth for each year of the observation period. On average, this wealth shock amounts to about €25,000. Evidently, even if households would be willing to fully compensate this shock through building up more household wealth, they cannot be expected to compensate it overnight and should spread out the effects over the remaining working life. An average compensation of about € 3,500 over the short period we observe is substantial, but plausible.

6.2 Estimations of the displacement effect

6.2.1 Results for the wage-employed

For determining the displacement effect for the wage-employed we start with a simple OLS estimation of Equation (5). Table 4 presents the results. For WE couples, we find a small but significant displacement effect of nine percent. A breakdown in quintiles shows a slight

[21] As a robustness check, we also study an alternative specification of Equation (2.6), where we look specifically at the effects of the funding ratio deficit on the level of household wealth. Here, the treatment variable is still zero when someone's pension fund does not have an active recovery plan, but we use the funding ratio deficit as a continuous variable for those in a pension fund with an active recovery plan. This analysis suggests an average treatment effect of about 1,800 euro, but it is not significant (p=0.21). Though the funding ratio deficit is a good proxy for the severity of the problems of the pension funds, it is not necessarily the best indicator of the impact of the recovery plan on the participants, as the plans can differ in the types of measures and timeframes. Also, it is questionable whether the participants at that time were sufficiently aware of the funding ratio of their pension fund. Possibly, the pension cuts in 2013 made funding ratios more salient, but during our observation period participants probably could only be expected to know that their pension fund was 'in trouble'. This might explain why the recovery plan status appears to have a more significant effect on household wealth than the funding ratio deficit.

increase in the displacement effect with income, possibly due to less liquidity constraints or differences in the propensity to consume across the income distribution.[22] For singles, we find in the simple OLS regressions a displacement effect of seven percent. A breakdown in quintiles shows a somewhat more volatile pattern.

The full results for the OLS regression for couples on all income levels can be found in Table 11a in Appendix 4. It shows that the addition of dummies on stock, third pillar and home ownership and of partner characteristics increased the displacement effect from about four to nine percent. If we look at the other estimation results, we find that the variance of income has a negative effect on household wealth, contrary to the prediction in Section 3. Possibly, this is due to the fact that the observation period primarily showed negative shocks in income, for example through the loss of employment. This would lead to a negative correlation between the variance of income and household wealth. We also find, contrary to our model prediction, a significant negative effect of $Var(k)$, which is our proxy for pension fund performance uncertainty. This would suggest that those with a pension fund with relatively high variability in its performance save relatively less.

Table 4: Estimates of the displacement effect for wage-employed (OLS) in 2010

Wage-employed	*Couples*	*Singles*
All income levels	**-0.089*** **	**-0.071** **
	(0.014)	(0.028)
Income quintile 1 (lowest incomes)	-0.016	-0.049
	(0.040)	(0.115)
Income quintile 2	-0.075**	-0.196***
	(0.034)	(0.075)
Income quintile 3	-0.125***	0.113*
	(0.035)	(0.061)
Income quintile 4	-0.139***	-0.156***
	(0.030)	(0.052)
Income quintile 5 (highest incomes)	-0.059**	-0.070
	(0.029)	(0.068)
N	***20,142***	***4,085***

*Notes: The numbers reported in this table are the estimates of β_1 in Equation (5) – the displacement effect of occupational pension wealth on household wealth (in euro) – under different specifications. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

[22] We also checked the effects of selecting on minimum levels of household wealth, e.g. excluding observations with a net debt or with a wealth level below 20.000 euro. On average, this also leads to increasing displacement levels. Households with low income and wealth levels have little options to compensate higher pension accrual, while high income household can to a certain extent be 'consumption constraint'. In that case a shift from pension accrual to more net income will more or less automatically result in more private saving, because even buying a bigger house is basically only a transfer from one wealth component to another.

Instrumental Variable (IV) analysis

The OLS regressions showed significant, but very small displacement effects. As discussed before, we expect these results to be biased downwards, due to remaining unobserved heterogeneity and possible measurement errors. That is why next we will apply instrumental variable analyses to further determine the displacement effect for wage-employed. We discussed before that pension scheme participation is strongly correlated with company size and sector. This qualifies them as potentially suitable instruments for the relationship between pension wealth and household wealth. For company size, we use the log of the number of employees in the company where the wage-employed works.[23] For sector we use the 13 dummies as shown in Table 9c. The first stage regression results, which can be found in Appendix 4, Table 11b, confirm that these instruments are strongly correlated with occupational pension wealth.[24] Yet, they should also be uncorrelated with the error in the second stage of the regression model and the Sargan test for overidentifying restrictions suggests that not all of our IV's are exogenous. Employees could sort into differently sized companies and into separate sectors, partly based on (or correlated with) risk and saving preferences. We acknowledge the potential limitations of our available instruments. They probably cannot fully correct for the biases in the displacement effect caused by unobserved heterogeneity and might even cause some biases themselves. However, given the common levels of displacement found in the literature and the known strong biases in the OLS estimates, we consider the IV results an improvement.

