

## **Carrots, sticks and old-age retirement. A review of the literature on the effects of the 2005 and 2017 pension reforms in Finland – an extended version**

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### **Abstract**

This article reviews the behavioural effects of Finland’s pension reforms in 2005 and 2017. With employment rates in older age groups at relatively low levels, both these reforms aimed to encourage later retirement and introduced a flexible old-age retirement age, initially between ages 63–68 and progressively raised to 65–70 years. However, the two reforms differed notably in terms of the means adopted. The 2005 reform relied heavily on “carrots”, i.e. individual choices and financial incentives. In the 2017 reform, “sticks” had a much bigger role, raising the age of eligibility for old-age pension. We consider how the behavioural effects of these two policies differed from each other. The article reviews the existing literature on pre-reform policy evaluations concerning the effects of the pension reforms and explores actual post-reform retirement behaviour based on studies that use register and survey data. It is shown that the 2005 reform failed to induce later retirement, and that employees in higher socio-economic positions benefited more from financial incentives associated with later retirement. In this regard, the 2017 reform, which will automatically increase retirement age via a higher age of eligibility, treats different socio-economic groups more equally.

**Key words: pension reform, old-age retirement, socio-economic differences**

**Nyckelord: Pensionsreformen, ålderspension, socioekonomiska mellanskillnaden**

## 1. Introduction

Boasting some of the highest life expectancies in the world, the Nordic countries have worked to encourage later retirement ever since the 1990s (NOSOSCO 2008). Sweden and Norway have constantly maintained high employment rates in their ageing populations, but Finland has recorded much lower employment figures in the 55+ age groups. Initially the priority in Finnish pension policy was therefore to limit early retirement and other early exit options (Saurama 2004, 75–77), while raising old-age retirement age entered the policy toolbox much later on. Employment rates among older people have edged up in Finland since the turn of the millennium, which has made the objective of raising the old-age retirement age a more realistic policy target.

Policymakers are keen to know how to achieve later average old age retirement age, and what is the most effective way to reach this goal. In the past two decades Finland has carried out two pension reforms aimed at postponing retirement. These reforms differed notably in their approaches and methods chosen to induce later retirement, and therefore offer valuable insight into how pension behaviour may be influenced by means of pension regulation. Furthermore, they shed light on how pension regulation may yield different behavioural outcomes depending on individuals' demographic and socio-economic background.

This article reviews the pension reforms carried out in Finland in 2005 and 2017, both of which introduced new old-age retirement rules, and subsequent changes in retirement behaviour. The first reform in 2005 took a “carrot” approach, combining a relatively low age of eligibility with financial incentives to continue working and to postpone retirement beyond the age threshold. The latter reform, then, adopted a “stick” approach and increased the age of eligibility for each birth cohort, fixing eligibility to increases in life expectancy.

While both programmes allowed for flexibility in the exact timing of retirement for ages above the threshold, they relied on distinctly different means to influence old-age retirement behaviour. The 2005 reform essentially used incentives to “nudge” people to voluntarily choose to retire later, whereas the 2017 reform relied on peremptory provision to increase the age of retirement.

In the Nordic context the Finnish case resembles the situation in Norway and Sweden, where a system of flexible old-age retirement allows people to retire earlier or later than the statutory old-age retirement age. In both countries financial incentives are in place to “punish” early and to encourage later retirement, implying that “carrots” are used to influence retirement behaviour. In addition, Sweden has agreed to

increase the lowest age of eligibility for old-age pension and to link these increases to life expectancy, hence applying a “stick” policy similar to the Finnish pension reform in 2017. In Denmark, flexibility is allowed only in the direction of later retirement. Denmark has also decided to increase the age limit for old-age retirement and to link it to life-expectancy. Limited flexibility means that Denmark has quite strictly followed the “stick” paradigm. (See Pensionsmyndigheten’s web page Pensionssystem i andra länder.)

In this article we review the existing literature on the Finnish pension reforms of 2005 and 2017. We describe the pre-reform expectations of the effect of these reforms, which date from the period when the reforms were still under preparation, and the actual post-reform retirement behaviour found in studies using register and survey data. We are particularly interested to evaluate the “carrots” and “sticks” policies and how effective they were in terms of increasing old-age retirement age, and to assess their implications for socio-economic differentials in retirement between population subgroups.

## **2. Theoretical background**

### **2.1 Earlier evidence on the effect of financial incentives on retirement**

A common starting point for the economic retirement literature is the life-cycle framework, which suggests that rational individuals choose their optimal consumption pattern jointly with the amount of work they wish to supply during their lifetime, i.e. the point of time when they wish to stop working. Retirement occurs when the utility of retirement exceeds the utility of working an extra year, i.e., when the financial incentives for retiring are higher. Financial incentives are typically measured by calculating the future streams of pension benefit as a function of retirement timing (for details, see e.g. Stock & Wise, 1990; Gruber & Wise, 2004).

Gruber and Wise (2004) found in their multiple country study a strong causal relationship between financial incentives and retirement. In 10 of the 12 countries studied, including Denmark and Sweden, the single-year accrual was negatively related to retirement likelihood. Using different measures of financial incentives, Belloni & Alessie (2009) and Achs et al. (2005) arrived at the same conclusion.

Research shows that it is important to control for the value of the future stream of pension benefits in models explaining retirement (e.g. Baker et al. 2003). This expected stream of income, called social security wealth, has both income and substitution effects. Due to the income effect, the level of social

security wealth affects retirement decisions; typically individuals with a higher current level of wealth tend to retire earlier (Berkel & Börsh-Supan, 2004; Chan & Stevens, 2004). On the other hand, people typically make decisions based on short-term expectations, even if the decision has longer-term effects (Gabaix et al. 2006). Therefore, a short-term increase in social security wealth (substitution effect) explains retirement timing better than measures based on longer-term financial measures (see e.g. Samwick 1998; Dellis et al. 2004). In other words, a higher future pension encourages people to work longer (for Sweden, see Nilsson 2013; for Norway, see Brinch et al. 2017).

However, financial incentives do not necessarily affect retirement. For example, Coile et al. (2002) report that despite the financial benefits of postponing retirement, only few people actually take advantage of this option. In particular, those who are in a weaker position in terms of education or socio-economic status tend to retire earlier regardless of financial incentives (for Norway, see Midsundstad 2002; for Denmark, see Poulsen 2015). Furthermore, the evidence from Norway suggests that people make retirement decisions based on their expected life expectancy: those who expect to die younger (Brinch et al. 2017) and those who have health problems (e. g. Hanel 2010; Poulsen 2015) tend to retire earlier. In this case it is not necessarily the financial incentives that are the main decision factor, but rather the desire to enjoy retirement for as long as possible.

Pension reforms usually involve two separate elements: a change in the statutory retirement age and a change in financial incentives. As described above, the effect of financial incentives on retirement is well documented. Much less attention has been paid to the effects of age limits on old-age retirement. It has, however, been observed that large numbers retire at the lowest age of eligibility (Behagel & Blau 2012; Ferreira & Santos 2013).

Furthermore, statutory retirement ages affect behaviour separately from financial incentives. For example, Seibolt (2017) argues that statutory ages serve as reference points for workers' retirement decisions, and observes that pure financial incentives have only a modest effect on retirement, while statutory age effects are considerable. Manoli and Weber (2016) and Behagel and Blau (2012) reported changes in retirement age even when financial incentives were absent or controlled for. They conclude that due to behavioural responses to statutory retirement ages, framing a reform as a change in the statutory age magnifies the behavioural impact, whereas framing it as a benefit cut dampens the response.

## **2.2 Earlier evidence on the effect of individual factors on retirement**

Apart from the effects of financial incentives and age limits, retirement has a clear socio-economic dimension. From the individual point of view, socio-demographic factors such as age, gender, education and income are reflected in retirement timing. Health and family issues can also have a bearing on retirement decisions.<sup>i</sup> The findings on the effect of gender are mixed: some results suggest that women are keener to retire early (Chan & Stevens 2004; Raymo et al. 2011), others that women have a tendency to work longer (Finch 2014).

