Government
Institute for
Economic Research

Working Papers 33

Voluntary pension savings and tax incentives: Evidence from Finland

Jarkko Harju

VATT WORKING PAPERS

33

Voluntary pension savings and tax incentives: Evidence from Finland

Jarkko Harju

Valtion taloudellinen tutkimuskeskus
Government Institute for Economic Research
Helsinki 2012

Jarkko Harju, VATT, Arkadiankatu 7, PL 1279, 00101 Helsinki, Suomi Finland, jarkko.harju@vatt.fi, +358403045507

I would like to thank Seppo Kari, Leena Kerkelä, Tuomas Kosonen, Tomi Kyyrä, Teemu Lyytikäinen, Jukka Pirttilä, Timo Silvola, Päivi Valdes, Takis Venetoklis, Heikki Viitamäki, Matti Virén and the participants in various seminars for their useful comments. I would also like to thank the Federation of Finnish Financial Services, the Nordic Tax Research Council, the Alfred Kordelin Foundation, the Finnish Cultural Foundation and the Yrjö Jahnsson Foundation for their financial support.

ISBN 978-952-274-026-7 (nid.)
ISBN 978-952-274-027-4 (PDF)

ISSN 1798-0283 (nid.)
ISSN 1798-0291 (PDF)

Valtion taloudellinen tutkimuskeskus
Government Institute for Economic Research
Arkadiankatu 7, 00100 Helsinki, Finland

Edita Prima Oy
Helsinki, June 2012

Cover design: Niilas Nordenswan

Voluntary pension savings and tax incentives: Evidence from Finland

Government Institute for Economic Research
VATT Working Papers 33/2012

Jarkko Harju

Abstract

This paper studies empirically savers' behavioral responses to the Finnish tax reform of 2005 by using comprehensive panel data. The tax schedule of voluntary pension savings changed from progressive to proportional, changing the saving incentives in different subgroups. The results indicate that the reform altered saving behavior by reducing voluntary pension saving coverage among high income-earners by 4 percentage points and increasing it among low income-earners by 2 percentage points. The reform also reduced annual saving contributions among high income-earners by over 20 percent. The estimated effects result entirely from the changed saving behavior of men.

Key words: Voluntary pension savings, tax reform, tax incentives

JEL classification numbers: H24, H31

Tiivistelmä

Vapaaehtoisten eläkevakuutusten verotus muuttui vuonna 2005 Suomessa, kun verotusperusteet siirtyivät ansiotuloverojärjestelmästä pääomatulovero-järjestelmään. Verouudistus muutti säästämiskannustimia eri ansiotuloryhmissä. Tämä tutkimus arvioi uudistuksen aiheuttamia käyttäytymisvaikutuksia empiirisesti. Tulosten perusteella säästämisaktiivisuus laski suurituloisten keskuudessa keskimäärin 4 prosenttiyksiköllä ja nousi 2 prosenttiyksiköllä pienituloisten keskuudessa. Lisäksi suurituloisten keskimääräiset säästöt eläkevakuutustileille pienenivät noin 20 prosenttia. Arvioidut tulokset johtuvat ainoastaan miesten muuttuneesta käyttäytymisestä.

Asiasanat: Vapaaehtoiset eläkevakuutukset, verouudistus, verokannustimet

JEL-luokittelu: H24, H31

Contents

1. Introduction[1]

Many western countries face increasing difficulties in financing their current social security programs due to the decreasing proportion of the working-age population. In response they have been cutting the future scope of their public pay-as-you-go pension systems. In order to guarantee an adequate level of old-age income, they have tried to encourage individual pension savings by granting tax-allowances. Well known examples of tax-favored individual pension savings plans are the IRAs and 401(k) plans in the USA, Personal and Stakeholder pensions, and ISAs and TESSAs in the UK and Riester pensions in Germany. Most OECD countries provide special tax treatment for some sort of individual saving plans (OECD 2005). A common system is EET (exempt-exempt-tax) which allows the saving to be deductible from the income tax base, the earnings of pension accumulations are tax-free, and the pensions, when withdrawn, are taxable income. Another widely used system is TEE (tax-exempt-exempt) where contributions are taxed but accrued interest and benefits are untaxed.

The most common motivation for tax-deferred voluntary pension plans is to increase the aggregate saving rate and secure the income of retired persons.[2] The paternalistic argument in favor of preferential tax treatment is that savers are myopic and they start to provide for pension savings too late. Some economists also argue that the illiquidity of pension savings makes their elasticity differ from that of precautionary savings. This would justify preferential tax treatment for pension savings (Fehr et al. 2008, p. 193). In the recent Mirrlees review, Banks and Diamond (2010) discuss why tax-favored pension savings are important. Their most fundamental argument for tax-favored treatment is the huge heterogeneity in people's saving behavior: some save too much and some do not save enough. They also argue that other methods should be thought of than just exemptions from tax bases. For example, it would be possible to increase the role of employers or financial institutions in the private pension saving markets.

However, there are some counter-arguments too. Only a small part of the increased pension contributions are new savings. Most is actually transfers from other savings instruments to tax-preferred instruments.[3] In addition, many front-

[1] List of abbreviations in the order of appearance in the paper: IRA, Individual Retirement Arrangement; ISA, Individual Savings Account; TESSA, Tax-Exempt Special Savings Account; EET, Exempt Exempt Taxable; TEE, Taxable Exempt Exempt; TR2005, Finnish Tax Reform on voluntary pension savings in 2005; VPP, Voluntary Pension Plan; TyEL, earnings-related pension; GDP, Gross Domestic Product; DIT, Dual Income Tax; METR, Marginal Effective Tax Rate; MTR, Marginal Tax Rate; OLS, Ordinary Least Squares.

[2] Bernheim (2002) presents a comprehensive analysis concerning taxation and savings.

[3] General equilibrium models are used to estimate the effects of voluntary pension plan savings on the capital stock and incremental savings. Imrohoroglu et al. (1998) have concluded that there are increases in national net savings, capital stock and additional savings but the effects are not extensive. Fehr et al. (2008) estimated the additional savings to be 22% higher than in the Imrohoroglu et al. paper (1998)

loaded voluntary pension plan instruments are problematic in countries where certain subpopulations can get larger tax advantages than others. This is especially true if the deductions are made based on progressive taxation.

The purpose of this paper is to analyze empirically how the Finnish tax reform of 2005 (TR2005) affected the behavior of voluntary pension plan (VPP) savers in Finland. The main objective is to examine whether or not the coverage and/or the amount of savings in VPPs changed. Before the reform, savings were deducted from labor income and the benefits were taxed as labor income, subject to a steeply progressive tax rate schedule[4]. TR2005 changed the tax treatment to a flat-rate capital income taxation regime. The previous tax schedule was seen as being problematic as the individuals faced different saving incentives depending on their taxable income.[5] The most drastic incentive change was among high income earners who were close to retirement age. Among young and middle income individuals the change in the incentives was very moderate, if any. Due to this variation, the reform seems to open up an interesting opportunity to estimate the effects of the tax change on different income groups.

This paper applies the TR2005 as a natural experiment using a difference-in-difference method. In the analysis, the control group is formulated for middle income individuals, who are compared to high and low income individuals who faced the largest changes in their saving incentives.

The questions examined by Attanasio et al. (2005), Chung et al. (2008) and Disney et al. (2010) are closest to that of this paper. Attanasio et al. (2005) studied the effect of tax deductions on saving behavior in the UK. They examined the tax reform of 1999 and found that the amount of tax-exempted savings increased in all age groups due to the reform. Particularly young people saved more. However, at the same time, the amount of aggregate savings decreased in all age groups and the largest decreases were among the young and low-income groups. Chung et al. (2008) and Disney et al. (2010) studied the UK tax reform of 2001. Chung et al. did not find any significant growth in new private savings after the reform. However, in the case of low labor incomes the amount of savings increased. Another focus in their study was the changes in the coverage of having a retirement plan before and after the reform. There was no evidence indicating any increase in the coverage. Disney et al. argued that the associated change in the contribution ceiling benefited low and zero-earners; this group added the coverage of savings in voluntary pension accounts. The results also provided evidence that women added coverage. In contrast to the rest of the

[4] Finnish income taxation follows the Nordic dual income tax system in which labor income is subject to a progressive tax schedule whereas capital income is taxed using a flat tax rate. (See Sørensen 1994, 2005)

[5] Kari and Lyytikäinen (2004) and Määttänen (2005) have drawn attention to this incentive aspect of TR2005.

sample, the level of contributions among those who benefiting from the higher contribution limit did not fall.[6]

According to my results, it seems obvious that TR2005 affected the VPP saving behavior of individuals. The coverage of high income earners decreased after the reform by 4 percentage points and contributions went down by 20 percent compared to middle income earners. Low income earners increased their participation rate by 2 percentage points but their level of savings did not change. These results seem to be consistent with the theoretical results. In addition, it seems that all of the responses were due to a change in men's behavior. Thus, women did not change their behavior at all. However, much of the responses could come from individuals' reallocation of savings and not from the changes in total savings, as many previous studies have indicated. Unfortunately, due to the lack of micro data on total savings, this study cannot answer how aggregate savings were affected by the reform.