Table 5 shows the results for the IV analyses for couples. The displacement effect is now -33%, thus substantially larger, and (strongly) significant.[25] This is also true in the case of the separate income quintiles, where the (significant) displacement effects range between -21% and -61%. Again, the displacement effect primarily rises with income. For singles the overall displacement effect in the IV analyses also becomes much stronger, at around -38%. But the breakup in income quintiles shows mostly non-significant results. The full results of the IV regression for couples over all income levels are shown in Table 11a in Appendix 4.

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[23] We use the log of company size since the company size distribution is strongly positively skewed. When we perform a first stage regression on 6 splines for the log of firm size, we find that the effect of the log of firm size on accumulated occupational pension wealth is discontinuous, but from the 25th to the 75th percentile it is smoothly and significantly positive.

[24] The F statistic on the joint significance of the instruments in the first stage regression equals 170.6, indicating that the instruments are relevant.

[25] We checked how sensitive this result is to different assumptions for the discount rate we use to calculate the current level of accumulated pension wealth. This sensitivity turns out to be limited. If, instead of a discount rate of 1.5%, we use 2,5% (or 0,5%), the displacement effect (IV) would be -36% (or -29%). If we remove firm size as instrument, the estimate of the displacement effect shrinks from -33% to -32%.

The impact of the instrumentation on most of the other variables in the full regression analyses is small, but now the effect of $Var(k)$ is significantly positive, consistent with our original expectations.

Table 5: Estimates of the displacement effect for wage-employed (IV), 2010

Wage-employed	*Couples*	*Singles*
All income levels	**-0.332*** **	**-0.378*** **
	(0.040)	(0.092)
Income quintile 1 (lowest incomes)	-0.105	-0.945**
	(0.121)	(0.427)
Income quintile 2	-0.337***	-0.372*
	(0.092)	(0.196)
Income quintile 3	-0.394***	-0.026
	(0.092)	(0.175)
Income quintile 4	-0.608***	-0.247
	(0.092)	(0.209)
Income quintile 5 (highest incomes)	-0.214**	-0.094
	(0.098)	(0.163)
N	***18,740***	***3,597***

*Notes: The numbers reported in this table are the estimates of β_1 in Equation (5) – the displacement effect of occupational pension wealth on household wealth (in euro), instrumented by the logarithm of company size and industry dummies, under different specifications. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Propensity score matching

In order to further mitigate the potential measurement errors in the accumulated pension wealth and possible selection effects, we also apply propensity score matching methods (nearest neighbor matching). This way we can use the occupational pension scheme participation instead of the pension wealth measures to elicit the displacement effect on household wealth accumulation. It also enables us to focus on the most similar individuals and to abstain from imposing a functional form.

Table 6 reports the average treatment effect for the treated (ATT) by comparing the wealth difference between WEP and WEN.[26] In 2010, the empirical results indicate that WEP couples have on average around 11,500 euro less household wealth than the matched WEN couples. The simple, unmatched, difference in wealth holdings between WEP and WEN can be read from the descriptive statistics in Table 9a and amounts to around 18,000 euro. So the

[26] To check the comparability between WEP and WEN after matching, we perform an equal mean test on the background variables used for matching. None of the variables differs significantly at conventional significance levels, indicating that the matching achieved good balancing. Technically, the treatment group in the analyses was formed by the, much smaller, group of WEN. But we present the ATT from the perspective of the WEP for better comparison with the results of the other methods.

matching results suggest that this simple difference would be an overestimation of the true displacement effect. In Table 6, we also tentatively compare these numbers with the average difference in occupational pension wealth between the two groups. This way, we include the potentially flawed pension wealth data in this robustness analysis after all, but it gives us an idea of the magnitude of the displacement effect. The matched difference in occupational pension wealth is slightly smaller than the unmatched descriptive statistics suggest. Together, these two matched amounts suggest the displacement effect is about -24% for couples. For the matched single households, the difference in household wealth is just over 21,000 euro and the difference in occupation pension wealth is about 26,500 euro, suggesting a displacement effect of -80%.

