

Towards an Agile and Evidence-based Pension System

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TOWARDS AN AGILE AND EVIDENCE-BASED PENSION SYSTEM

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*Tämän tutkimuksen rahoitti Työeläkevakuuttajat TELA.
Kiitämme Eläketurvakeskusta ja Tilastokeskusta aineistosta.



Raportteja | Reports 40
Helsinki 2019

Raportteja | Reports 40

ISBN 978-952-209-186-4

ISSN 2242-6914 (PDF)

Publisher:

Labour Institute for Economic Research

Arkadiakatu 7, 00100 Helsinki

www.labour.fi

Cover illustration: Eeva Rista, Helsingin kaupunginmuseo 1986.

ESIPUHE

Suomen taloudellinen kestävyys alati vanhenevan väestörakenteen vuoksi on iso huolenaihe. Uhkakuva on edelleen synkistynyt syntyvyyden voimakkaan alenemisen myötä. Vaikka emme ole läheskään ainoa maa, jossa demografinen kehitys muotoilee väestöpyramidia kärkikolmioksi, on meidän silti itse pystyttävä ratkaisemaan talouden kestävyyttä uhkaavat ongelmat. Keskeinen ratkaisu on korkeaa työllisyyttä edistävä eläkejärjestelmä, jonka muotoilu on meidän omissa käsissämme.

Suomen työeläkejärjestelmää on uudistettu laaja-alaisesti viime vuosina ja vuosikymmeninä, viimeksi vuosina 2005 ja 2017. Uudistusten tavoitteena on ollut kannustavan, oikeudenmukaisen ja kestävän työeläkejärjestelmän säilyttäminen. Eurooppalaisessa vertailussa Suomen lakisääteinen ja pakollinen eläkejärjestelmä voidaan nähdä verrattain turvallisena ja vakaana.

On kuitenkin välttämätöntä tuottaa tutkimukseen perustuvaa tietoa eläkejärjestelmän vaikutuksista. Tutkimustiedon avulla voidaan ylläpitää ketterää eläkejärjestelmää, joka reagoi muutostarpeisiin vaikuttavilla tavoilla. Tässä raportissa Palkansaajien tutkimuslaitoksen tutkimuskoordinaattori Ohto Kanninen ja tutkija Terhi Ravaska koaavat yhteen tutkimustietoa projekteistaan, jotka käsittelevät eläkejärjestelmän eri piirteiden vaikutuksia eläköitymispäätöksiin ja työkykyyn liittyviin tekijöihin. Lisäksi tutkimusraportissa tarkastellaan, millaisia eläkeuudistuksia muut Euroopan maat ovat viime vuosikymmenien aikana tehneet.

Tutkimusraportin on tilannut ja rahoittanut Tela. Kiitämme rahoittajaa lämpimästi. Raportti koostuu kolmesta osiosta. Ensimmäisessä osiossa kirjoittajat kuvailevat eläkeuudistuksia Euroopassa. Toinen osio perustuu kirjoittajien 2005 eläkeuudistusta koskevaan tutkimukseen, jossa yhteistyökumppaneina ovat Jon Gruber, Roope Uusitalo ja Satu Nivalainen. Tutkimusraportin kolmas osio perustuu Terhi Ravaskan omaan tutkimukseen osa-aikaeläkejärjestelmästä. Haluamme kiittää Eläketurvakeskusta, Kelaa ja Tilastokeskusta laadukkaista rekisteriaineistoista, jotka mahdollistivat raportin tutkimusten tekemisen. Kirjoittajat haluavat kiittää myös raporttiluonnoksen kommentaattoreita. Erityiskiitoksen tutkijat haluavat osoittaa Risto Vaittiselle kommentaateista ja tuesta.

Helsingissä 14. lokakuuta 2019

Elina Pylkkänen

Johtaja

Palkansaajien tutkimuslaitos

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TIIVISTELMÄ

Tarkastelemme tässä raportissa, kuinka eläkejärjestelmää uudistamalla voidaan vaikuttaa eläköitymispäätöksiin. Perustamme raportin keskeiset luvut kahteen tuoreeseen tutkimukseemme. Molemmissa esitellyissä tutkimuksissa käytetään laadukasta mikroaineistoa ja luonnollisiin koeasetelmiin perustuvia ekonometrisiä menetelmiä vaikutusten erittelyyn. Lisäksi vertailemme raportissa Suomen eläkejärjestelmää kansainvälisesti.

Suomessa vuonna 2005 toteutetulla eläkeuudistuksella pyrittiin nostamaan eläköitymisikää. Keskeinen uudistus oli vanhuuseläkeiän muuttaminen 65:stä joustavaan 63–68 ikään. Samalla työssä jatkamista kannustettiin korkeammalla karttumaprosentilla 63:n ja 68:n ikävuoden välillä. Vanhuuseläkkeen osalta uudistus vaikutti karttumiin, eläkevarallisuuteen ja eläkeikään. Tutkimme edellä mainittujen muutosten vaikutusta eläköitymiseen. Käyttämämme luonnollinen koeasetelma mahdollistaa eläkeiän muutoksen vaikutuksen tutkimisen muista tekijöistä eristettynä. Koska uudistuksen aiheuttamat kannustinmuutokset ja eläkeiän muutokset kohdistuivat eri tavalla lähellä eläkeikää oleviin ihmisiin, voidaan vertailla ryhmiä, jotka muuten ovat samankaltaisia, mutta joihin kohdistuu erilaisia kannustinmuutoksia tai eläkeikiä.

Ensimmäisessä tutkimuksessa tarkastelun kohteena on vanhempien työntekijöiden ryhmä, joka on työuran aikana kerryttänyt eläkevarallisuutta niin paljon, että eläköityessä eläke koostuu vain työeläkkeestä. Tutkimuksesta havaitsemme, että kannustinmuutokset vaikuttivat odotetusti. Korkeampi karttumaprosentti kannusti jatkamaan työssä pidempään. Toisaalta, korkeampi työhistorian aikana karttunut eläke kannusti eläköitymään aiemmin. Havaitsemme myös, että eläkeiän laskeminen 65:stä 63:een kannustinmuutokset vakioituina alensi eläkeikää. Lakisääteisen eläkeiän muutoksilla oli selvästi suurempi vaikutus eläköitymispäätöksiin kuin taloudellisten kannustimien muutoksilla. Vuoden 2005 aikana eläköityminen työeläkkeelle 63 vuoden iässä nousi noin 40 prosenttisyksiköllä verrattuna vuoteen 2004. Tulos, jonka mukaan eläkeikä itsessään vaikuttaa eläköitymiseen, tarjoaa käyttöömme tehokkaan työkalun eläköitymispäätösten ohjaamiseen.

Toisessa tutkimuksessa osoitamme, että osa-aikaeläkeiän laskeminen lisää jonkin verran työssä jatkamista niiden kohdalla, joilla on suhteellisesti heikko terveys. Osa-aikaeläköitymisen helpottaminen ei kuitenkaan keskimäärin pidentänyt työuria. Sen sijaan osa-aikaeläkkeelle jääminen kasvatti lääkkeiden kulutusta. Tämä saattoi johtua siitä, että lisääntynyt vapaa-aika käytettiin osittain omasta terveydestä huolehtimiseen. Yksi osa-aikaeläkkeen tavoitteista oli vähentää työkyvyttömyyseläkkeitä, mutta sitä hyödynsivät usein hyvätuloiset ja terveet. Johtopäätöksenä voidaan todeta, että eläkeuudistuksen vaikutukset voivat olla kokonaisvaltaisia. Näin ollen, uusia eläkeuudistuksia tehtäessä vaikutuksia tulee seurata laajalla mittaristolla.