The paper proceeds as follows. In the second chapter, I present a short introduction to the Finnish VPP savings scheme and the tax system related to it, and I will also describe the model for assessing the effective tax rate for savers before and after TR2005. The third chapter contains empirical analysis where I introduce the hypotheses and explain the econometric method used, in addition to which I present the data set and offer the estimates of the responses to TR2005. Finally, in the fourth chapter I present my conclusions.

[6] There is also a comprehensive previous literature about the effects of tax-deductible savings on aggregate savings in the US (see e.g. Engen et al. (1994), Venti and Wise (1992, 1995), Attanasio and DeLeire (2002), Benjamin (2003), Chernozhukov and Hansen (2004).

2. Voluntary pension plans in Finland

In the international literature it is common to describe pension systems in terms of three 'pillars'. In Finland the pension system[7] is based on a public first pillar which is divided into two parts. First, the national pension is the basic tier which is a flat-rate benefit, financed through taxes and contributions. The second part is the earnings-related pension (TyEL), which is financed from compulsory contributions paid by employees and employers[8]. The second pillar complements the first pillar and includes voluntary collective industry-specific or employer-specific schemes. The third pillar comprises voluntary pension plans (VPP).

The public pension provision is comprehensive in Finland, representing over 10 per cent of GDP. This share is expected to grow in the future. Total pension expenditure consists approximately of 95 percent statutory pensions and 5 percent VPPs. However, VPP savings have gradually grown in popularity in recent decades, but these instruments still have only a minor role compared to the other saving options.

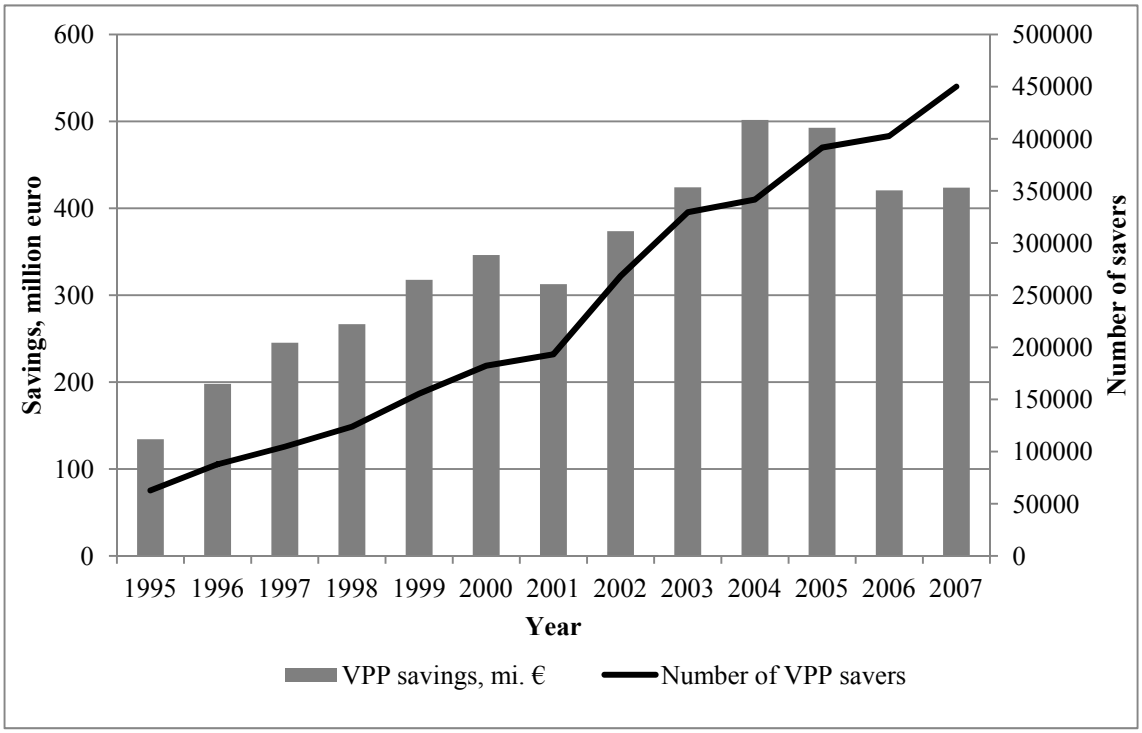
Figure 1 depicts the increase in the coverage and in the amount of yearly VPP contributions from 1995 to 2007. The data set is from Statistics Finland. It is a representative sample of Finnish people, including approximately 28,000 individuals per year. By weighting the data to represent the whole population of Finland, we can calculate the sum of VPPs and the number of savers per year. The sum of savings is in millions of euro and at 1995 prices. The grey pillars are the sum of deductions per year (left vertical axis) and the thick line shows the number of savers (right vertical axis).

The number of savers has increased considerably. Growth was stable until 2001 but thereafter the number of savers exceeded the average trend growth. In 2004 and 2006 there was just a small increase, which might be explained by the overall uncertainty regarding the new tax system. However, the number of pension savers rose by almost 50,000 savers from 2004 to 2005 and from 2006 to 2007.

[7] The Finnish Centre for Pensions (Handbook 2007:6) offers a comprehensive description of the Finnish pension system.

[8] In 2005 there were reforms in earnings-related pensions. The main changes in the reform were that earnings over persons' entire working career were taken into account, a flexible retirement age between 63 and 68 was introduced, higher accumulation rates for older workers were applied, and increased life expectancy started to matter for pensions with being lowered as life expectancy increases. At the same time there was a wide debate about the sustainability of the public pension system.

Figure 1 *The sum of VPPs and the number of savers from 1995 to 2007 (Source: Income Distribution data 1995–2007 (Statistics Finland))*



The sum of savings has increased over the last decade. The annual growth in savings has been fairly linear, except for 2001 and after the reform, in 2005 onwards. The poor economic cycle could also have affected the subnormal growth in savings in 2001. However, savings growth picked up from 2001 to 2005. In 2006 the aggregate amount of savings dropped approximately to the 2003 level and seemed to stay there in 2007 too. One explanation is that the decline in the sum of savings is simply reallocation of savings from VPPs to other types of saving options, leaving aggregate savings unaffected. Unfortunately, due to the data limitations it is not possible to evaluate the changes in aggregate savings caused by TR2005.

2.1 Tax scheme for VPPs

A notable feature of the Finnish income tax system is the Nordic-type dual income tax (DIT) which combines a steeply progressive taxation of labor income and a flat-rate taxation of capital income. Interestingly, although this has received little attention in tax literature, the DIT system offers two alternative ways to tax private pension savings in EET system. The first way is to apply a progressive labor income tax schedule and the other is to impose flat-rate capital income

taxation on both contributions and withdrawals. The differences in tax rates will have different implications for saving incentives.

Tax literature has paid some attention to progressive taxation applying an EET model (OECD 1994, 2005) which is the model applied to VPPs in Finland. According to the literature, a progressive tax scheme can lead to a wide variation of incentives between different contributors and may end up favoring savers in high income classes. A solution to these heterogeneous incentives under DIT could be to tax VPPs with flat rates of tax on capital income.

Tax reform of 2005

The Finnish law on VPPs was based on labor income taxation until 2004. Deductions were made from labor income and tax on withdrawals was paid as on labor income. After the reform deductions are made from capital income and withdrawals from these savings are taxed according to the flat tax rate on capital income (Ministry of Finance (2005)). VPP contributions are deducted from capital income after natural deductions[9], interests and losses. If the total amount of contributions is higher than the total amount of capital income, the taxpayer is entitled to deduct the deficit from the labor income taxes.