Table 6: Estimates of the displacement effect for wage-employed (PSM), 2010

Wage-employed	*Couples*	*Singles*
ATT - Matched difference in household wealth	**- € 11,430 *** **	**- € 21,203 *** **
(i.e. the HW of WEP minus the HW of WEN)	(7,177)	(9,537)
Matched difference in HH occupational pension wealth	€ 47,793 ***	€ 26,506 ***
	(3,161)	(4,592)
Tentative displacement effect of PW on HW	- 24%	- 80%
N	***18,740***	***3,597***

*Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

6.2.2 Results for the self-employed

Table 7 reports the displacement effect for the self-employed, for all the separate estimation procedures. Because the number of observations is considerably lower than for the wage-employed, we only show the estimates for couples. The standard OLS results for couples shows a significant and also relatively strong negative displacement effect of about -52%. A breakdown in income levels shows mostly non-significant and quite volatile results, though the significant estimates suggest a displacement effect between -48% and -84%.

The full results for the OLS regression for SE couples on all income levels can be found in Table 12 in Appendix 4. This time, the addition of dummies on stock, third pillar and home ownership and of partner characteristics appears to decrease the displacement effect from about -60% to -52%. For the SE we do find that the variance of income primarily has a positive effect on household wealth, in line with our predictions.

Table 7: Estimates of the displacement effect for self-employed, 2010

Displacement effect	*Couples*	*N*
All income levels (OLS)	**-0.520*** **	**3,084**
	(0.103)	
Income quintile 1 (lowest incomes)	*0.195*	
	(0.297)	
Income quintile 2	*-0.482**	
	(0.249)	
Income quintile 3	*-0.098*	
	(0.209)	
Income quintile 4	*-0.194*	
	(0.272)	
Income quintile 5 (highest incomes)	*-0.837****	
	(0.216)	
All income levels (Construction sector only)	**-0.612*** **	**615**
	(0.232)	
ATT - Matched difference in total household wealth	**- € 68,647**	**3,050**
(i.e. SEP minus SEN, through PSM)	(92,109)	
Matched difference in HH occupational pension wealth	*€ 82,138****	
	(14,744)	
Tentative displacement effect of PW on HW	*- 84%*	

*Notes: The numbers reported in this table are the estimates of β_1 in Equation (5) – the displacement effect of occupational pension wealth on household wealth (in euro) – under different specifications and the results of PSM. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Earlier, we concluded that the self-employed are a highly heterogeneous group. Especially, those self-employed currently participating in a compulsory pension scheme differ substantially from those who do not participate. The instruments we could use for wage-employed (company size and sector) are not applicable or suitable for the self-employed. But within the construction sector the obligation for certain groups of self-employed to participate in the sector pension scheme can be considered to be relatively random, as is illustrated by Table 9b. If we restrict our OLS analysis to the construction sector only, the resulting displacement effect amounts to about -61%, which again suggests the displacement effect is somewhat

stronger for the self-employed than for the wage-employed.[27] The full regression results can be found in Table 12.

When we apply propensity score matching, to circumvent the measurement errors in the pension wealth measures and to select the most similar individuals, we find that the matched self-employed couples have accumulated around 69,000 euro less household wealth if they are affiliated to the occupational pension system, but this estimate is not significant. Compared to the matched difference in occupational pension wealth the tentative displacement effect would be around -84%.

7 Conclusion

We look at the displacement effect from mandatory occupational pension saving on household wealth in the Netherlands, taking institutional differences among occupations into account. Where most wage-employed in the Netherlands participate in a mandatory occupational pension scheme, a substantial minority of about 9% – known in the Netherlands as the *white spot* ("witte vlek") – does not participate. Conversely, while most self-employed are fully responsible for their own pension accrual (on top of the state pension), some groups of self-employed (about 7% in total) are obliged to participate in a professional or industry pension fund. This allows us to separately measure the displacement effects within these groups, thus controlling for unobserved characteristics that correlate with the occupational choice between working as wage-employed or self-employed.

For the wage employed couples we first perform a difference-in-differences analysis, based on a quasi-natural experiment. We use the differential impact of the financial crisis on the separate pension funds in the Netherlands, and find that those whose pension fund did not need to apply a recovery plan accumulated about 3,500 euro less household wealth over de period 2007-2010. This indicates the existence of substantial displacement effects. Standard OLS regression results suggest only limited displacement effects for wage-employed couples, but based on IV analyses our estimate rises to about –33%. Further analyses on separate income quintiles suggest the displacement effects rise with income, with estimates for the higher income levels up to -61%. Propensity score matching analyses also point at a fairly

[27] A Chow test, based on an identical OLS regression specification for both groups, indicates that the displacement effect is significantly higher for self-employed than for wage-employed (F-statistics 821.70, $p<0.001$). This is also the case when we focus only on those self-employed in construction (F-statistics 63.35, $p<0.001$). However, the confidence interval for the displacement effect of self-employed does include the IV estimate of the wage-employed (not vice versa), which calls for some caution in interpreting the differences between them. We hypothesize that higher awareness of pension rights accumulation and lower risk-aversion could lead to higher displacement effects for self-employed. To the (limited) extent that we can proxy for this in our data, our checks suggest that awareness is the more important factor in explaining the difference between self-employed and wage-employed.

substantial displacement effects, with an average treatment effect for the treated of 11,500 euro (suggesting a displacement effect of about -24%).