Higher education and higher socio-economic status are usually related to higher retirement age. The highly educated typically start their working careers at a later age and continue to work longer than those with lower qualifications (for Norway, see Midtsundstad 2002; see also Mermin et al. 2007; Radl 2013). The socio-economic status reflects the nature of work tasks : upper-level non-manual employees, typically with less physically demanding jobs, have been observed to retire later than manual employees (Radl 2013; for Norway, see Solem et al. 2014).

Current income, expected pension income and wealth have all been found to affect retirement decisions. Higher wealth has been found to be related to earlier retirement (Mermin et al. 2007; Aaron & Callan 2011) and lower expected pension income has been observed to delay retirement (van Solinge & Henkens 2014). Income prior to retirement, in turn, has a less straightforward impact. Higher income makes early retirement financially possible, but higher income may also be related to the kind of jobs in which people tend to work longer (e.g. managers or white-collar workers). There is both evidence to support the conclusion that higher income is related to earlier retirement (Frieze et al. 2011; Raymo et al. 2011) and that is related to later retirement (Fisher et al. 2015; for Norway, see Brinch et al. 2017).

## **2.3 The Finnish context: pension reforms in 2005 and 2017**

The Finnish pension system is a defined benefit system where pension level is determined by the length of work history and the amount of past earnings. The earnings-related pension system is mandatory and covers all workers and virtually all earnings. There are some differences in the pension rules for public and private sector workers, mostly due to past differences and transition rules that still hold for older cohorts. In particular, the majority of older public sector employees have a fixed occupational or personal retirement age, the former typically being lower than and the latter higher than 63 (see e.g. Järnefelt &

Nivalainen 2016). The pension reforms did not affect the existing occupational or personal retirement ages in the public sector. Therefore, the focus here is on the private sector.

The two pension reforms in 2005 and 2017 brought changes both to the age limits for early and full retirement, and to the financial incentives to retire. The most fundamental changes are described in Table 1. In both cases one of the key motives for the pension system overhaul was to prolong working lives and increase employment rates.

The 2005 reform introduced a flexible old-age retirement age: instead of the standard eligibility age of 65, people could now retire with a full pension at any point between ages 63 and 68. The age limit for early old-age pension was raised from 60 to 62. There were also changes to how retiring earlier or postponing retirement affected pension levels: the credit gained from postponement was reduced and the reduction made for early retirement was increased.

Important changes were also made to pension accrual rules, first and foremost with a view to encouraging people approaching retirement age to stay on at work. At the same time, pension accrual was clarified so that pensions were now calculated based on annual earnings rather than average earnings of the last 10 years of every employment contract. Prior to the reform there were two accrual rates, a lower rate for younger workers and a slightly higher one for those approaching retirement age. After the reform, the higher of these accrual rates was lowered, and a third, accelerated rate was introduced to encourage people to postpone retirement beyond the lowest age of eligibility. In addition to the changes made to the retirement age limits and pension accrual rates, opportunities for early retirement were greatly restricted.<sup>ii</sup>

One key innovation of the 2005 pension reform was the introduction of a life expectancy coefficient which reduces accrued pension benefits. This is an automated mechanism designed to limit the growth of pension expenditure as a result of rising life expectancy and to encourage people to extend their working lives. The life expectancy coefficient is determined annually for each one-year cohort at the age of 62. It is applied at the point when the level of pension benefit is determined; no subsequent changes are made once the pension has started. The coefficient was first applied in 2010 for those born in 1948. When life expectancy increases, the cuts to pensions will also be increased for future cohorts. The cut in the monthly pension benefit can be offset at least in part by working longer.

Table 1. Changes in pension rules in 2005 and 2017 pension reforms

	Pre-2005	Post-2005	Post-2017
Old-age retirement age	Minimum standard age 65 years	Flexible retirement age 63–68 years. Upper age limit for insurance obligation 68 years.	Lower age limit raised by 3 months per year until the limit is 65. Starting from 2030, the lower age limit is tied to changes in life expectancy. The upper age limit for insurance obligation will increase to 70 years.
Pension accrual rate, by age	23–59: 1.5% 60–65: 2.5%	18–52: 1.5% 53–62: 1.9% 63–68: 4.5%	From 17 to upper age limit of insurance obligation: 1.5%
Early retirement age	60–64	62 (starting from those born in 1945)	-
Partial old-age pension	-	-	Starting from age 61. The lowest age limit to rise progressively. Option to take payment of 25 or 50 per cent of accrued pension
Early retirement deduction	0.4% per month of accrued pension prior to age 65	0.6% per month of accrued pension prior to age 63	For partial old-age pension: 0.4% per month of accrued pension prior the earliest old-age retirement age
Pension accrual after the earliest old-age retirement age	Delayed retirement credit 0.6% per month of accrued pension after age 65	Accelerated accrual rate 4.5% of annual earnings between ages 63–68. Delayed retirement credit 0.4%	Accrual rate 1.5% of annual earnings. Delayed retirement credit 0.4% per month of accrued pension after

	Pre-2005	Post-2005	Post-2017
		per month of accrued pension after age 68	the earliest retirement age

The Finnish pension system was reformed again in 2017. It was agreed that the lower age limit for old-age pension will be increased by three months for each birth cohort, starting from those born in 1955, until the threshold is 65 years. The upper age limit for insurance obligation is also being progressively raised to age 70. Starting from 2030, the lowest age limit for old-age pension will be tied to the increase in life expectancy.

The reform did away with age-specific accrual rates and introduced a standard accrual rate for all. Those who continue to work beyond the lowest age limit for old-age pension are eligible to receive a delayed retirement credit (based on accrued pension). At the same time, new pension rights are accrued from employment. The delayed retirement credit is actuarially neutral, i.e. on average, the amount of pension that the individual receives during their entire old-age pension period remains the same regardless of the timing of retirement.

The early old-age pension was discontinued in the 2017 reform. At the same time, to maintain flexibility in retirement, a new type of pension was introduced in the form of a partial old-age pension. Under this scheme employees can take payment of one quarter or one half of their accrued pension benefits, regardless of the number of hours they continue to work. An early retirement deduction or delayed retirement credit is applied depending on whether the partial old-age pension started before or after old-age retirement age. At the same time, the rest of the accrued pension increases in line with delayed retirement credit rules until the person's full retirement.

### **3. Methods and data**

Our review makes use of earlier research on either of the two pension reforms, published in the Finnish or English language. To ensure the inclusion of all relevant studies, we searched a Finnish database using the search terms “pension reform”, “retirement age” and “old-age pension” (in Finnish) for publications by Finnish research institutes, and Google Scholar using the search term “Finland AND (retirement OR pension)” for academic publications and journal articles in English. We found 51 studies that were



published between 2001 and 2019. Most of the studies, 36 in total, were related to the 2005 reform, while 15 concerned the 2017 reform. Because of this imbalance we give more attention to the 2005 reform.

However, not all of these studies contained information specifically on old-age retirement, nor were all of them relevant for the purpose of evaluating expected or observed behaviour regarding old-age retirement either pre- or post-reform. We therefore selected 27 studies which explicitly addressed expected or observed old-age retirement behaviour following the reforms.

Expectations concerning the effects of the 2005 and 2017 pension reforms are obtained from seven sources. Ilmakunnas (2002), Börsch-Supan (2005), the Finnish Centre for Pensions (2002) and (2019) and Risku (2010) offer estimates of the effects of the 2005 pension reform, while Reipas and Sankala (2015) and Tikanmäki et al. (2015) explore the effects of the 2017 pension reform. Each of these studies is based on different calculations and projections.