Before the reform, deductions were applicable if the saver had undertaken to keep his/her savings in the plan until the age of 60. This contractual limit was also increased to 62 years after 2005. In addition, the maximum deductable amount decreased considerably from 8,500 to 5,000 euro under to the reform.[10]

Transitional rules

The new law came into force at the beginning of 2005. However, it included the following transitional regulations. Firstly, in 2005 it was still possible to apply the old rules to contracts concluded before the government's first proposal (6 May 2004). Secondly, the tax rules on pension plans included transitional provisions for savers entering into a contract between the government's first reform proposal and the end of 2004. Savers making their first contributions in that period deducted their contributions from labor income and their future withdrawals will be taxed on the basis of capital taxation. This means that persons with high marginal labor income tax rates had a major incentive to save in pension plans in 2004. Thirdly, the contractual age remained at 60 years (or lower, depending on which age limit was valid when the contract was made) until 2009 if the contract with the insurance company was made before the first

[9] According to Finnish tax law, natural deduction refers to a taxpayer's right to deduct from investment income all expenses incurred in acquiring and maintaining such income (Ministry of Finance, 2005).

[10] The Finnish government reformed the VPP system again from the beginning of 2010 by introducing a new pension saving instrument. It was aimed to increase competition and lower the saving expenses of savers. Only insurance companies were allowed to provide pension savings plans until the end of 2009, but after 2010, for instance, all banks were allowed to offer VPPs.

government proposal. As from 2006, all deductions have been made from capital income and withdrawals are taxed at the capital tax rate.

2.2 Measuring tax incentives of VPP savings

A common way to compare tax incentives to save in a particular instrument is to calculate the marginal effective tax rate (METR), as was the case in the OECD (1994) report. The METR illustrates the tax burden of an investment option better than the nominal tax rate because it allows one to take into account many other factors which interact with taxes (OECD 1994, p. 62). For example, inflation, tax base regulations and overlapping taxes can be included in the formula of the METR.

Kari and Lyytikäinen (2004) introduced a simple way to measure the tax burden of different private investments in Finland and applied also the METR approach to VPPs in the EET system. The method of Kari and Lyytikäinen is simpler than the OECD (1994) version, and under their approach the METR can be presented in just one formula.[11] The pattern of the METR is based on[12]

$$METR = \frac{1}{rT} ln\left(\frac{1-\tau_t}{1-\tau_{t+1}}\right) \quad (1)$$

where r is the real interest rate, T is the saving period, τ_t is the marginal tax rate (MTR) for income from which deductions are made and τ_{t+1} is the MTR for pensions.

The model relies on the following assumptions. The contribution is one euro out of the saver's disposal income in a private pension plan at time t=0. The holding period is T years and the withdrawal is made in the form of a lump sum. The real interest rate r is fixed and positive. The model assumes perfect competition in the insurance market and that there are no management or other expenses.

The lower the METR, the better it is for the saver. The expression (1) is negative if $(1-\tau_t)/(1-\tau_{t+1})$ is between zero and one, and positive if $(1-\tau_t)/(1-\tau_{t+1})$ is larger than one. The saving incentive is affected by two different factors when the interest rate is fixed: first, the difference between MTRs on contribution and withdrawal periods and, second, the holding period of the savings. If the MTR is higher for the contribution period (τ_t) than for the withdrawal period (τ_{t+1}), the tax authorities do not collect all the tax deductions back as tax income. In a progressive tax scheme it is likely that some savers could benefit from this. Therefore, some savers could have a substantial tax incentive by saving in VPPs, especially those in the highest tax brackets. Hence

[11] Wakefield (2009) also used a similar method to calculate effective tax rates for different assets under the UK tax system.

[12] The notation is slightly different from Kari and Lyytikäinen (2004).

$$METR \begin{Bmatrix} > \\ = \\ < \end{Bmatrix} 0 \quad \Leftrightarrow \quad \tau_t \begin{Bmatrix} < \\ = \\ > \end{Bmatrix} \tau_{t+1}. \tag{2}$$

Secondly, the length of the holding period of savings (*T*) affects the extent of the incentives. The METR on retirement savings approaches zero in the holding horizon, as Kari and Lyytikäinen point out. Before the reform the effective tax rate could have been very low for short holding periods (*T)*, for example the METR can be as low as -150% if the holding period is only 3 years but it increases to -15% if the holding period is 20 years and further increases to over -10% when the holding period is over 30 years. Therefore, it is clear that holding period affects the METR but still does not eliminate the incentives totally. In the new system, where the flat tax rate is applied, the effective tax rate is zero and the incentives are equal between different savers.

Kari and Lyytikäinen (2004) illustrate in more detail the effect of the reform by simulating METRs at different fixed labor income levels (Figure 2)[13]. The figure illustrates that persons with low annual labor income (20,000 €) and low annual pension income (below 15,000 €) had very high positive METRs. Therefore, it was not very profitable for them to invest in the pension plans. Persons with higher annual labor income (40,000 € and 60,000 €) could benefit from below-zero METRs. For example, if the annual pension level is half of annual wages, the METRs for wages of 20,000 €, 40,000 € and 60,000 € are 28%, -20% and -54%. After the reform, in the capital taxation model, the METR equals zero and thus the incentives are the same independent of their income levels.

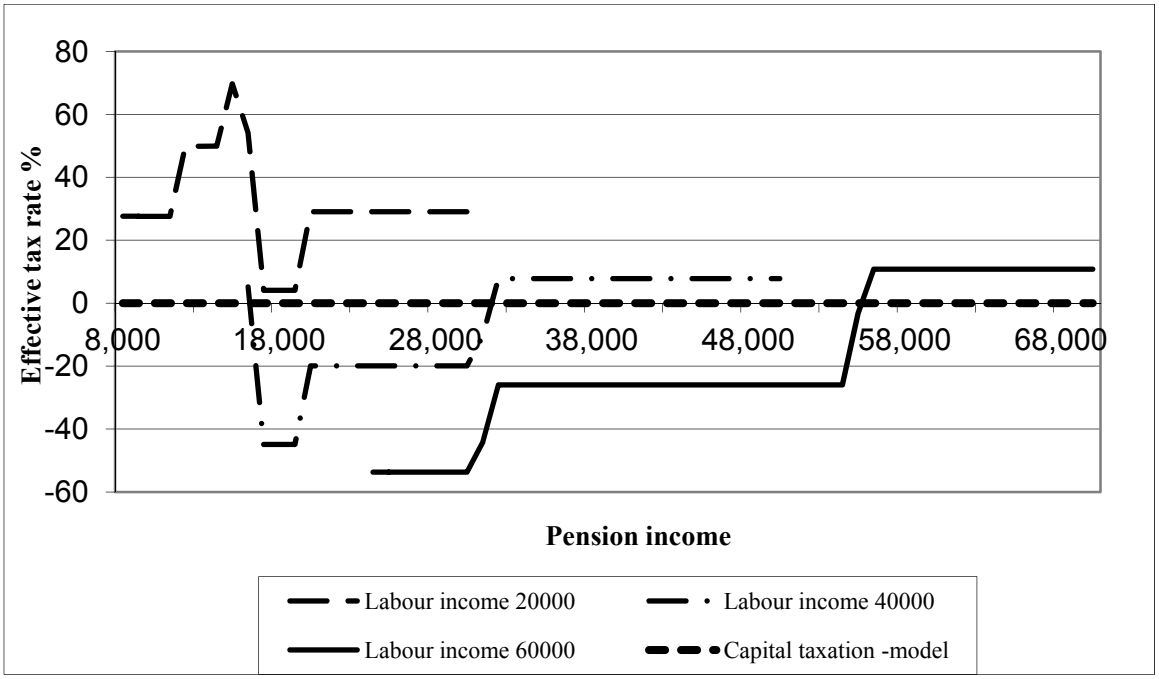
As TR2005 considerably changed saving incentives for VPPs depending on individuals' wage levels, how individuals reacted to these changes is an empirical question. The natural way to study the effects of the reform is to evaluate the changes in contributions and the rate of participation of different subgroups. To summarize, due to the changes in tax incentives, the empirical analysis is based on the following predictions that we observe

- a decrease in VPP savings and participation among high labor income individuals and especially those close to the retirement age, and;

- an increase in VPP savings and participation among low labor income and young individuals.

[13] In their analysis they applied the TUJA micro simulation model which is in use at VATT (Government Institute for Economic Research). The calculations are made assuming a 4% interest rate and a 10-year investment horizon.

Figure 2 *The marginal effective tax rates on pension savings for different labor and pension income (the interest rate is assumed to be 4% and the saving period is 10 years)*



3. Empirical analysis

3.1. Methods

The following empirical strategy is based on the assumption that the reform of 2005 was exogenous for individuals and that incentives changed differently in different subgroups. Thus, it provides an opportunity to estimate the effects of the reform on the saving coverage and the amount of savings by using a difference-in-difference strategy. This method requires individuals to be divided to those who were affected by the reform (treatment) and to those who were not affected (control).