For the self-employed we already find a quite strong displacement effect in our standard OLS analyses of about -52%. An analysis on only the construction sector, where compulsory pension scheme participation by the self-employed is arguably more random than in other sectors, raises this estimate to about -61%. Propensity score matching also shows a very substantial displacement effect of about 69,000 euro (or about -80%), but this could only be estimated very imprecisely.

Overall, our results suggest a larger displacement effect for self-employed than for wage-employed. One possible explanation lies in the fact that self-employed can on average be expected to be much more aware of the pension entitlements they do or do not accrue than wage-employed, especially those wage-employed in the *white spot*. Such a higher awareness would lead to an on average higher displacement effect among self-employed than among wage-employed (Card and Ransom, 2011; Bottazzi et al., 2006). Another potential explanation is that self-employed are on average less risk-averse than wage-employed and thus, ceteris paribus, would hold less precautionary savings.

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Bibliography

Alessie, R., Angelini, V., & Van Santen, P. (2013). Pension wealth and household savings in Europe: Evidence from SHARELIFE. European Economic Review, 63, 308-328.

Alessie, R. J., Kapteyn, A., & Klijn, F. (1997). Mandatory Pensions and Personal Savings in The Netherlands*. De Economist, 145(3), 291-324. Attanasio, O. and A. Brugiavini (2003): "Social Sec
urity and Households' Saving", The Quarterly Journal of Economics, 118:3, pp. 1075-1119.

Attanasio, O. P., & Rohwedder, S. (2003). Pension wealth and household saving: Evidence from pension reforms in the United Kingdom. American Economic Review,1499-1521.

Bottazzi, R., Jappelli, T., & Padula, M. (2006). Retirement expectations, pension reforms, and their impact on private wealth accumulation. Journal of Public Economics, 90(12), 2187-2212.

Card, D., & Ransom, M. (2011). Pension plan characteristics and framing effects in employee savings behavior. The Review of Economics and Statistics, 93(1),228-243.

Disney, R. (2006). Household Saving Rates and the Design of Public Pension Programmes: Cross–Country Evidence. National Institute Economic Review, 198(1), 61-74.

Engelhardt, G. V., & Kumar, A. (2011). Pensions and household wealth accumulation. Journal of Human Resources, 46(1), 203-236.

Euwals, R. (2000). Do mandatory pensions decrease household savings? Evidence for the Netherlands.
De Economist, 148(5), 643-670.

Feldstein, M. (1974): "Social Security, Induced Retirement and Aggregate Capital Accumulation", Journal of Political Economy, 82:5, pp. 905-926.

Gale, W. (1995). The Effects of Pensions on Wealth: A Re-evaluation of Theory and Evidence. Manuscript.Washington: Brookings Inst., 1995. 27

Gale, W. (1998). The Effects of Pensions on Household Wealth: A Reevaluation of Theory and Evidence, Journal of Political Economy, 106:4, pp. 706-722.

Gruber, J., & Wise, D. (1999). Social security programs and retirement around the world. Research in Labor Economics, 18(1),40.

Gruber, J., & Wise, D. A. (Eds.). (2008). Social security and retirement around the world. University of Chicago Press.

Hartog, J., Ferrer-i-Carbonell, A., & Jonker, N. (2002). Linking measured risk aversion to individual characteristics. Kyklos,55(1), 3-26.

Hurd, M., Michaud, P. C., & Rohwedder, S. (2012). The displacement effect of public pensions on the accumulation of financial assets. Fiscal studies, 33(1), 107-128.

Kapteyn A., Alessie R., Lusardi A.(2005),Explaining the wealth holdings of different cohorts: productivity growth and Social Security, European Economic Review 49 (2005) 1361 – 1391.

Kapteyn, A. and S. Panis (2005): "Institutions and Saving for Retirement: Comparing the United States, Italy, and The Netherlands", in D.A. Wise (ed.) Analyses in the Economics of Aging, University of Chicago Press, pp.281-312.

Kotlikoff, L. (1979): "Testing the Theory of Social Security and Life Cycle Accumulation", American Economic Review , 69:3, pp. 396-410.

Appendix 1 - Composition of household wealth

Table 8: Composition of household wealth

Household wealth			
	Assets (+)		
		Financial assets	
			Checking and savings account
			Bonds
			Shares
		Real estate	
			Primary residence
			Other real estate
		Business equity	
		Other assets	
		Third pillar pension wealth	
	Debts (-)		
		Mortgage debt of primary residence	
		Other debt	

Appendix 2 - The pension system in the Netherlands

The Dutch pension system consists of three pillars. The first pillar is the state pension (AOW), which provides a flat rate base income for retirees, only depending on the period someone has lived or worked in the Netherlands in the 50 years before the retirement age and on the household composition (couples receive a lower benefit per person than singles). It is financed through pay-as-you-go.