1. INTRODUCTION

In the current economic environment, a fiscally sustainable pension design requires longer working careers. The relevant policy question regarding the pension system concerns how to prolong careers and raise the effective retirement age. The common answer has been to increase the rewards for working longer, in the form of a larger pension. However, we have inadequate evidence on how individuals adjust their retirement decisions according to these financial rewards. Another question is the working capacity of the elderly work force. Recent policy discussions have revolved around increasing the part-time work of those with limited working capacity. Additionally, there is a firm belief that more flexibility with respect to work hours can ultimately prolong one's career. For this reason, the Finnish pension system has included a part-time pension scheme and currently includes a flexible partial old-age pension. However, we have little knowledge about whether these types of programs improve work capacity and prolong working careers.

In this report, we summarize results from two recent research projects¹, which focused on workers' retirement decisions and the effects of work hours on elderly workers' labor supply and health. In the first study, we exploit the Finnish pension reform from 2005 to study the determinants of the timing of retirement. In a large portion of the retirement literature, labor market exit decisions are studied in the context of financial incentives. We extend the approach to also include a pension eligibility age effect, which means that reaching the certain statutory pension age itself influences retirement decisions. We call this effect the "relabeling effect" because the reform we study reduced the full-retirement age from 65 to 63. Previously retiring between ages 63–65 was considered early retirement but the reform relabeled these individuals as full retirees who were entitled to full pension without early-claiming penalties. We can separate the effects stemming from increased pension wealth, marginal accrual and statutory age, and we show that the relabeling effect is large relative to incentive effects.

The second study contributes to a question what has been studied relatively little, namely, whether there is any advantage in reducing work burden in the late period of one's career. The aim of the Finnish part-time pension program was to make it possible to reduce one's work burden at the end of his or her career and thus maintain the capacity and motivation to remain in the labor force for longer than without this option. The analysis shows that while there is no evidence that decreasing the eligibility age increases the retirement age on average, there are decreasing early labor market exit risks for a subgroup whose sickness outcomes – compared to other part-time retirees – were worse before they took their part-time pension. That is, for individuals with poor health, having the option to reduce their workload late in their career can indeed lengthen their career. We also study the effects of a reform that decreased the eligibility age of the part-time pension program from 58 to 56. Surprisingly, the

¹ Kanninen et al. (2019), and Ravaska (2019).

reform increased drug purchases, while its effects on sickness absences are unclear. We cannot determine the mechanism but can speculate that increased leisure time was partly utilized to take care of one's own health.

These two studies exploit pension reforms, sophisticated econometric techniques and improved microdata, shedding new light on the effects of pension policies. The report is organized as follows. In the next section we compare the Finnish pension system and the Finnish pension reforms to those in the OECD countries. In section 3, we discuss the earlier findings from the quasi-experiments studying the effects of pension rules on retirement. In section 4, we describe the findings from the evaluation of the pension reform from 2005. In section 5, we describe the part-time pension system and how it has been used to study the effects of work hour reduction on health and labor market exit. Section 6 concludes.

2. THE FINNISH PENSION SYSTEM IN EUROPEAN COMPARISON – A VIEW OF PENSION REFORMS

2.1 Retirement and pension reforms in Europe

Strong public sector involvement in financing pensions is a common characteristic in the EU. Pensions are also one of the biggest public expenditure items in the EU²: in 2015 (the latest figure), on average, 12,8% of GDP went to pension expenditures in the EU-28, and for Finland, the figure is 13,1% (Eurostat). The fiscal impact of aging has led many EU countries to reform their public pension schemes over the last decades. Substantial reforms are vital when there is a mismatch between the costs of the current system and its benefits, or when social needs and the environment change in a way that requires a different design.

However, there are reasons why pension reforms should not be carried out too often: workers and retirees need to rely on the system and commit to contributing to its finances. Additionally, pension reforms are often implemented gradually so that the effects are visible with a lag. To determine the best possible pension design, there is a constant need to review how the system is working and to evaluate the effects of characteristics such as the incentive structure. Reforms also facilitate causal research.

The reforms implemented since 2000 in the EU member states have taken many forms. There have been several adjustments to pension calculations, financial incentives and social contribution rates. Eighteen countries out of the EU-28 have reformed the way pensions are calculated, and the trend has been towards extending the period

² For comparison, in the United States, pension expenditures are 6,7 percent of GDP in 2011 (OECD, Pension statistics).

over which earnings affect the calculation of pensions (Finland started to account for a person's entire career in pension calculations in 2005). Because, on average, individuals have an upward sloping age-earnings profile, this has led to a reduction in pension benefits compared the approach of calculating the pension based on the final years in the labor market. To induce individuals to work for a longer period, marginal accrual rates have been increased throughout the European continent. Additionally, to improve the fiscal status of the pension system, especially after the financial crisis, many countries increased their social contribution rates. (Carone et al., 2016).

Changes in pension calculations or in social contributions directly affect the revenue and expenditure side of the pension system. Changing financial incentives in turn indirectly improves the fiscal balance if it is effective at prolonging working careers. However, the main type of instrument used to prolong working careers in the 2000s was to change the statutory retirement ages for pensions and abolish the early labor market exit routes. From the pension system point of view this has a double effect: it simultaneously increases the number of workers and thus improves the revenue side of the pension system and decreases the number of eligible pensioners, lowering the costs of the pension system.

Nearly all European countries have increased the statutory ages for early and full pensions (Carone et al., 2016). The Finnish pension reform in 2005 shifted in a direction contrary to the European trend when it effectively reduced the full retirement age. In 2008, Finland had one of the lowest statutory old-age retirement ages in Europe (especially for men, as many countries have different retirement ages for women and men) (Carone et al., 2016). Figure 1 shows that for much of the 2000s, the average effective retirement age for Finnish men was below the European Union's average. For women, the effective retirement age in Finland has followed the European trend. The gap between effective retirement ages for men and women has narrowed over time, whereas in Europe, there is still almost as wide a gender gap as at the beginning of the 1970s. Many European pension systems, unlike that in Finland, still include a clearly lower statutory pension age for women.

What is also noticeable from figure 1 is that the effective retirement age throughout Europe declined during much of the 1970–2000 period³. This decrease in the effective retirement age has been the target of extensive research. A book series, "Social Security Programs and Retirement around the World", edited by Jonathan Gruber and David A. Wise, has collected these studies. The findings from this extensive research indicate that pension rules and social security systems have provided strong incentives to retire early. The disincentives to work magnify the financial burden caused by an aging population, which might lead to the insolvency of the pension system. The pension reforms executed in the 1990s and 2000s have helped to slowly turn around the declining trend.

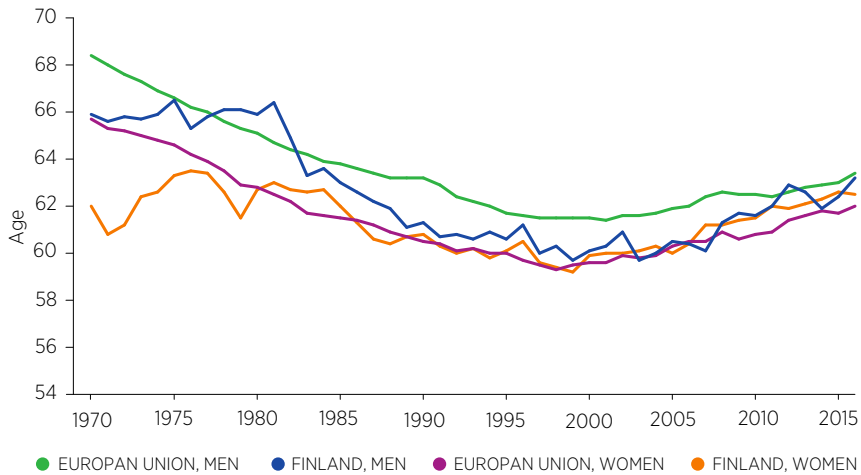
While changing the accrual rates and eligibility ages for retirement can be considered minor adjustments compared to the magnitude of future challenges, some

³ In fact, this trend is visible for most of the developed countries (Gruber and Wise (1999)).

countries have made more substantial reforms, which have changed the nature of pension design. Some countries have transitioned from a defined benefit system to a defined contribution system within their public pension schemes. In the defined contribution system, the future benefit for retirees is not fixed while the contribution is fixed. Rather, benefits in these systems depend on the contribution and the return on investment. Sweden adopted a notional defined contribution⁴ system gradually between 1998–2003, and Italy did so in 1995. The defined benefit system is still the prevalent pension system in the European Union, as 12 out of 15 “old” EU member states have this type of pension scheme.