The difference-in-difference model can be written as follows

$$P_{i,t} = \alpha + \delta Treat_i + \gamma Treat_i D + \beta X_{i,t} + \eta_i + \varepsilon_{i,t}, \qquad (3)$$

where $P_{i,t}$ is an outcome variable that is the annual (t) amount of VPP savings as a logarithm per individual i *or* a dummy variable with a value of one if the individual saves in a VPP and zero otherwise. *Treat* is a treatment status equaling zero for the control group and one for the treatment group, *D* represents an indicator of the post-reform period and X is a vector of control variables. In most cases the estimation strategy is a fixed-effect method in which the parameter η_i can be separated from the error term. The vector of control variables includes individuals' age, capital income, debt, labor income and tax payments when the fixed-effect model is used. In the case of the random effect or probit model, the control vector also includes other characteristics like marital status, place of residence, type of residence and socioeconomic status. In addition, all the specifications include year dummies for controlling the time trend and a flexible linear time trend for the treatment group.

Ideally, a difference-in-difference method would be used if the treatment and control groups could be selected randomly. However, the 2005 reform in Finland does not offer a random division into treatment and control groups. Thus, it is necessary to use a natural experimental approach and formulate the control and treatment groups carefully. The natural starting point is to consider the MTRs on pension and wages, as showed in the theoretical section. Individuals are aware of the MTR on their wages but not the MTR on pensions. To be able to use equation (1) in formulating the hypotheses, we need to assume that individuals expect the MTR on pensions to follow the current tax code for pensions. This is a sensible assumption since there is no clear reason why individuals would have any better information about the future tax scheme than the current tax schedule. Especially individuals with continuous work biographies generally fulfill this assumption; however, for workers with a fragmented work history this would not necessarily

hold very well. Thus, after the main econometric results in Section 4, I perform a battery of robustness checks to show that the main results are not affected by the formulation of the control and treatment groups.

As stated in the Section 2.2, the incentives to invest in VPPs depend on the MTRs on wages and pensions. Figure 3 presents the MTRs both on annual pensions and wages in 2003 to point out the incentive differences depend on income levels.[14] There are at least four important aspects in Figure 3. First, the MTRs are much higher for pensions between 7,500 and 16,000 euro than for wages, which is a result of differences in deductions between wages and pensions. Second, for the highest wage bracket the MTR is always higher than the MTRs on pensions if the pension income is lower than 55,000 euro (pensions higher than 55,000 euro are very rare in Finland). Therefore, individuals in this tax bracket had clear incentive to save in VPPs before the reform. Third, individuals in the second-highest wage bracket (wages between 33,000 and 58,000 euro) did not have such a clear incentive to save in VPPs, assuming that their pension income will not be below 7,500 euro (which is a very low annual pension level in Finland). Fourth, individuals in the wage band from 7,500 to 22,000 euro faced higher a MTR on pensions than on wages and therefore had a positive METR, implying no clear incentive to save in VPPs (again, assuming that their pension income will not be below 7,500 euro).

Both the control and treatment groups are formulated based on the tax schedule for wages and pensions presented in Figure 3. Using the marginal tax rate schedule for 2003, the highest bracket in the tax schedule constitutes a first treatment group (taxable labor income higher than 58,000 euro in 2003)[15]. The subgroup which saw an increase in incentives to save due to the reform is low income earners. Following the reform their positive METR went to zero.[16] Therefore, a second treatment group is for low earners which had taxable labor income between 7,500 and 22,000 euro in 2003. The second highest tax bracket acts as a control group (taxable labor income from 33,000 to 58,000 euro) and is not assumed to experience any change in incentives.

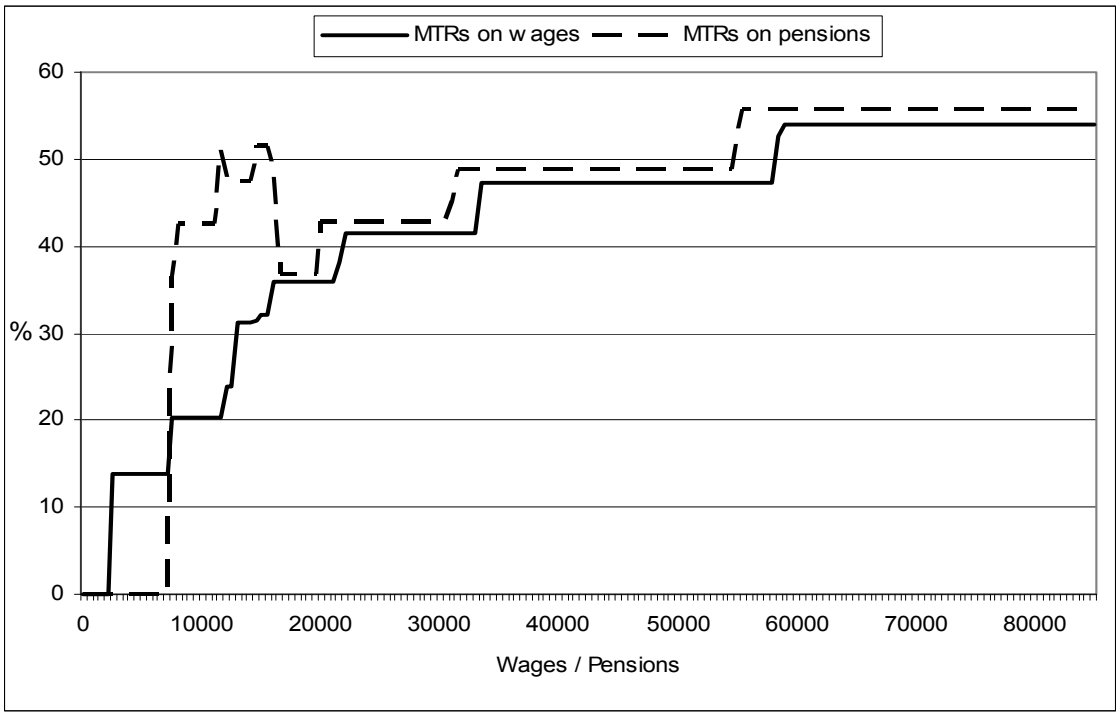
The main assumption of the difference-in-difference method is the parallel time trends between the control and treatment groups before the policy change. Thus, the time effects must be common for the control and treatment groups. In addition, the composition of the treatment and control groups must remain stable over time. If these assumptions hold, the model identifies the coefficient γ in equation (3), which is the average treatment effect on treated individuals.

[14] To be clear, wages refer here to the total sum of annual taxable labor income and pensions are the total sum of annual pensions taxed as labor income.

[15] The information for 2002 is used similarly in the robustness checks.

[16] If we assume that after the reform the capital tax rate is the same in the contribution and withdrawal period. However, this is not a huge assumption, at least in the sense of savers' expectations.

Figure 3 Marginal tax rates on pensions and wages in Finland in 2003



Until now, I have ignored the effect of the investment horizon which was discussed in the previous section. For a short investment horizon, the benefits for high income earners might have been considerable before the reform. This is taken into account in the regressions by introducing a new dummy (G), which is one if the individual is over 50 years old in 2003 and zero otherwise. By using this dummy it is possible to investigate if the effects of the reform are different among older treated individuals than younger. This can be done by using a triple difference estimation and the estimated equation is now

$$P_{i,t} = \alpha + \delta Treat_i + \phi G_i + \iota Treat_i G_i + \gamma Treat_i D + \lambda G_i D + \theta G_i Treat_i D + \beta X_{i,t} + \eta_i + \varepsilon_{i,t}, \quad (4)$$

where *G* is one if the individual is over 50 years old in 2003 and zero otherwise. The other variables in equation (4) are the same as in equation (3). Naturally, the parallel trend and the composition of the group assumptions must hold both in this case and in the standard difference-in-difference model. The parameter θ reveals the triple difference estimate, and therefore tells us whether older high earning savers saved differently than others after the reform.

One additional point to be taken into account is that the provision allowed existing savers to use the former system until the end of 2005. People could choose to make contributions up to the upper limit and gain the tax benefits. It was also possible to deduct contributions from labor income in 2004 and pay

capital tax if the contract between the saver and the insurance company was signed between 6 May 2004 and the end of 2004; in other words, it was possible to receive an extra tax benefit in these years. These special provisions created a clear incentive to anticipate the reform. Thus, to make sure that this does not bias the estimates, the estimations are also performed without the years 2004 and 2005. Then years 2000-2003 represent the before period and 2006 and 2007 the after period. Otherwise the years from 2000 to 2004 are used as the before period and the years from 2005 to 2007 as the after period.