The second pillar consists of the – capital funded – occupational pension schemes. Tax benefits depend on, and generally rise with, the income level. There is no general obligation to participate in an occupational pension scheme, but social partners can take the initiative for a pension scheme and ask the government to make this scheme mandatory for an entire sector or profession. Effectively, over 90% of all employees participate in the second pillar.

There are also almost a dozen mandatory professional pension funds (mostly founded in the 1970s) for independent professionals like medical specialists, general practitioners, physiotherapists and notaries, with in total about 50.000 active participants, mostly self-employed. Next to these professional funds there is an industry pension fund for painters,

carpenters and glaziers (founded in 1951) where the self-employed who are active in that industry are also obliged to participate. This fund had about 30.000 active participants in 2014, among whom a substantial number of self-employed (possibly more than half).

The third pillar consists of capital funded individual pension products. Those without a (full) second pillar pension can take advantage of the available tax benefits with these products. Based on preliminary data of the Dutch Statistics Bureau (CBS) self-employed hold 10% of the third pillar policies, but 20% of the total value. The relative weight of the three pillars is 50-45-5.[28]

Appendix 3 - Descriptive statistics

Table 9a: Descriptive statistics - wealth and income for couples, 2010 (x 1,000 euro's)

Variables	WEN	WEP	t-test sign.[A]	SEN	SEP	t-test sign.[A]
Means						
Household Wealth (HW)	172.1	154.1	***	301.2	397.6	***
o/w Net Primary residence	80.2	87.6	***	117.9	122.3	
o/w Financial wealth	65.9	47.9	***	58.8	140.6	***
o/w Saving account	47.9	38.7	***	44.5	107.3	***
o/w Shares	16.8	8.6	***	12.9	30.9	***
o/w HH 3rd pillar pension wealth	11.0	9.2	***	23.1	49.6	***
HH occupational pens. wealth (imputed)	110.7	142.0	***	52.3	133.1	***
HH occupational pension wealth (PW)	49.9	102.7	***	34.2	119.7	***
HH net income 2010	50.4	44.8	***	45.6	81.8	***
HH net total compensation 2010	51.4	50.6	**	46.5	97.4	***
HH average total compensation '07-'10	51.8	50.3	***	47.4	102.4	***
HH total compensation '07-'10 (st.d.) [B]	10.9	10.4		16.9	25.9	***
Medians						
Household Wealth (HW)	114.1	115.0	-	194.2	280.6	-
o/w Net Primary residence	50.9	64.5	-	83.8	98.2	-
o/w Financial wealth	23.9	21.5	-	22.3	49.9	-
o/w Saving account	20.0	18.6	-	17.9	41.9	-
o/w Shares	-	-	-	-	-	-
o/w HH 3rd pillar pension wealth	-	-	-	0.5	11.7	-
HH occupational pens. wealth (imputed)	94.0	116.5	-	35.2	95.7	-
HH occupational pension wealth	20.0	74.2	-	12.2	78.1	-
HH net income 2010	46.3	42.2	-	41.8	68.3	-
HH net total compensation 2010	47.3	47.2	-	42.5	79.6	-
HH average total compensation '07-'10	47.6	46.9	-	43.7	85.2	-
Total number of observations	1,890	18,726	-	3,161	241	-
% within occupational group (WE/SE)	9.2%	90.8%	-	92.9%	7.1%	-
% overall	7.9%	78.0%	-	13.2%	1.0%	-

*Notes: (d) = dummy variable, [A] two-sided p-value: * p<0.10 ** p<0.05 *** p<0.01, [B] regressions include variance of income.*

[28]CBS (2010), " Pensioenaansprakenstatistiek - Geld van nu voor later", and Grift, M. van de, and W. de Rooij (2008), "Course of life and pension rights": Conference paper IARIW 2008.