Our analysis of the actual behavioural effects of the pension reforms draws on eight studies, six of which consider the 2005 reform (Tuominen et al 2012a; Nivalainen 2013; Määttänen 2013; Sutela & Lehto 2014; Uusitalo & Nivalainen 2013 and Grüber et al. 2019) and two the 2017 reform (Nivalainen & Tenhunen 2018; Tenhunen et al. 2018). The determinants of retirement behaviour and the socio-economic dimension of retirement are investigated in ten studies, all of which considered the 2005 reform (Tuominen et al. 2012b; Järnefelt 2014; Nivalainen 2014; Nivalainen 2015; Järnefelt & Nivalainen 2016; Nivalainen & Järnefelt 2017; Böckerman & Ilmakunnas 2017; Riekhoff & Järnefelt 2017; Kuivalainen et al. 2018; Nivalainen 2019).

The studies we consult for our analysis use data from surveys, from administrative register sources, or a mixture of the two. In many cases the data comprised whole age groups or very large samples of the age group studied. In most cases the analyses concentrate on the private sector. The data used in each study are presented in more detail in Appendix 1.

## **4. How did carrots and sticks work out in the Finnish pension reforms?**

### **4.1 Carrots – the effect of the 2005 reform on financial incentives and retirement**

#### **4.1.1 What was expected?**

At the time that the 2005 reform was under preparation, Finland had an effective retirement age of 59 years – six years short of the official old-age retirement age. This was mostly due to the relative ease of access to early retirement pathways (unemployment pension, early old-age pension, individual early retirement pension). (Ilmakunnas 2002.)

Projections concerning the 2005 reform estimated that the pure effect of the reform would increase average retirement age by 0.9 years until 2015 and by 1.4 years in the long run. Average old-age retirement age between ages 63 and 67 years would increase by 0.1 years until 2015 and by 1 year in the long run (Finnish Centre for Pensions 2002; Risku 2010). Most of this increase would be due to higher employment among older people. It was projected that the 2005 reform would increase the total employment rate by almost 2 percentage points in the long run, and it was expected to have a sizeable effect (about 0.7 percentage points) even during first five years (Börsch-Supan 2005).

It was anticipated that the discontinuation of unemployment pension and the increased age limit for the unemployment pathway to retirement would be a major driver behind the increase in average retirement age in the short run (increase of 0.4-0.5 years until 2010-2015). The higher age of eligibility for early old-age pension was also thought to contribute significantly to increasing the retirement age (increase of 0.1 years until 2015). It was thought that the discontinuation of individual early retirement pension would have a similar, albeit smaller effect. In addition to the restrictions introduced to early retirement pathways, it was expected that flexible retirement age, the accelerated accrual rate and the life expectancy coefficient would have an increasing effect on the average retirement age. (Risku 2010; Finnish Centre for Pensions 2019.)

#### **4.1.2 What really happened? The effect of the 2005 reform on retirement behaviour**

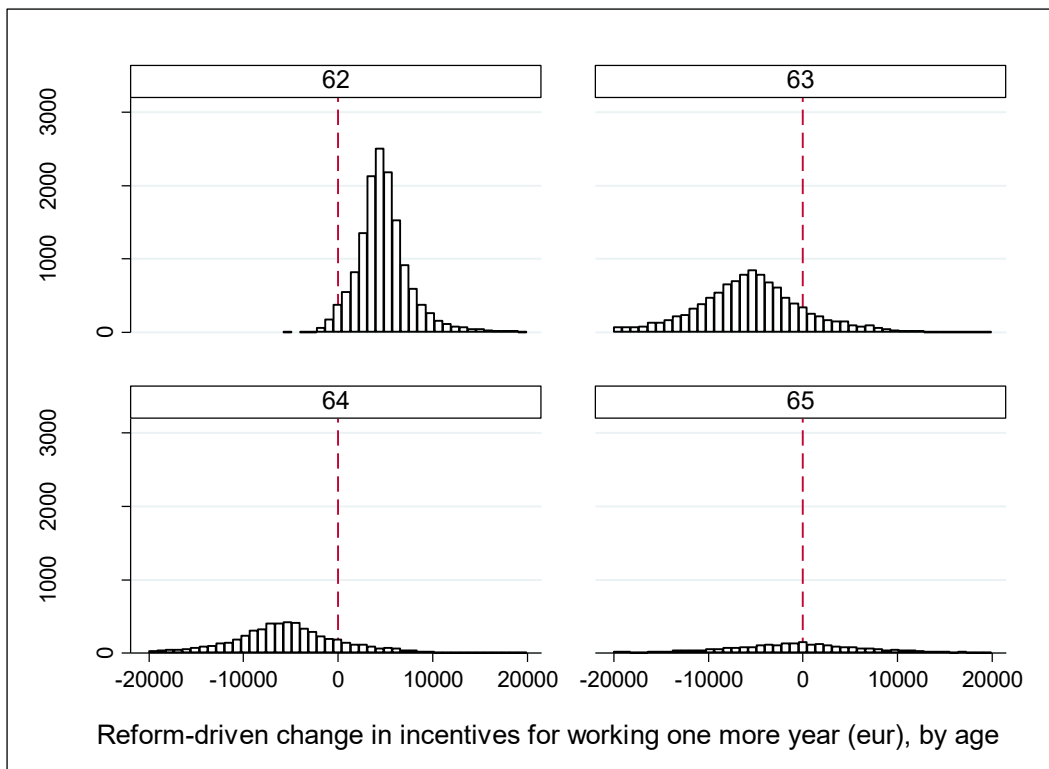
Studies assessing the effects of the 2005 reform found that the discontinuation of unemployment pension and individual early retirement pension, as well as the increased age limit for the unemployment pathway to retirement, increased employment rates in all the age groups affected by these changes. Overall, however, the effect was relatively minor. On average, the employment rate in the age group 50–64 increased by around 0.5 percentage points between 2005 and 2011, and the length of working careers in the age group increased by 0.1 years. This was in line with expectations, although the effects were less pronounced than expected. (Uusitalo & Nivalainen 2013.)

As for financial incentives, it was observed that the accelerated accrual rate increased the odds of retiring later, as expected (Tuominen et al. 2012a). Later assessments of the effect of the 2005 reform based on register data revealed that, on average, the financial incentives to continue working did not change significantly as a result of the reform. However, it was pointed out that the effects for people of different ages were very different. (Uusitalo & Nivalainen 2013; Grüber et al. 2019.) Both studies used social security wealth (SSW) as a financial incentive measure for income/wealth effect. They also considered the substitution effect, i.e. the change in the incentives to continue working one more year due to the reform.

There were clear age-related differences in the effect of the pension reform on the incentive to work one more year and to retire (Figure 1). Compared with the old pension rules, the new rules introduced with the 2005 reform offered a greater incentive for 62-year-olds to postpone retirement by one year. This was due to different early retirement deductions: under the new system, the amount of pension was reduced by 7.2 per cent per year, while under the old rules the respective reduction was just 4.8 per cent. The flexible old-age retirement scheme meant that the situation was the opposite for persons aged 63 and 64. For them, the financial incentives to continue working decreased after the reform (substitution effect<sup>iiii</sup>) and at the same time, retiring became a financially more attractive option. After the reform both these age groups could retire on a full pension, while before the reform retirement at these ages was penalized in the form of an early retirement deduction. As a result, their SSW increased by 9.6 and 4.8 per cent, respectively (wealth effect). In other words, an increased accrual rate of 4.5 per cent after age 63 was not a big enough financial incentive to offset the effect of the discontinuation of the early retirement deduction for those aged 63 and 64. (Uusitalo & Nivalainen 2013; Grüber et al. 2019.)

People aged 65 or over experienced both negative and positive changes in their incentives for working and retiring, depending on their accrued pension and earnings. For those with high earnings and low accrued pension rights, the new rules increased the incentives to work, while for those with low earnings and a high accrued pension, the old rules offered greater incentives to continue working. (Uusitalo & Nivalainen 2013; Grüber et al. 2019.)