3.2. Data

The data set is from Statistics Finland. It is a panel-stratified sample of approximately 53,000 annual observations. The data set is a representative sample of the Finnish population and covers the period from 2000 to 2007. The analysis is made by examining two outcome variables: the coverage of savers (participation) and the amount of VPP contributions deducted from the income tax bases as a logarithm (labor and capital). The data set contains many other relevant continuous variables including labor income, capital income and age, which are used as control variables. There are also many important dummy variables like gender, place of residence, marital and socioeconomic status. Unfortunately, the data has no variable representing the private wealth of a person, thus it is impossible to analyze the changes in total wealth of individuals because of the reform.

The descriptive statistics of the main variables used in the estimations are given in Table 1 below. These descriptive statistics are calculated for the subsample which includes only the control and the two treatment groups described above.[17] All the euro values are given in current prices for each year. VPP savings represents annual savings in the accounts. In the control group the mean VPP savings are over 300 euro but in the high treatment group the mean is over 900 euro. VPP savings coverage is also much higher in the high treatment groups. In the low treatment group the mean savings amount in VPPs is below 80 euro and 8 per cent of population save.

[17] The descriptive statistics for the whole data set are presented in the Appendix, Table 1.

Table 1 Descriptive statistics by groups, data from 2000 to 2007

Variables	Control	Treatment - high	Treatment - low
VPP savings coverage	0.1726	0.2589	0.0784
	0.3779	*0.4381*	*0.2687*
VPP savings	326.4	921.5	79.5
	1052.5	*2102.2*	*463.4*
Labor income	39284.3	72519.8	15233.7
	11641.6	*45360.6*	*6953.3*
Debts	25893.1	35268.0	11053.3
	40196.3	*64909.6*	*22768.0*
Capital income	2860.9	10460.8	928.1
	35222.8	*58348.3*	*7686.4*
Home ownership	0.7307	0.8293	0.4057
	0.4436	*0.3763*	*0.4910*
Taxes paid	14274.9	33955.9	3594.1
	11587.4	*31058.5*	*3397.4*
Male	0.7483	0.8532	0.4194
	0.4340	*0.3539*	*0.4935*
Age	47.9	49.8	50.5
	11.5	*9.9*	*17.5*
Number of observations	28727	6608	175917

Note: Table contains mean (uneven rows) and standard deviation (even rows) values of variables categorized by control and treatment status.

3.3. Descriptive analysis of the treatment and control groups

Figure 4 shows the coverage of VPP savers in two separate treatment groups and in the control group. The low-income treatment group increased its coverage over the whole examination period. The increase is almost linear, starting from under 5 per cent in 2000 and culminating at approximately 13 per cent in 2007. The high-income treatment group increased its coverage from 2000 to 2004, but after that the share decreased. The coverage in the control group increased from 2000 until 2003 but thereafter the share is relatively constant. The coverage of pension savers in the high-income treatment group seems to be similar to the control group before the reform, which is essential to the analysis, since the difference-in-difference model assumes common trends between groups. The pre-reform trends also seem to be relatively similar in both the low-income treatment group and the control group, although coverage increased a bit faster in the control group. Figure 4 provides descriptive support for our hypotheses: individuals in the high labor income treatment group lowered their participation rate and those in the low labor income treatment group increased their participation rate.

Figure 4 *Participation rate and 95% confidence intervals in the treatment and control groups from 2000 to 2007*

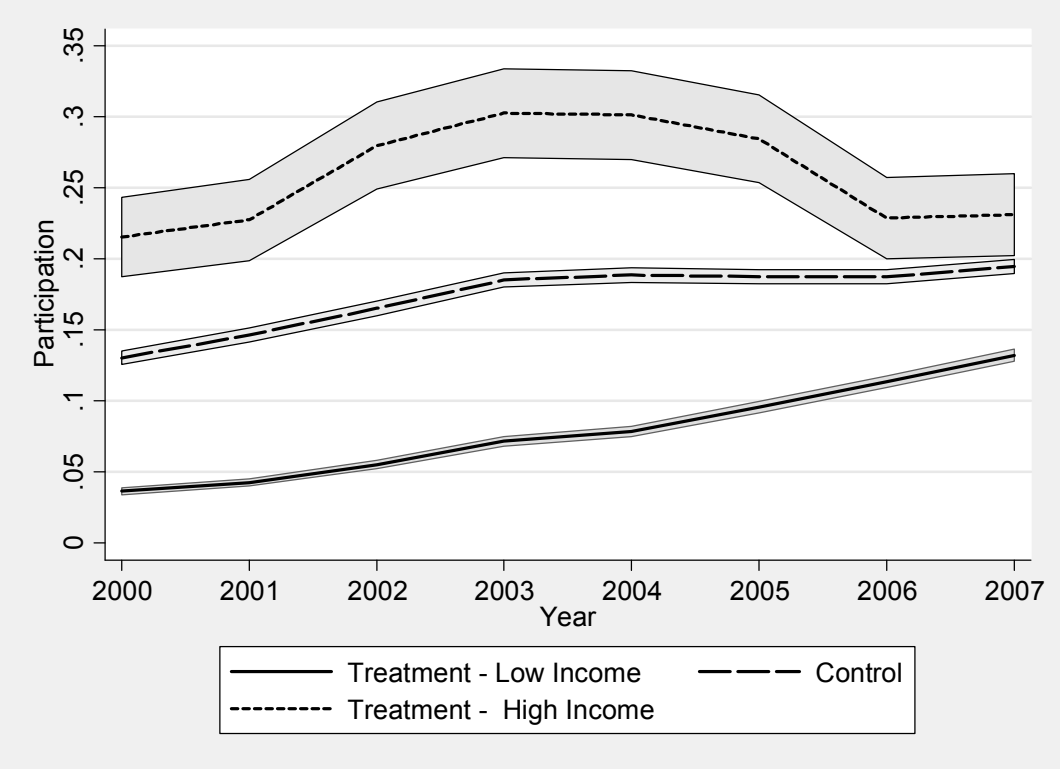
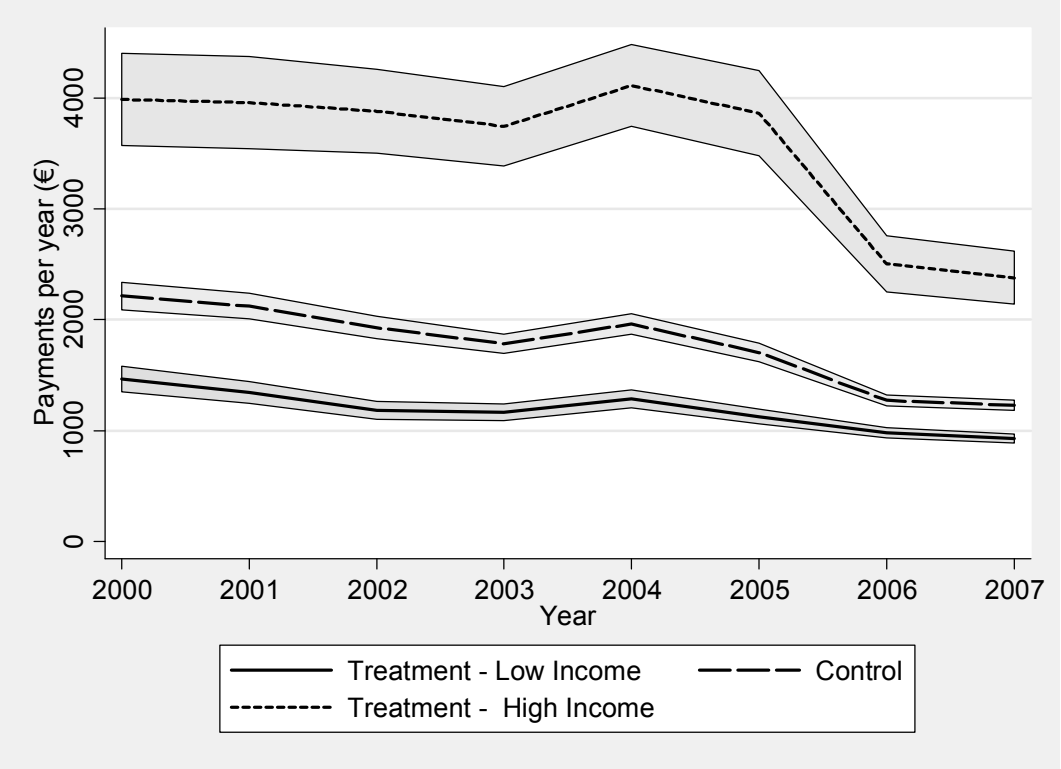


Figure 5 represents the mean of annual VPP savings in the treatment and control groups for those who saved in VPP accounts. Thus all those who did not save are excluded from this descriptive analysis. There seems to be a downward trend in mean payments after the reform. In all groups the mean amount of VPP savings decreased clearly from 2005 onwards. The mean savings amount in the high labor income treatment group declined much more than in the control group after the reform. The mean in the high labor income treatment group is 2,500 euro after the reform, whereas before it was approximately 4,000 euro. On the other hand, it seems that the mean savings amount in the low income treatment group did not change much after the reform compared to the pre-reform years.