Another prominent trend has been to link the key pension parameters to life expectancy. Most European countries have legislated this type of mechanism in their public pension systems, and the pace of change increased in the 2010s (Carone et al., 2016). In Sweden and Norway, the pension benefit level is adjusted according to changes in life expectancy. In Finland, since 2010, pension benefit levels have been linked to a life expectancy coefficient, and since 2017, retirement age has also been linked to life expectancy. In 2011 in Denmark, the retirement age was legislated to follow life expectancy such that the expected time in retirement would be kept fixed at 14.5 years. In the next subsection, we briefly summarize the Swedish experience of a more systemic pension reforms.

Figure 1: The average effective age of retirement in Finland and the European Union. Withdrawals are calculated for workers initially aged 40 and over abstracting from compositional effects in the age structure of the population.



Source: OECD (2019) estimates based on the results of national labor force surveys, the European Union Labour Force Survey and, for earlier years in some countries, national censuses. The European Union consists of the countries that were members in each year.

⁴ In the notional defined contribution system, the rate of return is set by the government instead of markets as in pure defined contribution system.

2.2 From defined benefit to defined contribution system: the case of Sweden

In Sweden, the late 1990s led to a dramatic systemic change in the public pension system. Sweden was among the first nations to shift its pension system to a system of notional accounts. The economic downturn of the 1980s and the projection of the rising old-age dependency ratio acted as a driving force behind this systemic pension reform. While the reform also aimed at having a fair and transparent system, the focus was on the fiscal sustainability of the pension design. The work of the committee preparing the pension reform also heavily emphasized basing the solutions on consensus and automatic mechanisms (Hagen, 2017). The worry in the pension policy circles is that without broad consensus and with suboptimal design, in the next elections, new pension reforms might be added to the agenda, and these short-term spurious changes can violate the sustainability of the system in the long-term.

The reform was gradually implemented in 1999, after several years of negotiations, and it was fully enforced in 2003 (Hagen, 2017). Before the reform, the Swedish public pension system resembled the Finnish one, especially the Finnish pension system before the 2005 reform. It consisted of a flat rate national pension (folkpension) that was universal and an earnings-related pension benefit (allmän tilläggspension) calculated based on the highest earnings during one's work life. Additionally, the Swedish system required a minimum of 30 years of contributions for a full pension.

After the reform, Sweden adopted the notional defined contribution system with adjustments made according to improvements in life expectancy. Contributions are fixed, and the benefits at retirement are calculated as a function of these contributions and life expectancy. The age at which benefits can be claimed was made flexible, with the lowest eligibility age set at 61 (Aspegren et al., 2019). The contributions-based basic pension is complemented with a guarantee pension for those with short contribution histories. While the basic pension accounts for the insurance component, the guarantee pension was established for pension adequacy reasons. The guarantee pension has an eligibility age of 65 years.

The first pillar of the present system in Sweden is called either a notional defined contribution (NDC) or nonfinancial defined contribution system. This system links the lifetime contribution to a type of personal savings account to benefits but is based on the pay-as-you-go format rather than being fully funded (Holzman, 2017). Changing the pension liabilities from a defined benefit system to a defined contributions system via notional personal accounts allows for smooth transitions instead of paying the high transition costs inherent in a move from a PAYG defined benefit scheme to a fully funded defined contribution scheme. In Sweden, the notional accounts are credited for 18.5% of the annual pensionable income (mostly labor earnings), of which 16 percentage points are ear-marked for the basic pension and the rest (2.5 percentage points) for the fully funded DC premium pension system. For this latter part, individuals can choose to invest in different funds, while the default is a fund managed by the government. The notional account yields a notional return and thus mimics an actual (private) sav-

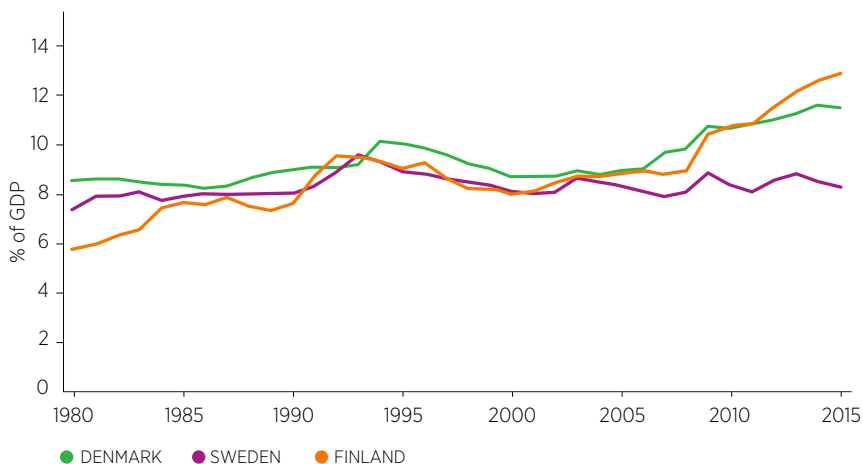
ings account. The rate of return is determined by the growth rate of average nominal pensionable income.

In the Swedish reform, different occupational pension schemes were also gradually shifted from defined benefit to defined contribution. The occupational pension schemes (second pillar) currently rely much more on the capital accumulated through contributions and yields than does the notional defined contribution system in the public pensions. However, the basic pension is the main source of income of the elderly and the occupational pensions together with private pensions account for only approximately 20 percent of the individual's retirement income. (Aspegren et al., 2019).

Figure 2 shows the expenditure on public and mandatory private pension of GDP in the Nordic countries. While we cannot say how much the NDC system has affected spending on pensions, the figure shows that Sweden has had the most stable development in this time-series. Additionally, figure 3 reveals that Sweden has the highest effective retirement age.

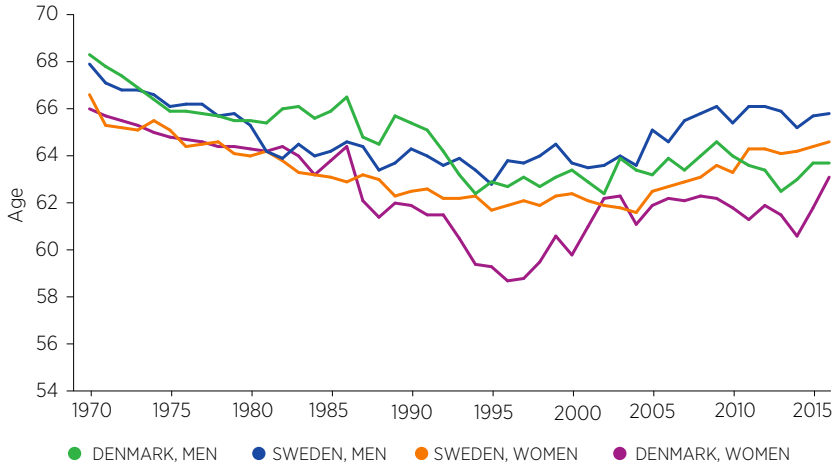
While defined contribution systems are generally fiscally more sustainable (conditional on having reasonable rates of contribution) than defined benefit systems, pension adequacy raises concerns as the risks of longevity and its costs are shifted to pensioners. Shifting the focus to the second and third pension pillars or making the first pillar's guaranteed pension fraction smaller, high-income workers are in better positions to top up their old-age income with private savings and occupational pensions. However, the least well-off individuals and workers are seeing their pensions drop below adequate levels. According to the latest OECD statistics, Sweden has the highest old-age poverty rate (11,3%) among the Nordic countries. The respective figure in Denmark is 3,1%, Norway 4,3% and Finland 6,3% (OECD Social and Welfare Statistics).