Table 9b: Descriptive statistics - wealth and income for SE couples within the construction sector,
2010 (x 1,000 euro's)

Variables	SEN Construction	SEP Construction	t-test sign.[A]
Means			
Household Wealth (HW)	235.2	210.9	
o/w Net Primary residence	120.8	110.7	
o/w Financial wealth	41.3	45.3	
o/w Saving account	32.1	31.7	
o/w Shares	8.8	13.5	
o/w HH 3rd pillar pension wealth	20.1	17.8	
HH occupational pens. wealth (imputed)	54.0	75.3	***
HH occupational pension wealth (PW)	39.6	62.3	***
HH net income 2010	40.4	43.3	
HH net total compensation 2010	41.1	49.6	***
HH average total compensation '07-'10	43.7	50.2	***
HH total compensation '07-'10 (st.d.) [B]	13.0	10.7	
Total number of observations	577	95	-
% within occupational group (SE in construction)	85.9%	14.1%	-

*Notes: (d) = dummy variable, [A] two-sided p-value: * p<0.10 ** p<0.05 *** p<0.01, [B] regressions include variance of income.*

Table 9c: Descriptive statistics - other controls variables for couples, 2010

Variables	WEN	WEP	t-test sign.[A]	SEN	SEP	t-test sign.[A]
Personal Characteristics						
Pension fund perform. uncertainty, $Var(k)$	0	0.02	***	-	-	-
HH Stock ownership (d)	0.37	0.29	***	0.31	0.38	**
HH 3rd pillar pension wealth (d)	0.44	0.46	*	0.52	0.71	***
HH Homeownership (d)	0.85	0.86		0.83	0.95	***
Non-temp contract (d)	0.95	0.98	***	-	-	-
Full-time contract (d)	0.85	0.85		-	-	-
Age	47.18	48.05	***	47.66	49.21	***
Male (d)	0.98	0.98		0.99	0.99	
Household size	3.71	3.65	**	3.79	3.78	
High urbanization (d)	0.14	0.13	**	0.15	0.13	
Dutch (d)	0.81	0.87	***	0.85	0.84	
Western immigrant, 1st generation (d)	0.05	0.02	***	0.03	0.04	
Western immigrant, 2nd generation (d)	0.05	0.05		0.04	0.10	***
Non-Western immigrant, 1st gen. (d)	0.08	0.06	***	0.08	0.02	***
Non-Western immigrant, 2nd gen. (d)	0.01	0.00	**	0.00	0.00	
Unmarried (d)	0.11	0.09	**	0.13	0.09	**
Married (d)	0.85	0.87	**	0.81	0.87	**
Widowed (d)	0.00	0.00		0.00	0.00	
Divorced (d)	0.04	0.04		0.05	0.04	

Sector dummies						
Agriculture	0.01	0.01	**	0.11	0.00	***
Industry	0.18	0.19	*	0.06	0.00	***
Public service and education	0.02	0.20	***	0.03	0.00	***
Construction	0.01	0.11	***	0.18	0.39	***
Wholesale and retail	0.18	0.14	***	0.22	0.00	***
Transportation and storage	0.05	0.08	***	0.04	0.00	***
Accommodation and food services	0.00	0.01	***	0.06	0.00	***
Information and communication	0.13	0.04	***	0.03	0.00	**
Finance related	0.19	0.04	***	0.02	0.00	**
Business services	0.22	0.10	***	0.17	0.07	***
Health care	0.00	0.04	***	0.02	0.53	***
Culture and sport	0.01	0.01	***	0.03	0.00	**
Other	0.01	0.03	***	0.04	0.00	***
Partner Characteristics						
WEP: WE with pension (d)	0.54	0.63	***	0.35	0.38	
WEN: WE without pension (d)	0.09	0.06	***	0.05	0.05	
SEP: SE with pension (d)	0.01	0.01		0.06	0.20	***
SEN: SE without pension (d)	0.05	0.03	***	0.26	0.06	***
Age	44.41	45.28	***	44.62	47.12	***
Male (d)	0.02	0.02	**	0.01	0.00	
Dutch (d)	0.79	0.84	***	0.82	0.90	***
Western immigrant, 1st generation (d)	0.06	0.04	***	0.05	0.03	
Western immigrant, 2nd generation (d)	0.05	0.05		0.05	0.04	
Non-Western immigrant, 1st gen. (d)	0.09	0.07	***	0.08	0.02	***
Non-Western immigrant, 2nd gen. (d)	0.01	0.01		0.01	0.00	
Total number of observations	1,890	18,726	-	3,161	241	-
% within occupational group (WE/SE)	9.2%	90.8%	-	92.9%	7.1%	-
% overall	7.9%	78.0%	-	13.2%	1.0%	-

*Notes: (d) = dummy variable, Province dummies are not shown, [A] two-sided p-value: * p<0.10 ** p<0.05 *** p<0.0*