All in all, the descriptive analysis indicates that the trends in the mean savings amount are similar between groups before the reform, and the main assumption of common time trends between groups, identifying the effect of the reform, seems to be reasonable. In addition, it is possible to control for possible trend differences in the econometric specification by introducing separate time trends for the groups. This further strengthens the identification strategy.

Figure 5 *Mean savings amount and 95% confidence intervals in the treatment and control groups from 2000 to 2007*



As mentioned above, the actual reform was announced already in 2004 and this enabled individuals to anticipate the reform in 2004. Also, the mixed system in 2005 causes problems for the identification. Figure 5 reveals that there might have been some anticipation before the reform, at least in 2004 in the high-income treatment group . Thus, to figure out the effect of the reform, the results are presented using the years from 2000 to 2003 as a before period and the years 2006 and 2007 as an after period.

4. Econometric results

The dependent variables are the dummy variable with a value of one if the individual has saved in VPPs and zero otherwise, and the logarithm of the annual amount of VPP savings for an individual. The main control variables are age, labor income, capital income, debts and tax payments. The control vector including gender, residence area, education and marital status is also added to the specification as a dummy when a method other than fixed effects is used. In addition, all the specifications include flexible time trends. The most interesting coefficient is the interaction term of the after-dummy and treatment variables. Changes in behavior in the treatment groups due to the reform are detected if these interaction terms produce a statistically significant coefficient.

As mentioned in the descriptive analysis section, only a relatively small fraction of individuals save in VPPs in Finland, thus there are many observations with a value of zero VPP savings in the data set. Therefore, when the analysis concerns the savings amount, the dependent variable is a combination of discrete and continuous distributions. In this case, it would be difficult to find a very credible estimator if only cross-section data were available. However, the ability to use panel data methods eases this difficulty. In line with Angrist (2001), the starting point is simply to use a fixed-effect OLS model to estimate changes in both coverage and the savings amount of treated individuals. There are at least two major benefits in using this method: first, the calculation of the average treatment effects or standard errors is not computationally demanding and second, the interpretation of the results is easy. However, I also estimate the coverage changes using a probit model to compare them to the base case result of the fixed-effect model.[18]

Table 2 presents the fixed-effect OLS and probit[19] results of the participation effects in both the high and low labor income treatment groups.[20] The results imply that the coverage of VPP savers decreased in the high income treatment group and increased in the low income treatment group. The results indicate that high-income earners decreased their participation by approximately 4 percentage points. Among low-income earners, coverage increased from 1 to 2 percentage points because of the reform. However, the change in participation is not statistically very clear because the changes are significant only at the 10 per cent level.

[18] This part of the analysis is similar to the analysis of Disney et al. (2010).

[19] The marginal effects of the interaction terms are calculated as Blundell et al. (2004) proposed.

[20] The results of the fixed-effect models with all the control variable coefficients are presented in the Appendix, Table 2.

Table 2 Results for the participation estimation

High income = Treat			Low income = Treat	
Variable	Fixed effect	Probit	Fixed effect	Probit
After*Treat	**-.034*** **	**-.046*** **	**.012***	**.022****
	(.012)	(.015)	(.007)	(.008)
Treat		.062***		-.032***
		(.009)		(.002)
N	31 790	31 790	197 357	197 357
R2	0.047	0.062	0.046	0.144
Log likelihood		-14458.4		-49135.3

Note: The table reports the effects of the reform on the probability of saving in voluntary pension saving plans. All the estimates are marginal effects of the reform. All the models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, and in the probit models residence area, gender, education, marital status and residence type were added as dummy variables.
The robust standard errors in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

Table 3 Results for the log of savings[21]

High income = Treat			Low income = Treat	
Variable	Random effect	Fixed effect	Random effect	Fixed effect
After*Treat	**-.255*** **	**-.242*** **	**.132***	**.035**
	(.088)	(.092)	(.070)	(.076)
Treat	.533***		-.365***	
	(.093)		(.044)	
N	6 273	6 273	16 205	16 205
R2	0.120	0.046	0.112	0.043

Note: The table reports the effects of the reform on the log of the savings amount in voluntary pension saving plans. The estimation is made using panel methods, random and fixed-effect models. Both models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, labor income and tax payments, and in the random effect model residence area, gender, education, marital status and residence type were added as dummy variables.
The robust standard errors are presented in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

Table 3 reports the estimates of the changes in the log of savings amounts among the treated groups due to the reform. In the high-income treatment the savings amount declined on average by 24 per cent. This can be seen as a relatively significant change. However, the estimate of the low-income treatment group is

[21] The Hausman test suggests that the fixed-effect model should be used instead of random effects because, for instance, in the high-income treatment case the null hypothesis of firm-specific effects uncorrelated with the regressors is rejected at the level of 494.89 (chi 2(5)). However, the coefficient of interest is not very sensitive to the model. Also, including municipality-level controls in the model does not affect the main results. These results are available upon request.

not statistically significant and the estimate value is financially minor - a change of only approximately 3 per cent on average.[22]

As a robustness check, the division into control and treatment groups is also performed by using taxable labor income and MTR schedules for 2002. Otherwise the groups are formed similarly, as presented in Section III.1. The results are not statistically different from the base case results, see Appendix, Table 7. This gives support to the base case estimates and further strengthens the conclusion that the reform affected individuals' saving decisions.[23]

Another way to test the robustness of the results is to check the existence of trends before the reform with a placebo intervention. I assume now that the reform was implemented in 2002 and use the years 2000 and 2001 as a pre-reform period and 2002 and 2003 as post-years. When low income treatment coverage is compared to the control group, the trend seems to be slightly different between groups, but after introducing a linear time trend for low income treatment the difference vanishes. The results are not statistically significantly different from zero between the groups in any other comparisons with coverage or the amount of savings. This test offers further support to my identification strategy.

The transitional provisions and the anticipation of the reform can have an effect on the results for the years 2004 and 2005; the results may be biased because of these reasons. If there was anticipation the base case results would be downward-biased. Both anticipation and transitional provisions need to be considered. One possible way to overcome the problem is to delete the years 2004 and 2005 from the data set. Then, 2000-2003 are used as a pre-reform period and 2006-2007 are used as a post-reform period. The results of the estimations are presented in the Appendix, Table 8 and 9. According to these results the estimates are larger than in the base case. However, the estimates are not statistically different from the base case results, and thus the anticipation effect is not very clear.

More comprehensive analysis of anticipation suggests no changes before the reform: neither of the treatment groups changed behavior in 2004 or 2005 in a statistically significant way. The results imply that there was no statistically or economically significant difference in the behavior of individuals in these years.

---

[22] The estimation is also performed using regression discontinuity design (RDD) for the high-income treatment group. The RDD result is approximately a 17 per cent decrease in the savings of high-income treated individuals, which is not statistically different from the base case result of a 24 per cent decrease. These results are available upon request.

[23] Mean labor income for 2000-2003 was also used for formulating the treatment and control groups. The estimates are not statistically different from the base case results. These and the results arrived at using 2002 labor income are available upon request.

Thus, the base case results seem to offer robust estimates of the reform on the behavior of low and high- income earners.[24]

According to the METRs, the hypothesis is that older individuals had a greater incentive to change their behavior even more than other individuals in the treatment group. The triple difference model with a fixed-effect strategy estimated according to equation (4) does not offer statistically significant estimates of interest where people over 50 years old in 2003 were multiplied with the high-income treatment group. Thus, we can conclude that savings coverage did not change differently among older treated individuals due to the reform[25]. One possible explanation is that older people are not well informed (or are not interested) in their pensions and incentives to save. This has been observed previously in the empirical literature[26]. The results from the estimations are parallel with this conclusion. Another explanation for the results could be that older people's contributions to VPPs have a larger discounted value than those of younger people and they do not change their behavior even though the tax incentive to save in VPPs decreased after the reform.

A further examination of responses by gender reveals that only males reacted to the reform. The two first columns in Table 4 represent the results for the divided sample by gender. The results indicate that the total response comes solely from the male treated group. Thus high-income males are less likely to be VPP savers after the reform than before, and also the savings of high-income males are much lower because of the reform. Moreover, the result implies that savings behavior did not change among high-income females at all. All the responses come from men's changed behavior in the high-income treatment group. It is also noticeable that the estimates for females' participation and savings amount are positive, which would imply increased savings. Nevertheless, these estimates are not statistically different from zero.