Figure 1. Distribution of the difference in financial incentives (in euros) for working one more year under the post-reform and pre-reform pension rules, by age

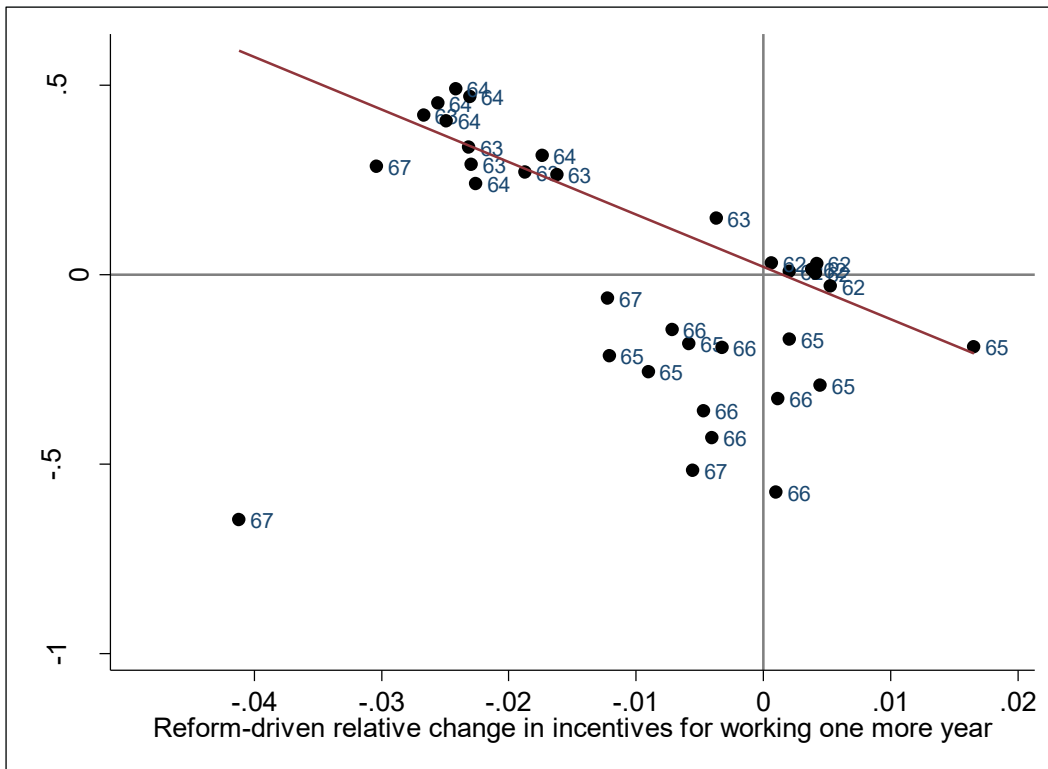


Source: Uusitalo & Nivalainen 2013

The results showed a direct correlation between the change in incentives and the risk of retirement (Figure 2). Decreasing incentives to work one more year and increasing incentives to retire as measured by change in SSW in the age groups 63 and 64 raised the odds of retirement at these ages significantly. Among persons aged 62, the likelihood of retiring remained more or less unchanged. It is worth pointing out that with regard to financial incentives and retirement behaviour, those aged 65 constituted a special group. Prior to the pension reform, practically everyone retired on an old-age pension no later than age 65. After the reform, retirement propensities in this age group dropped clearly. As a result, the overall risk of retirement at age 65 decreased more than one would have expected based on the change in financial incentives; retirement propensities also fell for those whose financial gains from continuing to work remained about the same or de facto decreased after the reform. This suggests that there were also other than purely financial factors that affected the observed behaviour of people in this age group. (Uusitalo & Nivalainen 2013; Grüber et al. 2019.)

Due to the varying size of different age groups, increasing retirement propensities at ages 63 and 64 had a larger effect on retirement age than the decreasing number of those retiring at age 65. As a result, and against expectations, the old-age retirement age fell somewhat after the reform. (Uusitalo & Nivalainen 2013.)

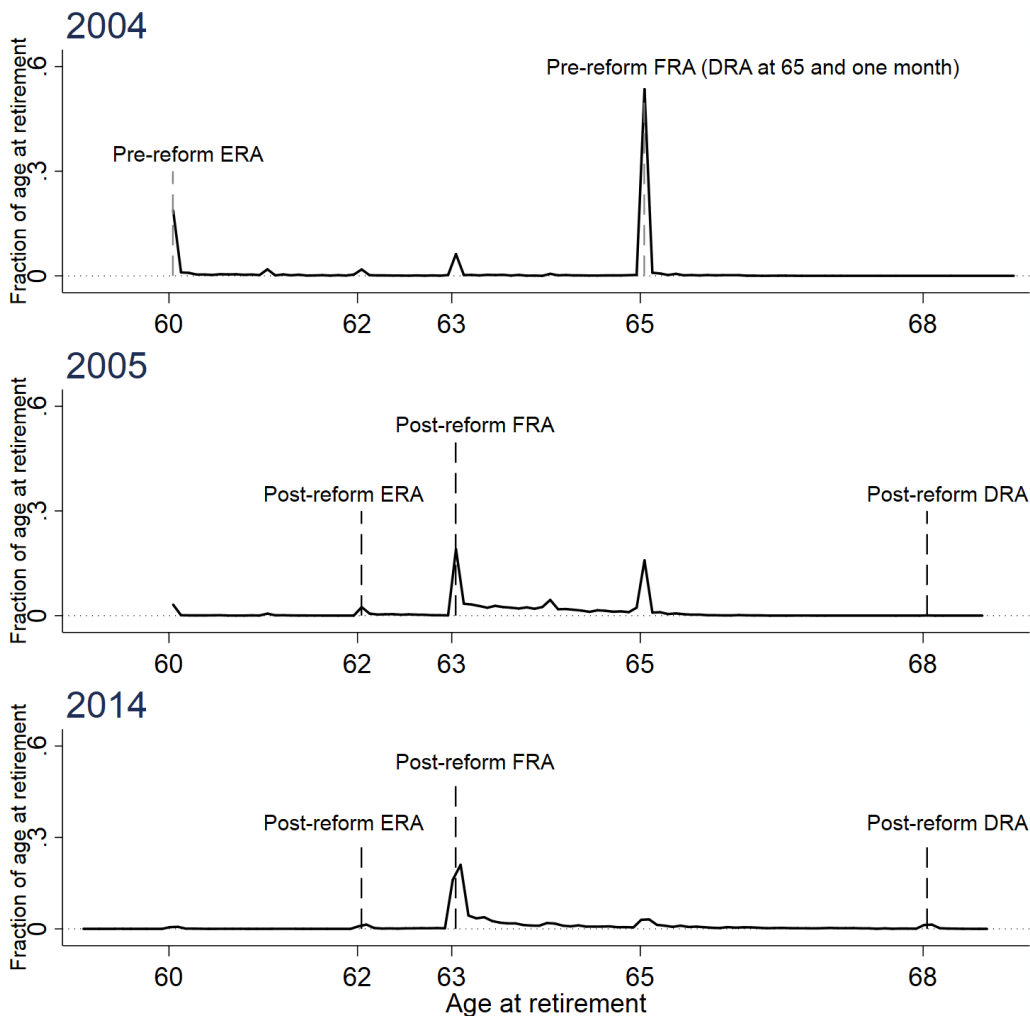
Figure 2. Relative change in financial incentives for postponing retirement by one year due to the 2005 reform and change in retirement propensities



Source: Uusitalo & Nivalainen 2013

Uusitalo & Nivalainen (2013) and Grüber et al. (2019) showed that in the 2005 reform, both age limits and financial incentives affected retirement behaviour. Grüber et al. (2019) found that in addition to financial incentives, relabelling had a very strong effect on retirement. This means that defining retirement at the ages of 63 and 64 years as full retirement instead of early retirement had a separate effect of increasing retirement propensities at these ages. Therefore, in contrast to intentions, both components (age limits and financial incentives) of the 2005 reform contributed to increase retirement at ages 63 and 64. As a result, the retirement pattern shifted strongly from 65 in 2004 towards 63 in 2005. Over a 10-year period, then, age 65 was replaced by 63 as the new “normal” of retirement age (Figure 3).