Figure 2: Public and mandatory private pension spending, source OECD. In addition, voluntary private pension spending was 0.8, 0.2 and 2,.9% of GDP in Denmark, Finland and Sweden, respectively.



Source: OECD Social Expenditure Database.

Figure 3: The average effective age of retirement in Sweden and Denmark. The withdrawals are calculated for workers initially aged 40 and over, abstracting from the compositional effects in the age structure of the population.



Source: OECD estimates based on the results of national labor force surveys, the European Union Labour Force Survey and, for earlier years in some countries, national censuses. The European Union consists of the countries that were members in each year.

3. PREVIOUS EVIDENCE ON THE EFFECTS OF PENSION RULES ON RETIREMENT

The extensive literature on retirement decisions has found that health conditions, family relations, work opportunities and retirement incomes contribute to the timing of retirement. In addition to these factors, individuals’ retirement decisions are affected by uncertainty regarding the future, longevity, returns on investment and credibility of the pension system, among other factors.

The wide set of studies analyzing retirement stems from the fact that retirement has important consequences for the whole economy. The dependency ratio worsens, while the health of the elderly population improves, and this raises the question of how the pension system could help to increase career lengths. Economists have been active in exploring the economic determinants of retirement. The underlying assumption is that, without changes in economic incentives, as workers become older and their health deteriorates, work becomes more burdensome and the probability of exiting labor market increases smoothly with age. However, with economic incentives, we can influence the exit rates. To understand the effect of incentives on exit hazards, we need a credible design to study this question.

The retirement literature is large, but here, the literature reviewed is chosen such that the research design is the most appropriate to answer the question in hand. To understand the causal relationships between the pension design and individual behavior and outcomes, we need either experiments or quasi-experiments. Much of the credible causal evaluation in social sciences comes from quasi-experiments such as pension reforms.

Major part of the evidence of how pension systems affect retirement comes from changes in the eligibility ages. We usually see sharp spikes in the retirement hazard at the eligibility age. When the eligibility age is changed in a reform, the spike moves to the new eligibility age. When there is no additional evidence that something else would be driving this effect, researchers have concluded that it is the statutory age effect. These types of effects are shown for the US by Blau (1994), Burtless and Moffitt (1986) and Mastrobuoni (2009), for France by Gruber and Wise, (1999) and for Germany by Börsch-Supan and Schnabel (1998). Seibold (2017) and Behaghel & Blau (2012) also observe that the retirement hazard moves in lockstep with the eligibility ages and explain this with loss-aversion and reference-dependent utility. In all of these studies, the eligibility age also means an increase in the benefits; thus, we cannot separate whether it is the benefit or the age itself that affects retirement decisions. With the help of the Finnish pension reform in 2005, we can disentangle the benefit and age effects.

In theory, public pension benefits can affect retirement decisions through the income and substitution effect. These two effects are a standard distinction in labor economics. In the standard case, the income effect refers to the lower labor supply, in this case earlier retirement that stems from higher incomes, or, in this case, from higher pension wealth. The substitution effect refers to the increase in labor supply, in this case later retirement, from higher marginal incomes or accrual rates. That is, the income effect refers to the effect of the level of income or accrued pension, and the substitution effect refers to the per-unit (say, one hour, or one month) income or accrual rate.

These effects are usually hard to disentangle because a higher accrual rates also increase accrued pension wealth. The earlier literature has not been able to separate the effects. Most often, the effects are combined into one, as in Coile and Gruber (2001, 2007), who develop a forward-looking peak value measure that incorporates the current pension wealth level and the marginal accrual from extra work in the future until the optimal retirement moment. While this measure is correlated with retirement, it is unable to explain all the retirement patterns or determine which effect drives the result. In our research project discussed in section 4, we can estimate both effects because the Finnish pension reform in 2005 caused variation in the wealth and pension accruals for people with different ages and accrued pensions.

4. THE EFFECT OF RELABELING AND INCENTIVES ON RETIREMENT

By exploiting a reform in the Finnish public pension system in 2005, we can study the effect of financial incentives and the relabeling of pensions on retirement decisions. Financial incentives include the wealth effect, which means the effect that changing the level of one's pension has on retirement, and the substitution effect, i.e., the effect the marginal accrual rate has on retirement decisions. The reform allows us to disentangle these two effects due to its very specific nature. The reform had an idiosyncratic impact on different individuals. Relabeling in the reform means renaming the pension type from early retirement to full retirement based on age, that is, the full retirement age was lowered from 65 to 63. Incentives were affected as a function of age and accrual-to-earnings ratio. All three effects played a role in the retirement decision, but we are able to show that the relabeling alone explains most of the immediate behavioral impact of the reform.

4.1 The pension reform of 2005

The 2005 reform implemented in Finland allows the separation of financial incentives and norms associated with retirement age. Before 2005, retirees in Finland were offered an early retirement age (ERA) that ranged from age 60 to age 65, with the full retirement age (FRA) being 65. The calculation of the pensionable wage was based on the 10 last years of each employment contract, and the accrual rates were 1 percentage point higher for individuals who had reached the ERA (see table 1). In 2005, the system was reformed so that a new 'flexible' retirement age was introduced at age 63, which was treated as effectively lowering the full retirement age to 63. Another age bracket for higher accrual age was introduced for individuals who had reached the FRA. The reform also changed the way pensions were calculated. Since 2005, the individual's whole working history has been taken into account when calculating the pension.

Table 1: Financial incentives and statutory retirement ages before and after the Finnish 2005 pension reform.

Variable	Before reform	After reform
Accrual %	Ages 23–58 1.5 % Ages 60–65 2.5 %	Ages 18–52 1.5 % Ages 53–62 1.9 % Ages 63–68 4.5 %
Early claiming Reference age for early claiming	-0.4% for each month 65	-0.6% for each month 63
Delayed claiming Reference age for delayed claiming	-0.6% for each month 65	-0.4% for each month 68

4.2 Relabeling and financial incentives

Changes in retirement ages generally involve two separate elements: a change in the labeling of what is considered early (ERA) or full statutory retirement age (FRA) and a change in financing incentives. For example, when the U.S. raised its full retirement age in 1983, starting after 2002, this amounted to a large benefit cut for those retiring at each age (Behaghel & Blau, 2012).

However, these changes need not go hand in hand. In fact, if there are large behavioral responses to the labeled early and normal retirement ages, then it is possible that reforming those ages alone, without changing financial incentives, could have important impacts on retirement ages.

However, separating the financial incentives associated with such ages from their impacts on retirement norms is difficult. The ages that are used for retirement targets may be correlated with retirement for other reasons, such as tastes for retirement at certain (round) ages or other government programs that kick in at those same ages (such as the U.S. Medicare program which starts at age 65). Past models have either assumed that the impact of these ages is independent of these other factors or have relied on reforms that change both the statutory ages and financial incentives. There is no work to date that distinctly separates financial incentives from the impact of the actual age change.