Appendix 4 - Full regression results

Table 10: full results FE GLS difference-in-differences analyses, 2007-2010

Household Wealth (HW)	**WE-couples**
Treatment (dummy recovery plan)	3468**
	(1725)
HH average total compensation '07-'10	-0.665
	(1.052)
HH variance total compensation '07-'10	-0.000
	(0.000)
Age	3.57 x 10^4
	(2.98 x 10^4)
Age^2	-940
	(598)
Age^3	7.02
	(4.01)
Household size	4284***
	(1605)
High urbanization (d)	6962
	(5501)
Married (d)	7695
	(8922)
Widowed (d)	48252
	(42107)
Divorced (d)	39170
	(12284)
Stock ownership (d)	3034
	(2382)
3rd pillar pension wealth ownership (d)	9207
	(7915)
Homeownership (d)	1.32 x 10^5***
	(4660)
Non-temp contract (d)	-1.42 x 10^4
	(1.22 x 10^4)
Full-time contract (d)	162
	(1711)
Partner is WE with pension (d)	-3533*
	(2066)
Partner is WE without pension (d)	-1158
	(3221)
Partner is SE with pension (d)	-1462
	(7856)
Partner is SE without pension (d)	10590
	(6440)
Year dummies	Yes
Pension fund dummies	Yes
Other controls	Yes
Constant	-1.51 x 10^6
	(9.28 x 10^5)
R-sqr (within)	0.0835
NxT	32,665

*Notes: The numbers reported in this table are the regression estimates of Equation (6), with household wealth (in euro) as the dependent variable. A complete list of the included partner characteristics can be found in Table 9c.Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Table 11a: full results OLS and IV regression WE couples, 2010

Household Wealth (HW)* (*in 1,000 euro)	**OLS-1**	**OLS-2**	**OLS-3**	**IV**
HH occupational pension wealth (PW) (in 1,000 euro)	-0.037**	-0.034**	-0.089***	-0.332***
	(0.014)	(0.014)	(0.014)	(0.040)
HH average total compensation '07-'10	0.004***	0.004***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
HH variance total compensation '07-'10	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Pension fund performance uncertainty, $Var(k)$	-439.251***	-326.944***	-183.757**	254.825**
	(85.189)	(89.314)	(85.690)	(104.520)
$Var(k)$ unknown (d)	-35.610***	-29.108***	-25.923***	-20.941***
	(3.367)	(3.567)	(3.420)	(3.245)
Age	162.513***	131.332**	69.053	40.909
	(54.595)	(54.083)	(51.893)	(49.022)
Age^2	-3.084***	-2.486**	-1.235	-0.579
	(1.111)	(1.101)	(1.056)	(0.998)
Age^3	0.020***	0.016**	0.008	0.003
	(0.007)	(0.007)	(0.007)	(0.007)
Western immigrant, 1st generation (d)	-72.109***	-67.885***	-35.343***	-44.703***
	(7.371)	(7.333)	(7.450)	(7.219)
Western immigrant, 2nd generation (d)	-40.202***	-37.622***	-30.758***	-31.097***
	(5.714)	(5.665)	(5.441)	(5.118)
Non-Western immigrant, 1st gen. (d)	-84.358***	-77.625***	-14.495**	-21.181***
	(5.167)	(5.331)	(7.318)	(6.886)
Non-Western immigrant, 2nd gen. (d)	-34.374*	-23.731	-5.873	-34.042*
	(20.808)	(20.626)	(19.810)	(18.494)
Non-temp contract (d)		0.158	-10.264**	1.260
		(5.340)	(5.144)	(8.106)
Full-time contract (d)		-18.876***	-20.736***	-25.189***
		(3.560)	(3.419)	(3.226)
Male (d)		4.492	-3.800	8.311
		(11.791)	(13.786)	(13.226)
Household size		10.897***	10.675***	12.273***
		(1.322)	(1.297)	(1.211)
High urbanization (d)		-17.769***	-7.054*	-6.915*
		(3.962)	(3.819)	(3.573)
Married (d)		-6.783	-10.188**	-13.058***
		(4.341)	(4.177)	(3.911)
Widowed (d)		-25.949	-24.877	-24.059
		(39.658)	(38.005)	(37.273)
Divorced (d)		-33.781***	-24.302***	-26.361***
		-0.034**	-0.089***	(7.280)
Stock ownership (d)			59.880***	58.951***
			(2.702)	(2.511)
3rd pillar pension wealth ownership (d)			14.590***	13.914***
			(2.396)	(2.224)
Homeownership (d)			97.330***	104.295***
			(3.680)	(3.600)
Partner is WE with pension (d)			-31.063***	-18.691***
			(2.773)	(2.659)
Partner is WE without pension (d)			-27.525***	-24.510***
			(5.266)	(4.987)
Partner is SE with pension (d)			-47.972***	-29.100***
			(11.828)	(11.079)
Partner is SE without pension (d)			-1.754	8.943
			(6.742)	(6.354)
Other partner characteristics	No	No	Yes	Yes

Province dummies	No	No	Yes	Yes
Constant	-2916.966*** (887.265)	-2437.632*** (879.037)	-1561.295* (843.182)	-1236.499 (795.141)
Adj. R-sqr	0.204	0.220	0.282	0.259
N	20,142	20,142	20,142	18,740