Figure 3. Retirement propensities by monthly age bins, pre- and post-reform



ERA=early old-age retirement age, FRA=full old-age retirement age, DRA=delayed retirement age.

Source: Grüber et al. (2019)

It has been estimated that the life expectancy coefficient tends to decrease the risk of retirement and to increase the length of working careers (Uusitalo & Nivalainen 2013; Määttänen 2013). However, those with higher education and higher socio-economic status are more responsive to the life expectancy coefficient: around half of upper-level non-manual workers were willing to continue working due to the life expectancy coefficient, while the respective share for manual workers was only one third (Sutela & Lehto 2014). The same applies to financial incentives in general. Nivalainen (2015) found that the behaviour of individuals with a low educational level, lower socio-economic status and low income is not affected by financial incentives, while highly educated upper non-manual employees with a higher income stay at work longer due to financial incentives.

#### 4.1.3 The socio-economic dimension of retirement

No systematic information is available on socio-economic differences in retirement for the pre-2005 period, as there was only one official retirement age for all: 65 years. After the 2005 reform which brought increased individual choice, more research emphasis was placed on the socio-economic dimension of retirement. It was found that continuing at work until old-age retirement varies greatly by socio-economic group (Järnefelt 2014). Manual workers often exit working life before old-age retirement through unemployment or disability, while upper-level non-manual employees more likely transfer to old-age pension directly from work. Only 40 per cent of manual workers continue to work until old-age retirement, while the respective figure for upper-level non-manual employees is 70 per cent. (Järnefelt 2014.) Moreover, the timing of retirement varies by socio-economic group. Manual employees tend to retire at the earliest possible age, while the majority of upper non-manual employees and those with higher education stay on at work longer (Nivalainen 2014; Nivalainen & Järnefelt 2017).

Furthermore, it was realised that the age-specific accrual rates do not treat different population groups equally. The timing of working careers varies between socio-economic groups (Järnefelt 2014). Manual workers tend to start their careers earlier, and they also stop working earlier compared to upper non-manual workers (Järnefelt 2014). In particular, the accelerated accrual rate was problematic from a socio-economic point of view. It favoured those who are healthy enough and able to remain at work longer, typically those in higher socio-economic positions (Sutela & Lehto 2014). As a result, it has been estimated that only one in five manual employees had the opportunity to benefit from the accelerated accrual rate, while the respective figure for upper-level non-manual employees was two in five. Moreover, the accelerated accrual rate was calculated based on earnings, not according to accrued pension or length of working career, and therefore it favoured those with higher income at the end of their working careers.

It was found that retirement patterns do not differ by gender *per se*, but the factors affecting men's and women's retirement differ from each other. It seems that men in higher socio-economic positions had a slightly better chance to benefit from the accelerated accrual rate than women. On the other hand, men with higher wealth and men in higher income quartiles were more likely to retire early. Instead, women with higher income seemed to use the accelerated accrual rate more often than men. (Nivalainen & Järnefelt 2017; Riekhoff & Järnefelt 2017.) It is difficult, therefore, to determine the overall effect of the 2005 reform on gender differences. However, the gender difference in the length of working life in Finland is much smaller than in most other countries (women's average 36.6 years, men's 38.5 years), which is explained by the fact that women in Finland work much longer than in most other European countries (Kuivalainen et al. 2018).

## **4.2 Sticks – the 2017 reform and the effect of increasing age of eligibility**

### **4.2.1 What was expected?**

When the 2017 reform was being prepared, the average effective retirement age in Finland was 60.9 years. It is expected that the 2017 reform will increase the average effective retirement age to 62.4 years by 2027 and to 64.4 years by the mid-2060s. By 2025, the number of employed persons is expected to increase by one per cent and the employment rate by one percentage point. By 2060, the number of employed persons is expected to grow by three per cent. The employment rate will be two percentage points higher than the estimate based on the 2005 rules. The projected increase in retirement age and employment rates is solely due to the higher age of eligibility for old-age retirement. (Reipas & Sankala 2015.)

The length of working careers is expected to increase in all socio-economic groups, but for the higher educated it is projected that this increase will be somewhat larger than in the lower educated groups. Gender differences are expected to remain mostly unaffected. In all other respects socio-economic differences are expected to diminish. In the long run, the pensions of the low educated will increase slightly more than those of the highly educated. (Tikanmäki et al. 2015.)

### **4.2.2 What is likely to happen?**

The 2017 reform attempted to redress and correct the mistakes made in connection with the 2005 reform. It was decided that the age of eligibility for old-age pension will be progressively raised until the lowest retirement age is brought back to the pre-2005 limit of 65 years. The lowest age of eligibility for old-age retirement will subsequently be tied to changes in life expectancy. The effective retirement age has already increased by 0.3 years from 2017 to 2019 (Finnish Centre for Pensions database). It is estimated that the rising age limit for old-age retirement will drive up the incidence of unemployment and disability pensions (Reipas & Sankala 2015). Based on earlier evidence, these changes will primarily affect manual workers (Järnefelt 2014). This may contribute to increasing socio-economic inequalities.

The 2017 reform was clearer about the effects of the life expectancy coefficient in that it introduced a target retirement age for each age cohort. Staying on at work until the target retirement age offsets the



effect of the life expectancy coefficient. Moreover, replacing the accelerated accrual rate by a delayed retirement credit, which is based on accrued pension rather than earnings, treats people in different socio-economic groups more equally.

It is as yet too early to analyse the behavioural effects of the 2017 reform based on register data. However, a survey on the behavioural effects of the reform (Nivalainen & Tenhunen 2018) has shown that both the life expectancy coefficient and the delayed retirement credit will increase the likelihood of continuing to work longer. Financial incentives particularly encourage those with higher education and those in higher socio-economic positions to stay on at work. Those in higher socio-economic positions also more often intend to continue to work beyond the earliest old-age retirement age, while manual workers more often intend to retire at the earliest age of eligibility. (Nivalainen & Tenhunen 2018.)

Since those in higher positions are more responsive to financial incentives and also more often intend to postpone retirement, the life expectancy coefficient and delayed retirement credit may in the future further increase socio-economic differences in working life length and in pension levels. On the other hand, the survey also showed that those who expected to have lower levels of financial well-being in retirement were more responsive to financial incentives and they also intended to continue at work longer (Nivalainen & Tenhunen 2018). This group more often includes those in lower socio-economic positions, which may to some extent reduce socio-economic differences in pension levels.

Moreover, pension accrual rates are now the same at every age. In the long run, this will most likely reduce differences in pension levels between socio-economic groups. The overall effect of the reform on socio-economic differences remains to be seen. Nivalainen & Tenhunen (2018) found no gender differences in the effect of financial incentives or in intended retirement age, so it seems that, as expected, the gender differences in pensions will largely remain unaffected.

The 2017 reform discontinued the early old-age pension and introduced instead a new pension scheme in the form of the partial old-age pension. It has been discovered that men, the self-employed and the unemployed are more likely to take payment of an early partial old-age pension. Those receiving an early partial pension were not particularly highly educated or in high positions in the labour market. Instead, those who took payment of a partial old-age pension late were more likely to be women, highly educated and in upper-level socio-economic positions. It seems clear, then, that there is a definite need for flexibility in retirement timing. However, people in different positions need different types of flexibility. Men and those in weaker positions (the unemployed) tend to take advantage of early retirement flexibility, whereas women and those in higher positions are more likely to take advantage of the

flexibility available to lengthen their working lives. (Tenhunen et al. 2018.) Position in the labour market thus seems to work in the same way both in partial and full retirement.