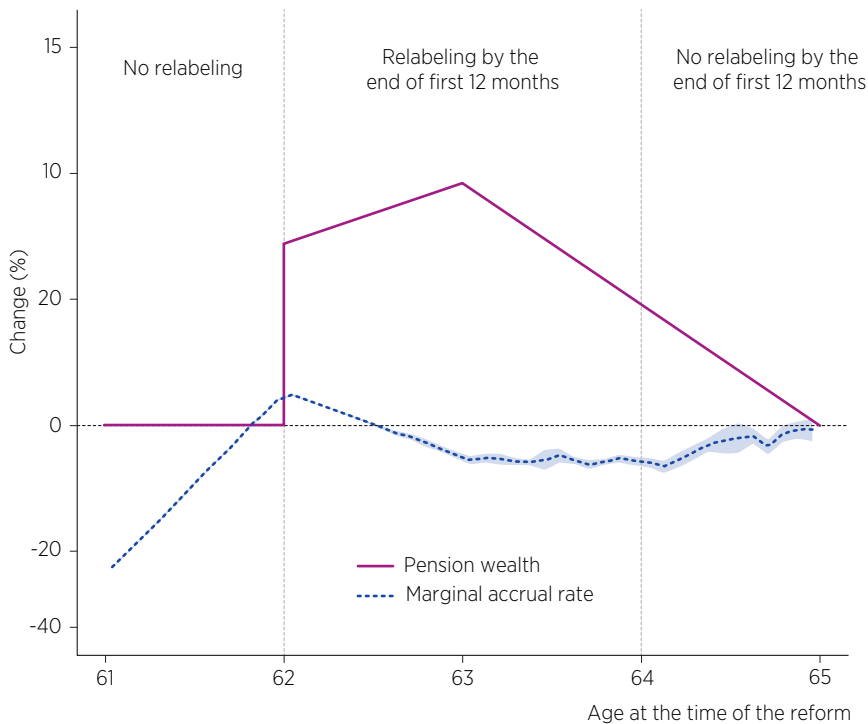
Recent literature has used quasi-experimental evidence to study the effect of incentives on retirement (Brown, 2013; Manoli & Weber, 2016a; Furgeson et al., 2016). The estimated effects vary enormously. Additionally, a recent branch of literature has exploited reforms to study the effect of a change in statutory retirement age and found that labels affect behavior in a manner that cannot be rationalized by standard preferences (Behaghel & Blau, 2012; Cribb et al., 2016; Manoli & Weber, 2016b; Seibold, 2017).

All in all, the Finnish reform changed both the retirement ages and the financial incentives. However, compared with relabeling, the changes in financial incentives were both modest and more continuous across cohorts allowing us to separate the two. Figure 4 illustrates this point. The figure is drawn for January 1, 2005, the date of the reform. The x-axis shows age as of that date, where the demarked ages represent the endpoint for that age. That is, the point labeled age 64 represents the last individuals who are age 64 as of January 1, 2005 – those born January 1940. As shown by the two vertical dashed lines, ages 62 to 64 saw a large relabeling (defined in the next 12-month window) when the law took force. That is, before the law, if they wanted to retire, they were considered 'early retirees' for the next twelve months – whereas following the reform, they were 'full retirees' under the new flexible retirement regime.

The change in the financial incentives was the following (see also table 1). If the individual continued working between the ages 63–68, the earnings accrued pension at a rate of 4.5%. This high accrual rate was popularly dubbed the 'super accrual', although the accrual rate was not superior to the pre-reform rates due to the lack of early claiming penalties post-reform. The accrual rates for ages 53–62 were set to 1.9% and to 1.5% for work done before the age of 53. The early old-age minimum age was

increased to 62 and the penalty for claiming one's pension early was 0.6% for each month. The increase in pension for delaying retirement until after age 68 was 0.4%. The solid line in Figure 4 shows the overnight change in pension wealth – i.e., the percentage increase in pension wealth if retirement was delayed by one day in Dec 31, 2004. The overnight jump in pension wealth shown in the figure stems mainly from a reduction in the early retirement penalty, which resulted from a reduction in the reference age for early claiming from 65 to 63. For example, at age 63, the reform reduced the penalty from 9.6% (24 times 0.4%) to zero (0 times 0.6%) for a total of a 9.6% overnight increase in pension wealth. The dashed line shows the average percentage change in the marginal accrual rate (with associated error bands) by age group.

Figure 4. Changes in incentives and relabeling (pension wealth and the 12-month accrual rate) in 2005 compared to 2004 due to the pension reform.

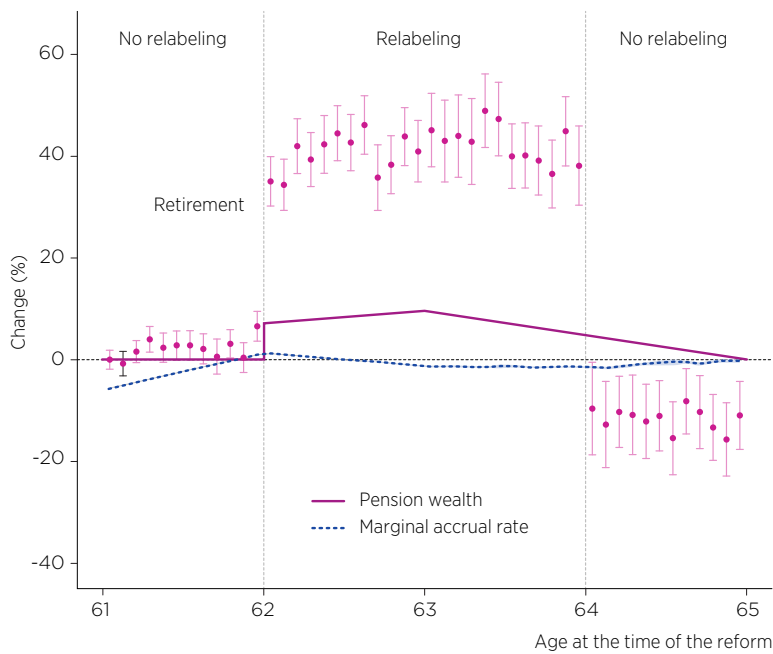


Notes. Pension wealth, if retired immediately, increased on January 1, 2005 due to the reform as a function of age. The marginal accrual rate as a proportion of accrued pension calculated for a 12-month period changed due to the reform as a function of age, earnings and accrued pension. The means are estimated for bimonthly birth bins. The 95% confidence intervals are shown in the shaded area. The sample is those with only earnings-related pensions. The cohorts represented in the x-axis are 1940–1943.

What is notable here is two things. First, on Jan 1, 2005 the changes in pension wealth and accrual rate due to the reform are relatively small – pension wealth rises by only up to 10%, and accrual rates fall by only a small percentage. The changes in financial incentives are continuous for individuals around age 62 as well as age 64. This allows us to separate the discontinuous impact of relabeling from the continuous changes in financial incentives.

Our results suggest that this relabeling had an enormous effect. Figure 5 shows a rescaled version of the same type of graph as figure 4, but this figure also includes the percentage change in retirement rates from 2005 relative to the pre-reform year of 2004. What we find is an enormous increase in retirement hazard for those who were relabeled due to the reform, on the order of 40% or more. Not only does this huge impact seem inconsistent with the relatively modest change in financial incentives, but we see a huge discontinuity in impacts right around the end of the relabeling period. Taken together, this provides strong evidence that it is relabeling, not financial incentives, driving most of the change in retirement behavior.

Figure 5. Changes in incentives and relabeling in 2005 compared to 2004 due to the pension reform and the associated changes in retirement rates.



Notes. Pension wealth increased on January 1, 2005 due to the reform as a function of age. Marginal accrual rate as a proportion of accrued pension calculated for a 12-month period changed due to the reform as a function of age, earnings and accrued pension. The means are estimated for monthly age bins. The 95% confidence intervals are shown in the shaded area. Retirement is estimated as a t-test of the difference in 2005 and 2004 for monthly birth bins. The 95% confidence intervals are shown by the error bars. The sample is those with only earnings-related pensions.

Regarding financial incentives, the reform allows us to separate the effect of a sudden jump in pension wealth on January 1, 2005 from the exogenous change in marginal accrual rates, also caused by the reform. Consequently, we can study the relative importance of all three effects.

The quantitative analysis is performed with a Cox proportional hazards regression model. The main regression results are presented in Table 2. The point estimate on the first row shows that increasing the pension wealth by one percentage point leads to a 1.11 times higher retirement hazard ($e^{0.105} \approx 1.11$). Additionally, changing the 12-month accrual rate has an expected sign, the improvement in marginal accrual by one percentage point relative to accrued earnings multiplies the hazard rate of retirement by approximately 0.94. The third row of the table shows the relabeling effect. The estimate for this effect is large, leading to the interpretation that reaching the full retirement age within the next 12 months strongly affects retirement decision making, multiplying the hazard by a factor of 7.6. The relabeling alone, holding incentives constant, had an impact on retirement roughly equivalent to a 20 to 30 percentage point increase in pension wealth or marginal accrual rates.