The third and fourth column in Table 4 contains the estimates for the low-income treatment group by gender. The effects of the reform for the low-income treatment group offer similar results: coverage changed statistically significantly only among males. The estimates imply that only males responded to the reform in the low-income treatment group by being more active in saving in VPPs. As can be expected from the base case results, the amount of savings did not change, either for males or females.

---

[24] As told before, the reform reduced the upper limit of tax deductions from 8,500 euro to 5,000 euro. This could, for example, solely explain the reduction in high-income earners voluntary pension savings. However, I have done a robustness check by substituting all observations higher than 5,000 euro VPP savings before the reform by 5,000 euro, and the estimates are not statistically different from the base case results.

[25] These results are presented in the Appendix, Table 10.

[26] See example.g. Lusardi (2008).

The results suggest that high-income savers seemed to change their behavior actively because of the reform by both lowering their saving activity and lowering the amount of savings. On the other hand, the results imply that low-income individuals increased their activity to save in VPPs but did not change the amount of savings. It also seems clear that gender is important role for the responses; all of the changed behavior is made by males and females did not change their behavior at all. These results support the view that males respond more actively to changes in saving incentives.

However, there are additional caveats which should be emphasized. The effects of added marketing of voluntary pension plans and the effect of the reform of earning-related pensions cannot be fully controlled in the estimations. It is also possible that the reform of earnings-related pensions has indeed changed younger VPP savers' behavior but it has hardly changed savings in different income groups. These effects cannot be ignored and might cause bias in the observed results.

Table 4 The differences in responses between male and female treated individuals: changes in participation and savings amount

	High-income treatment				Low-income treatment			
	Participation		Savings		Participation		Savings	
Variable	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
After*Treat	**-.033****	**.019**	**-.265****	**.076**	**.010***	**.003**	**-.074**	**.043**
	(.017)	**(.042)**	**(.106)**	**(.169)**	**(.006)**	**(.014)**	**(.093)**	**(.121)**
N	25,718	7,726	4,564	1,709	88,569	99,845	7,349	8,856
R2	0.047	0.059	0.067	0.143	0.041	0.053	0.224	-0.161

Note: The table reports the effects of the reform on the probability of saving and the amount of savings in voluntary pension saving plans. The estimation is made using fixed-effects OLS. All the estimates are marginal effects of the reform. All the models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, labor income and tax payments.
Robust standard errors in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

5. Conclusion

The Nordic-type dual income taxation offers two alternatives for taxing VPPs. The first option is the progressive labor income taxation and the second is to apply the proportional capital income taxation. In 2005 the taxation of VPP instruments changed from labor income to capital income taxation in Finland. The reform changed the tax incentives to save in VPPs differently in different subgroups.

The empirical analysis of this reform was conducted by using micro data and econometric methods in a before-after framework. Before the reform, high income individuals had a clear tax incentive to save in VPPs but the reform abolished these incentives. In addition, the reform increased the incentives of low-income individuals to save in VPPs. Therefore, subpopulations faced the tax change differently and it is reasonable to examine the effects of this reform on savers' behavior by using a difference-in-difference strategy.

The results imply both economically and statistically significant estimates. Firstly, the results imply that high labor income savers lowered their savings amounts and the coverage in VPPs. The probability to save in voluntary pensions declined by approximately 4 percentage points and savings decreased by 24 per cent on average, among high earners. Low income earners' probability to save increased from 1 to 2 percentage points but their savings amounts did not change. Gender seems to have a remarkable role in explaining the responses since the results indicate that only males changed their behavior.

With the proportion of working-age populations declining, governments are facing huge budgetary pressure, especially in countries such as Finland, where pensions are mostly government-funded. The results of this analysis show that tax incentives have an influence on private pension savings although the responses are heterogeneous.

6. Appendix

Table 5 Descriptive statistics, data from 2000 to 2007

Variable	Mean	SD	N	Min	Max
VPP savings coverage	0.067	0.249	424304	0	1
VPP savings	97.3	576.1	424304	0	14780.3
Labor income	14827.2	15539.0	424304	0	1014499
Debts	10664.9	30860.7	424304	0	4412886
Capital income	1034.2	13455.9	424304	0	4652870
Home ownership	0.333	0.471	424304	0	1
Taxes	4245.3	7770.3	424304	0	1334057
Male	0.417	0.493	424304	0	1
Age	38.9	22.3	424304	0	103

Table 6 Fixed-effect results with full set of control variables

	High-income treatment		Low-income treatment	
VARIABLES	Savings	Coverage	Savings	Coverage
Labor income♦	-0.005	0.002	0.007**	0.015***
	(0.006)	(0.002)	(0.002)	(0.002)
Debts♦	-0.002*	-0.001*	-0.008	0.005***
	(0.001)	(0.001)	(0.007)	(0.001)
Capital income♦	0.001**	0.001	-0.003***	-0.002***
	(0.001)	(0.002)	(0.001)	(0.000)
Tax payments	0.051	0.014**	-0.019	-0.006***
	(0.045)	(0.007)	(0.026)	(0.002)
Age	0.331***	0.075***	0.302***	0.037***
	(0.051)	(0.005)	(0.029)	(0.001)
Age square	-0.003***	-0.001***	-0.003***	-0.000***
	(0.001)	(0.000)	(0.000)	(0.000)
Year 2001	0.042	-0.002	0.035	-0.000
	(0.040)	(0.003)	(0.040)	(0.003)
Year 2002	-0.052	0.021***	-0.066	0.024***
	(0.044)	(0.004)	(0.044)	(0.004)
Year 2003	0.038	0.037***	0.021	0.040***
	(0.038)	(0.004)	(0.037)	(0.004)
Year 2004	0.138***	0.030***	0.113***	0.032***
	(0.043)	(0.004)	(0.043)	(0.004)
Year 2005	0.139***	0.027***	0.062*	0.023***
	(0.035)	(0.004)	(0.033)	(0.004)
Year 2006	-0.015	-0.000	-0.049***	-0.002
	(0.024)	(0.003)	(0.017)	(0.001)
Year 2007	-0.017	0.000	-0.055*	-0.001
	(0.024)	(0.002)	(0.038)	(0.004)
Treat*After	**-0.242*** **	**-0.034*** **	**0.035**	**0.012***
	(0.092)	(0.012)	(0.076)	(0.007)
Observations	6,273	33,444	16,205	188,414
R-squared	0.046	0.047	0.043	0.047

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
♦In thousands of euros

Table 7 Results for participation and savings as groups defined by 2002 data

	High income = Treat		Low income = Treat	
Variable	Participation	Savings	Participation	Savings
After*Treat	-0.045***	-0.242**	0.018**	0.143*
	(0.019)	(0.116)	(0.007)	(0.080)
N	31,790	6,009	197,357	16,784
R2	0.046	0.046	0.047	0.043

Note: The table reports the effects of the reform on the probability of saving in voluntary pension saving plans. The estimation is made using a fixed-effect method. All the estimates are marginal effects of the reform. All the models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, labor income and tax payments. Robust standard errors in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

Table 8 Results for the participation estimation

	High income = Treat	Low income = Treat
Variable	Fixed effect	Fixed effect
After*Treat	-.056***	.025***
	(.014)	(.005)
N	25 605	144 256
R2	0.050	0.056

Note: The table reports the effects of the reform on the probability of saving in voluntary pension saving plans. All the estimates are marginal effects of the reform. All the models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, labor income and tax payments, and in the probit models residence area, gender, education, marital status and residence type were added as dummy variables.
Robust standard errors in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

Table 9 Results for the log of savings

	High income = Treat		Low income = Treat	
Variable	Random effect	Fixed effect	Random effect	Fixed effect
After*Treat	-.393***	-.355***	.158***	.096*
	(.088)	(.093)	(.035)	(.049)
N	4 561	4 561	11 829	11 829
R2	0.234	0.121	0.268	0.211

Note: The table reports the effects of the reform on the log of the amount of savings in voluntary pension savings plans. The estimation is made using panel methods using random and fixed-effects models. All the models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, labor income and tax payments, and in the random effect model residence area, gender, education, marital status and residence type were added as dummy variables.
Robust standard errors in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

Table 10 Triple-difference model for high income and treated individuals over 50 years old: changes in participation and amount

	Participation		Savings	
Variable	FE OLS		FE OLS	
DDD	-.005	(.024)	-.068	(.203)
DD	-.031**	(.014)	-.202***	(.051)
Age*After	-.042***	(.010)	-.181*	(.110)
N	34,088		34,088	
R2	0.049		0.137	

Note: The table reports the effects of the reform on the probability of saving and the amount of savings in voluntary pension saving plans. The estimation is made using fixed-effects OLS. All the estimates are marginal effects of the reform. Both models are estimated with a full set of control variables and controlling for separate linear time trends for treatment individuals. The personal-level controls are capital income, age, age square, debts, labor income and tax payments.