## 5. Conclusions

Our paper aimed to provide insight into the 2005 and 2017 pension reforms in Finland and their success in terms of postponing old-age retirement. The two reforms applied different measures to try and achieve this goal. The 2005 reform relied on individual choice and financial incentives – the “carrots” – while the 2017 reform relied more heavily on “sticks” and increased the age of eligibility for old-age pension. This article evaluated the impact of the two approaches on the timing of old-age retirement and their implications for socio-economic differentials in retirement.

Our review suggests that the flexible old-age retirement scheme introduced in 2005 did not have the desired effects on old-age retirement age. Even though financial incentives to continue working were sharply increased after age 63, – due to the simultaneous decrease in the age limit for old-age retirement – , the financial incentives to continue working actually decreased for those aged 63 and 64, and consequently, retirement at these ages increased. Hence, the reform failed to encourage those reaching the lower flexible age limit to stay on at work. In the longer run, the reform had the effect of shifting the most common old-age retirement age from 65 to 63. (Uusitalo & Nivalainen 2013; Grüber et al. 2019.)

Uusitalo & Nivalainen (2013) concluded that in order to push up the retirement age in line with pre-reform projections, the age limits and/or the financial incentives would need to be considerably revised. Similarly, and in line with international evidence (e.g. Manoli & Weber 2016), Grüber et al. (2019) concluded that instead of focusing on changing the accrual rates and other financial incentives, it would have been more cost-effective to nudge people to retire later by changing the age of eligibility for statutory pension. This is exactly what was done in the 2017 reform. This reform will have more success in increasing old-age retirement age, since that age is now rising automatically. The effective retirement age has already gone up.

The results also show that despite the pension policy rules, low-educated manual workers have much less opportunity and are less willing to continue to work than highly educated, upper non-manual workers. This holds irrespective of the pension reforms. The elements of the 2005 reform, i.e. a relatively low flexible retirement age coupled with an accelerated accrual rate based on earnings, contributed to an increase in socio-economic differences. The 2017 reform discontinued this feature and instead introduced a standard accrual rate for all ages. At the same time the decision was made to progressively raise the age

of eligibility for old-age pension and to determine the amount of delayed retirement credit based on accrued pension instead of earnings. This should contribute to reducing socio-economic differences, at least to some extent. The ultimate impacts on socio-economic differences will remain to be seen.

The effects of these two reforms in Finland provide lessons for other countries planning to reform their pension systems and so to delay retirement. Based on Finnish evidence, it seems that increasing statutory age limits is far more effective than financial incentives in this regard. Furthermore, the choice of policy approach has the potential to reduce socio-economic differentials in retirement behaviour. Our review of the Finnish pension reforms suggests that it is in fact possible to achieve the two goals at the same time, i.e. improved efficiency and reduced socio-economic differentials.

However, retirement decisions are affected not only by pension policy rules, but also by conditions in the workplace. The results from Finland indicate that favourable working conditions can indeed contribute to later retirement. Nonetheless, the single most important factor in predicting retirement timing is health. This underscores the importance of healthy working environments and high-quality occupational health care at the organisational level. (Tuominen et al. 2012; Nivalainen 2020; for similar conclusions in Sweden, see Nilsson 2013; for Norway, see Blekesaune & Solem 2005.) However, these topics need further research.

It is also possible that increasing life expectancy coupled with improving health, the growing prevalence of employers' ageing programmes and the slow social acceptance of a higher retirement age can lead to a situation where financial incentives start to assume a greater role than they have had in past decades. Nevertheless, there will always be groups that are unmoved by financial incentives.

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<sup>ii</sup>Fisher et al. (2016) also mention a whole range of psychological factors, such as motivation, values, attitudes etc., that have been found to be related to retirement timing but that are not considered in this article.

<sup>ii</sup> For example, the unemployment pension and individual early retirement pension were discontinued. Unemployment pension was a system covering long-term unemployed persons aged 60 or over and born before 1950. Individual early retirement pension was a form of disability pension, but with more lenient medical criteria for those aged 58 or over and born before 1944.

<sup>iii</sup> For example, for those who were 63 years at the end of 2004, the old system would give an accrual rate of  $(1 \times 2.5\% \times \text{earnings} + 1 \times 4.8\% \times \text{accrued pension})$  in case they decided to continue to work for the next 12 months. In the new system the respective accrual rate would be  $(1 \times 4.5\% \times \text{earnings})$ . Thus the change in the accrual rate due to the reform was negative. In other words, incentives to continue working decreased.

## References

- Aaron, H. J. & Callan, J. M. (2011) Who retires early? Center for Retirement Research at Boston College Working Paper 2011-10.
- Achs, B. & Haider, S. & Zissimopoulos, J. (2005) Financial Incentives and Retirement: Evidence from Federal Civil Service Workers. *Journal of Public Economics*, 89, 427-440.
- Baker, M. & Grüber, J. & Milligan, K. (2003) The retirement incentive effects of Canada's Income Security programs. *Canadian Journal of Economics*, Canadian Economics Association 36, 261-290.
- Behagel, L. & Blau, D. M. (2012) Framing Social Security Reform: Behavioral Responses to Changes in the Full retirement Age. *American Economic Journal: Economic Policy* 4: 41-67.
- Belloni, M. & Alessie, R. (2009). The importance of financial incentives on retirement choices: New evidence for Italy. *Labour Economics* 16, 578–588.
- Berkel, B. & Börsch-Supan, A. (2004) Pension reform in Germany: the impact on retirement decisions. *Finanzarchiv* 60, 393-421.
- Blekesaune, M. & Solem, P.E. (2005). "Working conditions and early retirement a prospective study of retirement behavior." *Research on Aging* 27(1): 3-30.
- Brinch, C. N. & Fredriksen, D. & Vestad, O. L. (2017) Life Expectancy and Claiming Behavior in a Flexible Pension System. *Scandinavian Journal of Economics*, 120, 4, 979-1010.
- Böckerman, P. and Ilmakunnas, P. (2017). Do good working conditions make you work longer? Evidence on retirement decisions using linked survey and register data. *Labour Institute for Economic Research, Working papers* 315.
- Börsch-Supan, A. (2005) The 2005 Pension Reform in Finland. *Finnish Centre for Pensions Working Papers* 2005:1.
- Cahill, K. E., Giandrea, M. D. & Quinn, J. F. (2012) Older workers and short-term jobs: patterns and determinants. *Monthly Labor Review* 135: 19-32.
- Chan, S. & Stevens, A. (2004) How Does Job Loss Affect the Timing of Retirement? *The B.E. Journal of Economic Analysis & Policy*, De Gruyter 3, 1-26.
- Coile, C. & Diamond, P. & Grüber, J. & Jousten, A. (2002) Delays in claiming social security benefits. *Journal of Public Economics* 84, 357-385.
- Dellis, A. & Desmet, R. & Jousten, A. & Perelman, S. (2004) Micro-Modeling of Retirement in Belgium. In Grüber, J. & Wise, D. A. (Eds.): *Social security and retirement around the world, micro-estimation*. University of Chicago Press, 41-98.
- Earl, C. & Taylor, P. (2015) Is workplace flexibility good policy? Evaluating the efficacy of age management strategies for older women workers. *Work, Aging and Retirement* 1, 214-226.