Table 2. Cox proportional hazard model regressions.

Variable	Estimate
Immediate increase in pension wealth, % (wealth effect)	0.105*** (0.0195)
Increase in marginal accrual rate, % of pension (substitution effect)	-0.0637*** (0.0109)
Reach full retirement age in 12 months (relabeling effect)	2.050*** (0.122)
Monthly age controls	Yes
Year controls	Yes
Individual controls	Yes
N	25,088

Notes. Years covered: 2003–2004 (control), 2005 (treatment). Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Individual controls are tertiary education indicator, female indicator, pension wealth at the beginning of the year and marginal accrual rates with no reform.

4.3 Retiring via other programs

An issue arises in the study setting because there are some overlapping programs that might absorb some of the behavioral effect we observe. Indeed, approximately 7% of all program claiming at ages 62 to 65 is through other programs. In Table 3, we run our main regression, but now the dependent variable is any program available. The point estimates are very similar to our main estimates. The relabeling effect is lower when one also includes programs that were not relabeled, which is to be expected.

Table 3. Cox proportional hazard model regressions for claiming any program.

	Any program claiming
Immediate increase in pension wealth, % (wealth effect)	0.0922*** (0.0180)
Increase in marginal accrual rate, % of pension (substitution effect)	-0.0578*** (0.0105)
Reach full retirement age in 12 months (relabeling effect)	1.543*** (0.1114)
Monthly age controls	Yes
Year controls	Yes
Individual controls	Yes
N	25,088

Notes. Years covered: 2003–2004 (control), 2005 (treatment). Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Individual controls are tertiary education indicator, female indicator, pension wealth at the beginning of the year and marginal accrual rate with no reform. 9,436 individuals retire within any program.

5. PART-TIME PENSION, WORKABILITY AND FULL RETIREMENT

By exploiting the eligibility age changes in the part-time pension system and difference-in-differences and instrumental variable econometric techniques, the effects of reducing work hours in one's late career on health-related outcomes and labor market exit risks can be studied. The focus in this study is the subgroup of individuals who received a part-time pension during 1998–2005. The part-time pension program provides an interesting research design because it certainly reduced the hours worked, which is not the case in many voluntary partial retirement schemes.

The study focuses on the effects of part-time pension from two different angles. First, the effects at the individual level are studied by instrumenting the part-time retirement age with eligibility age, and second, the effects of one specific reform that lowered the eligibility age from 58 to 56 are studied. The latter design gives so-called intention-to-treat effects that are of interest to the policy maker because these effects can be used in the cost-benefit analysis. In the first study design, however, the so-called instrumental variable approach is used. Here, one can examine the causal effects on only the subgroup of part-time pensioners who change their behavior because of the rules of pension institutions. This subgroup has worse health outcomes before taking up the part-time pension, and the subgroup also has lower incomes than the average part-time pensioner.

Both approaches exploit pension reforms that affected the eligibility age in the part-time pension system. The reform effects are studied in a difference-in-differences approach, where a treatment group comprises those whose eligibility age was 56 and a control group who were eligible at the age of 58. After the reform, the treatment group purchased more drugs. We cannot observe why this is so, but one potential explanation could be that the increased leisure is used for taking care of oneself. Looking at the individual level, we find that the sicker subgroup of part-time pensioners who take up a part-time pension as soon as it is available to them have fewer drug purchases in subsequent years. Additionally, their early labor market exit decreases substantially.

5.1 The part-time pension program before 2017

Increasing the old-age retirement age is not a good policy if the work capacity of elderly workers is low and labor market exit occurs via other pension programs such as the disability pension. Although different policies at the workplace level have been adopted to improve the health of workers, the pension system has, in the past, offered gradual retirement options such as part-time pension. The current pension system, from 2017, also offers an option to claim part of the accrued pension before reaching old-age pension eligibility, but in this system, there is no requirement to reduce hours worked.

Gradual retirement has been promoted with the expectation that workers prefer exiting gradually to exiting through an abrupt departure directly to full-time pension. The second founding idea behind gradual retirement is a belief that reduced hours help individuals to maintain or improve their health and work capacity, which would lead to longer careers. That is, the hypothesis is that part-time work would lead to a higher effective retirement age.

The Finnish part-time pension scheme is an example of a gradual retirement program, and its explicit goals stated in the preparation of legislation were to reduce disability pension claims and improve the capacity to work. Workers needed to reduce their working hours to between 16–28 hours per week, and the benefit was very generous. Using it had a very modest effect on disposable income or future pension rights. For studying the effects of work-hours reduction, it is important that we can rule out that the effects are not coming from a change in income or the work environment. As in the Finnish case, nothing else changed much besides the hours worked, so this is a very suitable research design for studying the work hour effect in the elderly population.

In the 1990s, there were several changes made to the part-time pension program. For the current study, the most relevant was the change in the eligibility age in 1998. Before 1998, both in the public and private pension systems, the eligibility age was 58. This was the same eligibility age as in the individual early retirement scheme. The individual early retirement scheme pulled more workers out of the labor market than did the part-time pension, and so there was an idea to test whether reducing the eligibility age for the part-time pension could make part-time work more popular and reduce the use of the individual early retirement and disability pension claiming. The

eligibility age for the part-time pension was reduced to 56 and was initially legislated to last until the end of 2000 but was later prolonged to last until the end of 2002.

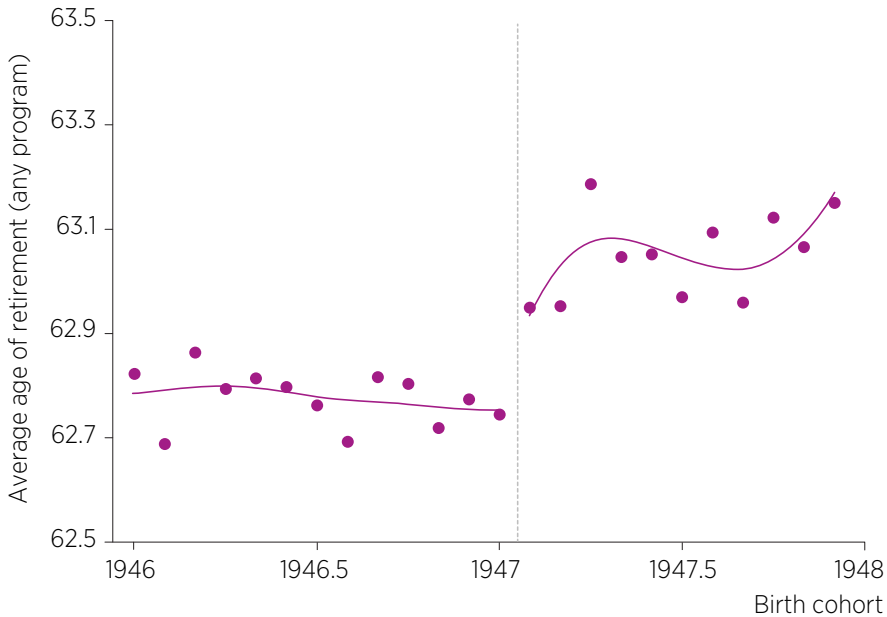
The change in eligibility age is often used in the causal estimation. Because different cohorts have different eligibility ages, one can create comparison groups to show the effect of the program. Additionally, in an instrumental-variable type of approach, where the decision to retire is instrumented with the legislated eligibility age, the sudden reform affecting these ages mitigates the concern of anticipatory behavior. The previous evaluation of Finnish early retirement schemes exploited the eligibility age reforms, including the part-time pension, and studied how being eligible affects early labor market exits (Kyyrä, 2015). The findings suggest that part-time pension did not lengthen the working career and, if anything, slightly reduced the risk of unemployment. The results hinge on eligibility, and the limitation of this study is that it could not study the take-up effect of the part-time pension.