*Notes: The numbers reported in this table are the regression estimates of Equation (5) – with household wealth (in 1,000 euro) as the dependent variable – under different specifications. A complete list of the included partner characteristics can be found in Table 9c. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Table 11b: first stage results IV regression WE couples, 2010

HH occupational pension wealth (PW) in 1,000 euro	**First stage**
Sector dummies	
Agriculture	-72.1***
	(6.42)
Industry	-43.0***
	(3.74)
Public service and education	13.4***
	(3.76)
Construction	-38.0***
	(4.00)
Wholesale and retail	-56.7***
	(3.88)
Transportation and storage	-63.5***
	(4.04)
Accommodation and food services	-20.1***
	(6.64)
Information and communication	-55.9***
	(4.45)
Finance related	-63.1***
	(4.26)
Business services	-40.1***
	(3.96)
Health care	21.2***
	(4.64)
Culture and sport	-25.3***
	(7.08)
Other *(reference dummy)*	.
	.
Company size	
Log(company size)	2.06***
	(0.277)
Other controls	Yes
Constant	Yes
F-stat	170.6
p-value	<0.0001

*Notes: The numbers reported in this table are the first stage regression estimates of an IV specification of Equation (5) with household occupational pension wealth (in 1,000 euro) as the instrumented variable. A complete list of the included controls can be found in Table 11a. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Table 12: full results OLS regression SE couples, overall and in Construction Sector, 2010

Household Wealth (HW) ***(in 1,000 euro)***	**OLS-1**	**OLS-2**	**OLS-3**	**Construction**
HH occupational pension wealth (PW) (in 1,000 euro)	-0.603***	-0.583***	-0.520***	-0.612***
	(0.103)	(0.102)	(0.103)	(0.232)
HH average total compensation '07-'10	0.004***	0.004***	0.003***	0.005***
	(0.000)	(0.000)	(0.000)	(0.001)
HH variance total compensation '07-'10	0.000***	0.000***	0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Age	338.460	276.586	335.690	-119.891
	(266.820)	(265.273)	(255.279)	(446.948)
Age^2	-6.564	-5.450	-6.708	2.411
	(5.443)	(5.410)	(5.206)	(9.162)
Age^3	0.044	0.038	0.046	-0.015
	(0.037)	(0.036)	(0.035)	(0.062)
Western immigrant, 1st generation (d)	-151.506***	-132.243***	-76.357**	-121.386*
	(34.703)	(34.742)	(35.167)	(67.434)
Western immigrant, 2nd generation (d)	-111.256***	-95.042***	-68.674**	-66.598
	(28.494)	(28.405)	(27.409)	(50.620)
Non-Western immigrant, 1st gen. (d)	-179.014***	-170.189***	-63.634*	-93.537
	(23.281)	(24.000)	(34.592)	(77.374)
Non-Western immigrant, 2nd gen. (d)	-105.718	-114.839	-85.359	0.000
	(116.537)	(115.767)	(111.315)	(.)
Male (d)		50.482	34.753	0.000
		(72.162)	(95.201)	(.)
Household size		28.602***	23.615***	25.895***
		(6.007)	(5.923)	(9.854)
High urbanization (d)		-26.270	2.850	-16.004
		(18.973)	(18.539)	(34.050)
Married (d)		7.873	-4.838	-11.303
		(18.442)	(17.906)	(30.928)
Widowed (d)		47.379	5.646	-63.116
		(164.112)	(157.903)	(237.046)
Divorced (d)		-75.010**	-61.328*	-67.505
		(33.398)	(32.213)	(51.582)
Stock ownership (d)			120.291***	66.372***
			(12.699)	(22.488)
3rd pillar pension wealth ownership (d)			-12.031	9.898
			(12.014)	(20.784)
Homeownership (d)			157.562***	186.829***
			(17.693)	(30.075)
Partner is WE with pension (d)			-51.230***	-28.012
			(14.758)	(22.716)
Partner is WE without pension (d)			-87.908***	-35.602
			(28.787)	(41.498)
Partner is SE with pension (d)			40.141	-55.503
			(24.998)	(52.011)
Partner is SE without pension (d)			63.725***	20.013
			(15.883)	(36.765)
Other partner characteristics	No	No	Yes	Yes
Province dummies	No	No	Yes	Yes
Constant	-5845.738	-4916.796	-5992.002	1415.470
	(4328.601)	(4302.733)	(4143.038)	(7217.072)
Adj. R-sqr	0.205	0.220	0.281	0.266
N	3,085	3,085	3,085	615

*Notes:The numbers reported in this table are the regression estimates of Equation (5) –with household wealth (in 1,000 euro) as the dependent variable – under different specifications. A complete list of the included partner characteristics can be found in Table 9c.Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*