- Ferreira, P. C. & Santos, M. R. (2013) The effect of social security, health, demography and technology on retirement. *Review of Economic Dynamics* 16, 350-370.
- Finch, N. (2014) Why are women more likely than men to extend paid work? The impact of work-family life history. *European Journal of Aging* 11, 31-39.
- Finnish Centre for Pensions database.  
[https://tilastot.etk.fi/pxweb/fi/ETK/ETK\\_130elakkeellesiirtymisika/?tablelist=true](https://tilastot.etk.fi/pxweb/fi/ETK/ETK_130elakkeellesiirtymisika/?tablelist=true) (accessed 19.11.2020).
- Finnish Centre for Pensions (2002) Arvioita työmarkkinajärjestöjen sopiman yksityisalojen eläkeuudistuksen vaikutuksista, Eläketurvakeskuksen monisteita 40. (in Finnish, "Estimations on the effect of labour organisations' agreement on private sector pension reform")
- Finnish Centre for Pensions (2019) Vuoden 2005 uudistuksen taustaselvityksiä ja vaikutusarvioita. <https://www.etk.fi/elakejarjestelmat/elakejarjestelma-muutoksessa/lainmuutosten-taustoja/elakeuudistus-2005/taustaselvityksia-ja-vaikutusarvioita/>, visited 24.6.2019. (In Finnish, "Investigations and estimations concerning the impact of the 2005 pension reform")
- Fisher, G. G., Ryan, L. H. & Sonnega, A. (2015) Prolonged working years: Consequences and directions for interventions. In Vuori, J., Blonk, R. & Price, R. H. (eds.) *Sustainable Working lives: Managing work transitions and health throughout the life course*. Springer: Dordrecht, Netherlands.
- Fisher, G. G., Chaffee, D. & Sonnega, A. (2016) Retirement Timing: A Review and Recommendations for Future Research. *Work, Aging and Retirement* 2, 230-261.
- Frieze, I. H., Olson, J. E. & Murrell, A. J. (2011) Working beyond 65: Predictors of late retirement for women and men MBAs. *Journal of Women & Aging* 23, 40-57.
- Gabaix, X., Laibson, D., Moloche, G. & Weinberg, S. (2006): Costly Information Acquisition: Experimental Analysis of a Boundedly Rational Model. *American Economic Review* 96, 1043-1068
- Grüber, J. & Wise, T. (2004) *Social Security Programs and Retirement Around the World: Micro-Estimation*. NBER. The University of Chicago Press, Chicago.
- Grüber, J. & Kanninen, O. & Nivalainen, S. & Ravaska, T. & 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* 3.
- Hanel, B. (2010) Financial incentives to postpone retirement and further effects on employment – Evidence from a natural experiment. *Labour Economics* 17, 474–486.
- Ilmakunnas, S. (2002) Yksityisen sektorin työeläkeuudistus. *Kansantaloudellinen aikakauskirja*, 98, 4, 334-343. (In Finnish, "Pension reform in the private sector")
- Järnefelt, N. (2014) Vanhuuseläkkeelle siirtyneiden työurat. (Working careers among those retiring on old-age pension) In: Järnefelt, N. & Nivalainen, S. & Salokangas, S. & Uusitalo, H. *Sosioekonomiset erot – työurat, eläkkeelle siirtyminen ja eläkejärjestelmä*. Eläketurvakeskuksen raportteja 01/2014, 33-59 (Socioeconomic differences: working lives, retirement and the pension system, in Finnish, English abstract)

- Järnefelt, N and Nivalainen, S. (2016). Miksi julkisella sektorilla aiotaan myöhemmin vanhuuseläkkeelle kuin yksityisellä? (Why public sector workers intend to retire later than private sector workers? In Järnefelt, N. (ed.) Työolot ja työurat – tutkimuksia työurien vakaudesta ja eläkkeelle siirtymisestä. Eläketurvakeskuksen tutkimuksia 08/2016. Eläketurvakeskus: Helsinki, 201–25. (Working conditions and working lives: Research on the stability of working lives and retirement, in Finnish, English summary)
- Kuivalainen, S. & Nivalainen, S. & Järnefelt, N. & Kuitto, K. (2018) Length of working life and pension income: empirical evidence on gender and socioeconomic differences from Finland. *Journal of Pension Economics and Finance*, 1-21. doi:10.1017/S1474747218000215
- Manoli, D. S., & Weber, A. (2016). The effects of the early retirement age on retirement Decisions. NBER Working Papers No. w22561. National Bureau of Economic Research.
- Mermin, G. B. T., Johnson, R. W. & Murphy, D. P. (2007) Why do boomers plan to work longer? *The Journal of Gerontology Series B: Psychological Sciences and Social Sciences* 62, 286-294.
- Midtsundstad, T. (2002) AFP-pensjonisten: Sliten – eller frisk og arbeidsfør? Analyse av førtidspensjonering og bruk av AFP i LONHO-området. Fafo-rapport 385. Oslo: Fafo. (In Norwegian, “AFP-retiree: tired – or healthy and able-bodied?”)
- Määttänen, N. (2013) Eläkepoliittisten uudistusvaihtoehtojen arviointia stokastisen elinkaarimallin avulla. In Lassila, J. & Määttänen, N. & Valkonen, T. (eds.) : Eläkeiän sitominen elinaikaan – miten käy työurien ja tulojaon? Eläketurvakeskuksen raportteja 05/2013, 17–50. (In Finnish, with English abstract. “Evaluations of the pension policy reform alternatives based on stochastic life-course models”)
- Nilsson, K. (2013). To work or not to work in an extended working life? - Factors in working and retirement decisions. (Doctoral Thesis), Swedish University of Agricultural Sciences, Alnarp., *Acta Universitatis agriculturae Sueciae* 2013:20
- Nivalainen, S. (2013) Työstä vanhuuseläkkeelle siirtyminen ja sen taustatekijät 2000-luvulla: rekisteripohjainen tarkastelu. Eläketurvakeskuksen raportteja 02/2013.
- Nivalainen, S. (2014) Kuka jatkaa työssä 63 ikävuoden jälkeen? In: Järnefelt, N. & Nivalainen, S. & Salokangas, S. & Uusitalo, H. Sosioekonomiset erot – työurat, eläkkeelle siirtyminen ja eläkejärjestelmä. Eläketurvakeskuksen raportteja 01/2014, 83-102. (Socioeconomic differences: working lives, retirement and the pension system, in Finnish, English abstract)
- Nivalainen, S. (2015) Miten elinaikakerroin vaikuttaa eläkkeelle siirtymiseen. Eläketurvakeskuksen keskustelualoitteita 01/2015. (The effect of life expectancy coefficient on old-age retirement, in Finnish)
- Nivalainen, S. & Järnefelt, N. (2017). Eläkeaiheet ja toteutunut eläkkeelle siirtyminen: Sukupuolen, työskentelysektorin ja muuttuneiden elämäntilanteiden vaikutukset. Eläketurvakeskuksen tutkimuksia 06/2017. (Retirement intentions and actual retirement: the effect of gender, working sector and changed life circumstances, in Finnish, English summary)
- Nivalainen, S. & Tenhunen, S. (2018) Eläketietous, taloudellisten kannustimien vaikuttavuus ja eläkeaiheet. Eläketurvakeskuksen tutkimuksia 01/2018. (Pension knowledge, effect of economic incentives and retirement intentions, in Finnish, English summary)

Nivalainen, S. (2020). From plans to action? Retirement thoughts, intentions and actual retirement: an eight-year follow-up in Finland. *Ageing and Society* DOI: <https://doi.org/10.1017/S0144686X20000756> (FirstView online July 2020).

NOSOSCO (2008) Old-age pension systems in the Nordic countries. Nordic Social-Statistical Committee: Copenhagen. <http://norden.diva-portal.org/smash/get/diva2:968720/FULLTEXT01.pdf>

Pensionskyddcentralen, Pensionssystem i andra länder, <https://www.etk.fi/sv/pensionssystemen/pensionssystem-i-andra-lander/> (11.9.2019)

Poulsen, O. M. (2015) National report: Denmark. Teoksessa: Hasselhorn, Hans Martin & Apt, Wenke (eds.) *Understanding employment participation of older workers: Creating a knowledge base for future labour market challenges*. Federal Ministry of Labour and Social Affairs.