In this study, with new data, we can extend the analysis of Kyyrä (2015) and see – at least descriptively – what happened in the group of part-time pensioners with respect to the effective retirement age. The data include all part-time pensioners born between 1940–1947 and who took part-time pension between 1998–2005. In addition to all pension-claiming information, the data also include information on sickness days and the purchase of prescription drugs, which we will use in the next subsections.

Figure 6 shows the effective retirement age for two cohorts. For the cohort born in 1947, the eligibility age was 58 for part-time pension, and for the 1946 cohort, the eligibility age was 56; thus, the red line in the figure indicates the cut-off line in the eligibility age. Most of the part-time pensioners also took up the part-time pension program in the year they became eligible, so these two cohorts differ with respect to the duration of their time in the part-time pension program. In this study, we have also explored whether the observable variables (for example wages, unemployment and employment months, family characteristics, etc.) at age 55 or during the years 1995–1997, that is, before anybody could be on part-time pension, differ near the cut-off line. There are no clearly visible differences with respect to these observable background variables. However, figure 4 suggests that there is a visible jump in the average retirement age at the cutoff. This indicates that reducing workload earlier did not lead to an increase in the effective retirement age. The jump in the average retirement age cannot be attributed to other reforms because there is no such reform affecting these two cohorts in a discontinuous manner. Unfortunately, near the cut-off, there are not enough observations to properly estimate this effect in a regression discontinuity setting.⁵

⁵ In the 1946 cohort, there are approximately 10 000 individuals and in the 1947 cohort, there are slightly fewer than 2000 individuals whose birth months are distributed in a nearly uniform manner.

Figure 6: Average age of retirement by birth cohort and month, only part-time pensioners.



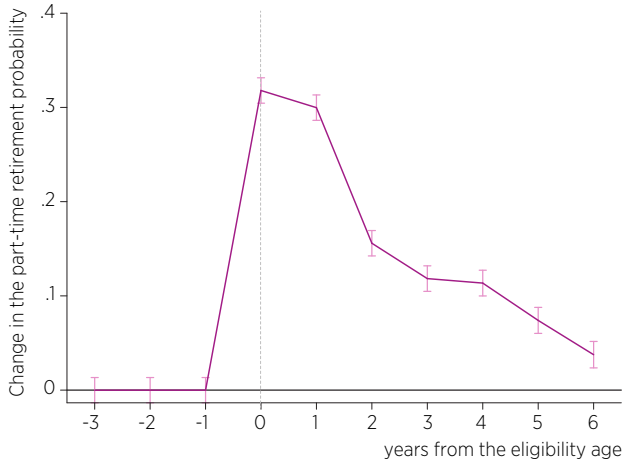
5.2 Take-up effect of part-time pension on health and early labor market exits

Health-related expenditure is the second largest expenditure item for public finances with respect to elderly workers. This means that labor market policies concerning the elderly population should also consider the effect on health. It is difficult to study the take-up effect of part-time pension on health and labor market exits because health affects work decisions as well. As the part-time retirement decision is potentially endogenous, one approach is to find an instrument that explains the part-time retirement decision but is unrelated to the health and labor market exit outcomes.

A common instrument in these types of settings is the statutory age for retirement. The limitation of this setting is that it is only possible to reveal the effect on the compliers, that is, individuals who change their retirement behavior because of the instrument. Effectively, we can study the health and labor market exit risk effects of a subgroup who retire the same year they become eligible for the part-time pension. The background characteristics show that this subgroup has worse health outcomes during the pre-pension period.

We instrument the part-time retirement decision with the eligibility age, which is either 58 or 56 depending on the cohort. Figure 7 reveals that approximately 30 percent of individuals take the part-time pension within the first year since following eligibility. These are the compliers we can study.

Figure 7: Take-up of first part-time pension spell since becoming eligible for the part-time pension.



Notes: the estimates are based on a fixed effects model where years from the eligibility act as explanatory variables. The estimation is done for years 1995-2004 including the total part-time pensioners sample. The vertical lines represents 95% confidence intervals.

In the estimation, we also account for the individual unobserved effects by using an individual fixed effects instrumental variable (FE-IV) estimator. We find that the probability of purchasing any drugs decreases by 2.8 percentage points and that there is a 6.9 percentage point reduction in long (over 10 day) sickness absences within a subgroup of compliers. These effects are stronger for women. The risk of early labor market exit is also reduced by 5.2 percentage points.

Table 4: Take-up effect on drug purchases

	Taken part-time pension first year eligible, First-stage	Any drug purchases, FE-IV	Mental illness drug purchases, FE-IV
eligible	0.2174***(0.0555)		
part-time retirement		-0.0280***(0.0067)	-0.0090***(0.0026)
age	0.2088*(0.0839)	0.2088*(0.0839)	0.0334*(0.0040)
age ²	-0.0017*(0.0008)	-0.0001(0.0001)	-0.0003(0.0001)
F-stat	43.31		
Observations	521 155	521 155	521 155

Notes: Years in the estimation are 1995–2004. Regressions include year dummies. Health outcomes measured in period t+1. Cluster robust standard errors are in parentheses (clustered on birth cohort level). *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 5: Take-up effect on sickness absences and early labor market exit risk

	Taken part-time pension first year eligible, First-stage	Sickness absences, over 10 days, FE-IV	Taken part-time pension first year eligible, First-stage	Early labor market exit risk
eligible	0.2122***(0.0318)		0.2122***(0.0318)	
part-time retirement		-0.0691*** (0.0084)		-0.0518*** (0.0142)
age	0.1314*(0.0547)	0.1561*(0.0127)	0.1315*(0.0547)	-0.0915***(0.0138)
age^2	-0.0011*(0.0005)	-0.0014*(0.0001)	-0.0011*(0.0005)	0.0009***(0.0001)
F-stat	44.61		44.51	
Observations	511 973	511 973	512 126	512 126

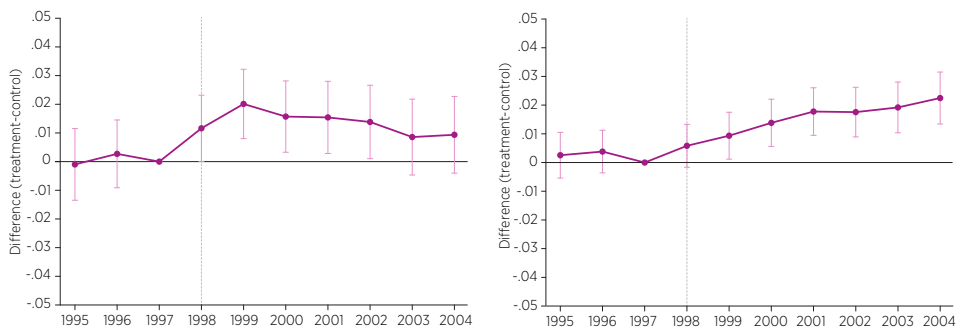
Notes: Years in the estimation are 1995–2004. Regressions include year dummies. Health outcomes measured in period t+1. Cluster robust standard errors are in parentheses (clustered on birth cohort level). *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

5.3 Reform effects: Average effect in the treated cohorts

The 1998 reform of the eligibility age is utilized to study what kind of average effects the reform had on the similar outcome measures as above. We form a treatment and control group and compare the difference in the outcomes of the two groups before and after the reform. In this case, the treatment group is those who are entitled to part-time pension in the age of 56, and the control group is those who are eligible for part-time retirement at the age of 57 or 58.

Figure 8 shows the difference between the treatment and control group in drug purchases over the course of a year during the period 1995–2004. The end year here is 2004 because the reform in 2005 might have independently affected the cohorts in question and thus biased the results. After the reform, the difference between the two groups increases, indicating that the treatment group, who were eligible for the part-time pension at the age of 56, purchases more medicine due to the reform.