Robust standard errors in parenthesis.

*** p<0.01, ** p<0.05, * p<0.1.

References

Angrist, J. D. (2001), Estimation of Limited Dependent Variable Models With Dummy Endogenous Regressors: Simple Strategies for Empirical Practise, Journal of Business and Economic Statistics, Vol. 19, No.1 pp.2–28.

Attanasio, O. P., and T. DeLeire (2002), The effect of Individual Retirement Accounts on Household Consumption and National Saving, The Economic Journal, 112, pp.504–538.

Attanasio, O., Banks, J., and Wakefield, M. (2005), Effectiveness of tax incentives to boost (retirement) saving: theoretical motivation and empirical evidence, OECD Economic Studies, Vol. 2, No. 39, pp. 145–167.

Banks, J., and Diamond, P. (2010), The Base for Direct Taxation,in: J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles, and J. Poterba (Eds), Dimensions of Tax Design: the Mirrlees Review, ISBN: 978-0-19-955375-4, Oxford University Press: April 2010.

Benjamin, D. J. (2003), Does 401(k) eligibility increase saving? Evidence from propensity score subclassification, Journal of Public Economics, Vol. 87, No. 5.

Bernheim, D. B. (2002), Taxation and Saving, Handbook of Public Economics, Vol. 3, Chapter 18, pp. 1173–1250.

Blundell, R., Costa Dias, M., Meghir, C., and Van Reenen, J. (2004), Evaluating the employment impact of a mandatory job search program. Journal of the European Economic Association, 2, 569–606.

Chernozhukov, V., and P. Hansen (2004), The effect of 401k participation on the wealth distribution: An Instrumental Quantile Regression Analysis, Review of Economics and Statistics, 86, 735–751.

Chung, W., Disney, R., Emmerson, C., and Wakefield, M. (2008), Public policy and retirement saving incentives in the UK, in: De Menil, G., Pestieau, P. and Fenge, R. (Eds), Strategies for Pension Reform, Cambridge: MIT Press.

Disney, R. Emmerson, C., and Wakefield, M. (2010), Tax Reform and Retirement Saving Incentives: take-up of Stakeholder Pensions in the U.K., Economica, 77, p. 213–233.

Engen, E. M., Gale, W. G., and Scholtz, J. K. (1994), Do Saving Incentives Work?, Brookings Papers on Economic Activity, Vol. 25, Issue 1, pp. 85–180.

Federation of Finnish Financial Services (2007), http://www.fkl.fi/asp/system/empty.asp?P=2437&VID=default&SID=678679730332895&S=1&C=22680.

Fehr, H., Habermann, C., and Kindermann, F. (2008), Tax-Favored Retirement Accounts: Are they Efficient in Increasing Savings and Growth? FinanzArchiv, Vol. 64, No. 2, pp. 171–198.

Finnish Centre for Pensions (2007), The Finnish Pension System, Finnish Centre for Pensions, Handbooks 2007:6. Available http://www.elaketurvakeskus.fi/Binary.aspx?Section=44670&Item=60250

Imrohoroglu, A., Imrohoroglu, S., and Joines, D. H. (1998), The Effects of Tax-Favored Retirement Accounts on Capital Accumulation, American Economic Review, Vol 88, No. 4, pp. 749–68.

Kari, S., and Lyytikäinen, T. (2004), A method to calculate the effective tax rate on private pension savings with an application to Finnish tax reform. Paper presented at the IIPF annual congress in Milan, 2004. Available https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=IIPF60&paper_id=286

Lusardi, A. (2008), Household Saving Behavior: The Role of Financial Literacy, Information, and Financial Education Programs, NBER Working Paper No. 13824.

Määttänen, N. (2005), Voluntary saving plans, taxation and savings, ETLA Discussion Papers no 1018, Research Institute of the Finnish Economy, Helsinki, (Publication in Finnish).

Ministry of Finance (2005), Taxation in Finland 3/2005, Ministry of Finance, Tax Department, Helsinki. Available http://www.vm.fi/vm/en/04_publications_and_documents/01_publications/075_taxation/20060428Taxati/taxationkirja_huhti_netti.pdf

OECD (1994), Taxation and Household Saving, Organisation for Economic Co-Operation and Development, Paris.

OECD (2005), Tax-Favoured Retirement Saving, OECD Economic Studies, No. 39, 2004/2, Organisation for Economic Co-Operation and Development, Paris.

Sørensen, P. B. (1994), From the Global Income Tax to the Dual Income Tax: Recent Tax Reforms in the Nordic Countries, International Tax and Public Finance, Vol. 1, No. 1, pp. 57–79.

Sørensen, P. B. (2005), Dual Income Tax: Why and How?, FinanzArchiv, Vol. 61 No. 4, pp. 559–586.

Wakefield, M. (2009), How Much Do We Tax the Return to Saving?, IFS Briefing Note 82 (http://www.ifs.org.uk/publications/4467).

Venti, S. F., and Wise, D. A. (1995), Individual Response to a Retirement Saving Program: Results from U.S. Panel Data, Ricerche Economiche, Vol. 49, Issue 3.

Venti, S. F., and Wise, D. A. (1992), Government Policy and Personal Retirement Saving, Tax Policy and the Economy, Vol. 6, MIT Press, Cambridge.

IN VATT WORKING PAPERS SERIES PUBLISHED PUBLICATIONS

13. Ilja Kristian Kavonius: Fiscal policies in Europe and the United States during the Great Depression. Helsinki 2010.
14. Miikka Rokkanen – Roope Uusitalo: Changes in job stability – evidence from lifetime job histories. Helsinki 2010.
15. Heléne Lundqvist: Granting public or private consumption? Effects of grants on local public spending and income taxes. Helsinki 2010.
16. Ossi Korkeamäki – Tomi Kyyrä: Institutional rules, labour demand and retirement through disability programme participation. Helsinki 2010.
17. Tomi Kyyrä: Early retirement policy in the presence of competing exit pathways: Evidence from policy reforms in Finland. Helsinki 2010.
18. Tuomas Kosonen: What was actually cut in the barbers' VAT cut? Helsinki 2010.
19. Tuukka Saarimaa – Janne Tukiainen: Coalition formation and political decision making: Evidence from Finnish municipal mergers. Helsinki 2010.
20. Teemu Lyytikäinen – Torsten Santavirta: The effect of church tax on church membership. Helsinki 2010.
21. Tomi Kyyrä – Ralf A. Wilke: On the reliability of retrospective unemployment information in European household panel data. Helsinki 2011.
22. Ossi Korkeamäki: The Finnish payroll tax cut experiment revisited. Helsinki 2011.
23. Tuomas Kosonen: To work or not to work? The effect of child-care subsidies on the labour supply of parents. Helsinki 2011.
24. Olli Ropponen: Reconciling the evidence of Card and Krueger (1994) and Neumark and Wascher (2000). Helsinki 2011.
25. Olli Ropponen: A Note on the Robustness of Card and Krueger (1994) and Neumark and Wascher (2000). Helsinki 2011.
26. Teemu Lyytikäinen: Tax competition among local governments: evidence from a property tax reform in Finland. Helsinki 2011.
27. Jarkko Harju – Seppo Kari: Dividend taxes and decision of MNEs: Evidence from a Finnish tax reform. Helsinki 2011.
28. Piia Aatola – Kimmo Ollikka – Markku Ollikainen: Informational Efficiency of the EU ETS market – a study of price predictability and profitable trading. Helsinki 2012.
29. Kristiina Huttunen – Jenni Kellokumpu: The Effect of Job Displacement on Couples' Fertility Decisions. Helsinki 2012.
30. Essi Eerola – Teemu Lyytikäinen: On the role of public price information in housing markets. Helsinki 2012.
31. Jenni Pääkkönen – Timo Seppälä: Dimensions of health care system quality in Finland. Helsinki 2012.
32. Saara Tamminen – Han-Hsin Chang: Company heterogeneity and mark-up variability. Helsinki 2012.

VALTION TALOUDELLINEN TUTKIMUSKESKUS
STATENS EKONOMISKA FORSKNINGSCENTRAL
GOVERNMENT INSTITUTE FOR ECONOMIC RESEARCH

Valtion taloudellinen tutkimuskeskus
Government Institute for Economic Research
P.O.Box 1279
FI-00101 Helsinki
Finland

ISBN 978-952-274-027-4 (PDF)
ISSN 1798-0291 (PDF)