Radl, J. (2013). Labour Market Exit and Social Stratification in Western Europe: The Effects of Social Class and Gender on the Timing of Retirement. *European Sociological Review* 29,3, 654–668. DOI:10.1093/esr/jcs045

Raymo, J. M., Warre, J. R., Sweeney, M. M., M, H. R. & Ho, J.-H. (2011) Precarious employment, bad jobs, labor unions, and early retirement. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 66B, 249-259.

Riekhoff, A.-J. and Järnefelt, N. (2017). Gender differences in retirement in a welfare state with high female labour market participation and competing exit pathways. *European Sociological Review*, 33, 6, 791–807.

Risku, I. (2010): Eläkkeellesiirtymisiin odote Eläketurvakeskuksen pitkän aikavälin laskelmissa (In Finnish, “Average effective retirement age in the long-term calculations of the Finnish Centre for Pensions”), In: Uusitalo, H. & Kautto, M. & Lindell, C. (eds.) *Myöhemmin eläkkeelle - selvityksiä ja laskelmia*,. Eläketurvakeskuksen selvityksiä 2010:1., 123-128. (In Finnish, ”Later retirement: investigations and calculations”)

Reipas, K. & Sankala, M. (2015) Effects of the 2017 earnings-related pension reform – Projections based on the government bill. Finnish Centre for Pensions Reports 08/2015.

Samwick, A. (1998). New evidence on pensions, social security, and the timing of retirement. *Journal of Public Economics* 70, 207–236.

Saurama, L. (2004) Experience of early exit. A comparative study of the reasons for and consequences of early retirement in Finland and Denmark in 1999–2000. Finnish Centre for Pensions, Studies 2004:2.

Seibold, A. (2017). Reference Dependence in Retirement Behavior: Evidence from German 21 Pension Discontinuities, mimeo.

Solem, P. E., Syse, A., Furunes, T., Mykletum R. J., De Lange, A., Schaufeli, W. & Ilmarinen, J. (2014). To leave or not to leave: retirement intentions and retirement behavior. *Ageing and Society* 36, 2, 259-81.

Stock, J. H. & Wise, D. A. (1990). Pension, the option value of work, and retirement. *Econometrica* 58, 1151–1180.

Sutela, H. & Lehto, A.-M. (2014) Työolojen muutokset 1977-2013. Official Statistics of Finland, Statistics Finland. (In Finnish, “Changes in working conditions in 1977-2013”)

Tenhunen, S. & Nivalainen, S. & Järnefelt, N. & Salonen, J. (2018) Ketkä valitsevat OVEN? Tutkimus osittaiselle varhennetulle vanhuuseläkkeelle siirtymisen taustatekijöistä. Eläketurvakeskuksen tutkimuksia 06/2018. (Who opt for partial old-age pension? In Finnish, English summary)

Tikanmäki, H. & Sihvonen, H. & Salonen, J. (2015) Työurien ja eläkeajan kehitys sekä eläkkeiden ja niiden jakautumisen muutos (In Finnish, "The development of working careers and time spent on retirement and changes in pensions and their distribution"). In: Kautto, M. & Risku, I. (eds. )(2015) Laskelmia vuoden 2017 työeläkeuudistuksen vaikutuksista. Eläketurvakeskuksen raportteja 02/2015, 83-101. (In Finnish, "Calculations on the effects of the 2017 pension reform")

Tuominen, E. & Karisalmi, S. & Takala, M. & Kaliva, K. (2012a) How Do Intentions Affect Future Retirement? A Case Study of the Finnish Flexible Old-Age Pension Scheme. *European Journal of Social Security* 14,2,111–131.

Tuominen, E. & Tuominen, K. & Kahma, N. (2012b) Joustava vanhuuseläkeikä. Työnantaja- ja työntekijäkyselyihin perustuva tutkimus joustavan eläkeiän toimivuudesta. Eläketurvakeskuksen tutkimuksia 02/2012: Helsinki. (In Finnish, "Flexible old-age retirement age")

Uusitalo, R. & Nivalainen, S. (2013) Vuoden 2005 eläkeuudistuksen vaikutus eläkkeellesiirtymisikään. (In Finnish, The effect of the pension reform of 2005 on the retirement age). Valtioneuvoston kanslian raporttisarja 05/2013.

Van Solinge, H. & Henkens, K. (2014). Work-related factors as predictors in the retirement decision-making process of older workers in the Netherlands. *Ageing and Society* 34, 1551-74.





## **Appendix 1: More detailed description of the data used in the article**

Tuominen et al. (2012a) and (2012b) investigated determinants of retirement age. The former concentrated on particularly the effect of accelerated accrual rate on retirement age. Both studies used data from the “Flexible Retirement Age” survey collected in 2003 consisting on persons born in 1940-1945, employed in the private sector. The survey data was supplemented by administrative register data from the Finnish Centre for Pensions covering the period 2003-2009.

Nivalainen (2013) investigated the determinants of old-age retirement and other exit routes from work before and after the pension reform of 2005. The study used Finnish administrative register data from the Finnish Centre of Pensions containing a 10 % representative sample of persons aged 50-69 in 2000-2010.

Määttänen (2013) presented estimations of different policy options based on stochastic life-cycle models with emphasis on the effect of the life expectancy coefficient. Sutela & Lehto (2014) used a nationally representative Finnish Quality of Working Life Surveys (QWLS) data collected between 1977-2013. They analysed, among other factors, the effect of life expectancy coefficient and accelerated accrual rate on behaviour of different socio-economic groups.

Both Uusitalo & Nivalainen (2013) and Grüber et al. (2019) investigated the behavioral effects of the pension reform of 2005 with a Finnish administrative register data from the Finnish Centre for Pensions and Statistics Finland (henceforth administrative register data). Uusitalo & Nivalainen (2013) used a 10 % representative sample of persons aged 50-70 in the period 2000-2011, while Grüber et al. (2019) used data containing all persons born in 1930-1965 and covering the period 2000-2017. In both studies, the analyses concentrated on private sector employees.

In their descriptive analyses, Järnefelt (2014) and Nivalainen (2014) investigated socio-economic differences in retirement using Finnish administrative register data, containing all persons who retired on old-age pension in 2011. Kuivalainen et al. (2018) used the same data.

Nivalainen (2015) investigated the determinants of early retirement by inspecting characteristics of those public sector workers who retire before their personal retirement age, thus facing a 7-9 % reduction in their accrued pension. The study utilized a Finnish administrative register data including all public sector workers who retired in 2011.

Järnefelt & Nivalainen (2016) considered the determinants of late retirement by inspecting characteristics of 50-62 year-old employees who planned to continue to work at least until age 64. They used the nationally representative QWLS of Statistics Finland from 2008 and 2013, linked to administrative register data.

Nivalainen & Järnefelt (2017) and Nivalainen (2019) investigated determinants of retirement age. Both studies used data on employees aged 50-62 in 2003 (in the former) and 2008 (in the latter) using the QWLS from 2003 and 2008, linked to administrative register data covering the period 2005-2013 and 2008-2016, respectively. Böckerman & Ilmakunnas (2017) also used the QWLS from 2003 and 2008, linked with administrative register data covering the period 2004-2013 to investigate retirement age of employees. Riekhoff & Järnefelt (2017) studied the determinants of competing exit pathways of men and women using administrative register data of the cohort born in 1948.

Nivalainen & Tenhunen (2018) investigated the effect of economic incentives introduced in the pension reform of 2017 on the intended retirement age using a representative survey conducted in 2017 that was linked with administrative register data among those aged 55-62. Tenhunen et al. (2018) studied the characteristics of those who took partial old-age pension using an administrative register data including all persons who had taken or could have taken partial old-age pension during 2017 and in the first half of 2018.