Figure 8: Purchases of any drugs and mental illness drugs within a year. Without controls.



The difference-in-differences estimates (pooling 3- years before and 3- years after the reform), when controlling for characteristics such as gender, birth year, family composition, previous sickness absences, education level and industry, give positive 0.0163 (s.e 0.0094) point estimate for any drug purchases and 0.0231 (s.e. 0.0065) for mental illness drugs. While the data do not reveal the underlying mechanism, one potential explanation for this result is that with more leisure time, individuals also have more time to take care of themselves and consult medical professionals.

Table 6: Difference-in-differences (DD) results on main outcomes.

	Any drug purchase	Mental illness drug purchase	Any drug purchase	Mental illness drug purchase
DD estimate	0.0269***(0.0067)	0.0181***(0.0047)	0.0163(0.0094)	0.0231***(0.0065)
Cohort & Gender	YES	YES	YES	YES
Controls	NO	NO	YES	YES
R ²	0.027	0.0141	0.0852	0.0456
Observations	236 406	236 406	132 863	132 863
Individuals	39 422	39 422	22 449	22 449

Notes: Years in the estimation are 1995-2001. Cluster robust standard errors are in parentheses (clustered at the individual level). *, **, and *** indicate statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

In a regression model, where full retirement age is regressed on the status of belonging either to the treatment or control group and the control variables, the result is qualitatively similar to that observed in figure 6. The treatment group retired 0,62 years earlier than the control group. This also indicates that working less at the end part of the career did not prolong careers. However, this is a selected sample because not all individuals could negotiate part-time work options with employers or did not meet the full-time work requirement and the accrual requirement. Therefore, these results are not directly applicable to the entire population.

Earlier studies on of Finnish part-time pension have shown that the system was costly, and it was more often available to more educated workers and workers in larger firms (Salonen et al., 2017). The system was generous because the subsidies paid for the reduced hours were made exceptionally high to provide a realistic option for an average worker. The costs are justifiable if the benefits, in the form of longer working careers and improved well-being, are also high. The study by Kyrrä (2015) and the above analysis have shown that on average the late part-time pension program was not a good instrument to increase the labor supply. However, we also learned from the previous subsection that for a subgroup, those with worse health outcomes, there are benefits of being able to reduce their workload. Together, these observations suggest that targeting flexible working options towards individuals with worse health outcomes could be welfare-improving.

6. CONCLUSIONS

We conclude by drawing three policy conclusions. First, our analysis of the Finnish pension reform of 2005 showed that when retiring, people are influenced by more than financial incentives. The retirement decision is strongly influenced by eligibility ages per se. Tinkering with eligibility ages seems to give policy makers a new important tool to influence retirement ages and thus ensure the fiscal sustainability of pension systems. However, we are also concerned with maximizing the welfare of the insured individuals. The relabeling effect might cause people to make decisions that are not optimal for their wellbeing. In that case, prolonging working careers through labeling might not be the welfare-maximizing way to design pension systems.

Second, in the part-time pension analysis, we showed that especially for a subgroup with worse health outcomes, working part-time is beneficial: this group purchased fewer drugs and had a lower early labor market exit risk, while on average, part-time retirement did not lead to major savings in health-related costs. In designing pension reforms, these types of not-directly-retirement-related costs and benefits should be carefully considered.

Third, we have exploited reforms to make causal inferences. When designing reforms, it is crucial to also design their evaluation. Some reforms simply go to waste in terms of how much we can learn from them, whereas some offer powerful quasi-experiments. The 2018 labor market activation reform acts as an example of the former, and, the 2005 pension reform is an example of the latter. Reform design can be undertaken with the support of researchers or through a general understanding of program evaluation within the civil service.

REFERENCES

Aspegren, H., Duran, J. & Masselink, M. (2019), Pension reform in Sweden: Sustainability & Adequacy of Public Pensions

Behaghel, L. & Blau, D. M. (2012). Framing social security reform: Behavioral responses to changes in the full retirement age. *American Economic Journal: Economic Policy*, 4(4), 41-67.

Blau, D.M. (1994) Labor force dynamics of older men. *Econometrica* 62(1): 117-156.

Brown, K. M. (2013). The link between pensions and retirement timing: Lessons from California teachers. *Journal of Public Economics*, 98, 1-14.

Burtless, G. & Moffitt, R. (1986) Social security, earnings tests, and age at retirement. *Public Finance Quarterly* 14: 3-27.

Börsch-Supan, A. and Schnabel, R. (1998) Social security and declining labor-force participation in Germany. *American Economic Review* 88(2): 173-178.

Carone, G., Eckefeldt, P., Giamboni, L., Laine, V., & Pamies. (2016) Pension Reforms in the EU since the Early 2000's: Achievements and Challenges Ahead. *European Economy Discussion Paper No. 042*.

Coile, C.C. and Gruber, J. (2001) Social Security incentives for retirement. In D.A. Wise (ed.), *Themes in the Economics of Aging*, Chicago: University of Chicago Press.

Coile, C.C. and Gruber, J. (2007) Future social security entitlements and the retirement decision. *Review of Economics and Statistics* 89(2): 234-246.

Cribb, J., Emmerson, C. & Tetlow, G. (2016). Signals matter? Large retirement responses to limited financial incentives. *Labour Economics*, 42, 203-212.

Furgeson, J., Strauss, R. P. & Vogt, W. B. (2006). The effects of defined benefit pension incentives and working conditions on teacher retirement decisions. *Education Finance and Policy*, 1(3), 316-348.

Gruber, J. & Wise, D.A. (1999) Introduction and summary. In J. Gruber and D.A. Wise (eds.), *Social Security and Retirement Around the World* (pp. 1-35). Chicago: University of Chicago Press.

Hagen, Johannes (2017) Pension principles in the Swedish pension system, *Scandinavian Economic History Review*, Volume 62, Issue 1, Pages 28–51

Holzmann, R. (2017) The ABCs of Nonfinancial Defined Contribution (NDC) Schemes, IZA Policy Paper No. 130.

Kanninen, O., Ravaska, T., Gruber, J., Nivalainen, S. & Uusitalo, R. (2019), The Effect of Relabeling and Incentives on Retirement: Evidence from the Finnish Pension Reform in 2005. *Labour Institute for Economic Research Working Papers* 328.

Kyyrä, T. (2015) Early Retirement Policy in the Presence of Competing Exit Pathways: Evidence from Pension Reforms in Finland, *Economica*, 82, 46-78

Manoli, D. & Weber, A. (2016a). Nonparametric evidence on the effects of financial incentives on retirement decisions. *American Economic Journal: Economic Policy*, 8(4), 160–82.

Manoli, D. S. & Weber, A. (2016b). The effects of the early retirement age on retirement decisions (No. w22561). National Bureau of Economic Research.

Mastrobuoni, G. (2009) Labor supply effects of the recent social security benefit cuts: empirical estimates using cohort discontinuities. *Journal of Public Economics* 93(11-12): 1224–1233.

OECD (2016), "Pension expenditure", in *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics*, OECD Publishing, Paris, <https://doi.org/10.1787/factbook-2015-82-en>.

OECD (2019), Poverty rate (indicator). doi: 10.1787/Ofe1315d-en (Accessed on 06 September 2019)

OECD (2019), "Social Expenditure: Aggregated data", *OECD Social and Welfare Statistics (database)*, <https://doi.org/10.1787/data-00166-en> (accessed on 26 September 2019).

Ravaska, T. (2019). *Essays on Optimal Lifetime Redistribution, Inequality and Well-Being*. Tampere University Dissertations 75. Tampere University.

Salonen, J., Takala, M., Vidlund, M., & Väänänen, N. (2017). Suomen osa-aikaeläkkeet ja osittaiset eläkkeet Euroopassa. *Eläketurvakeskuksen raportteja* 8/2017.

Seibold, A. (2017). Reference Dependence in Retirement Behavior: Evidence from German Pension Discontinuities, mimeo.



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