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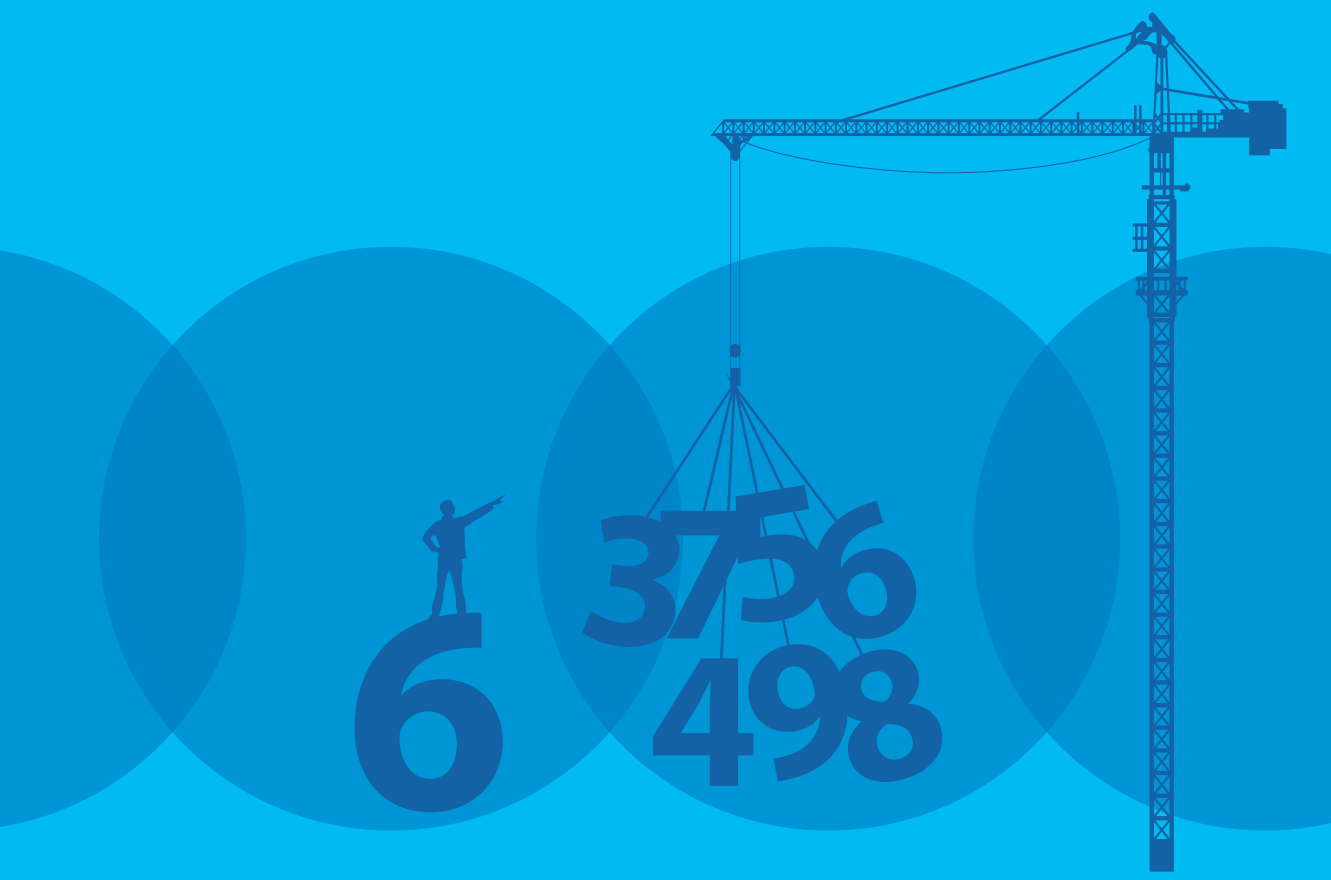
Jukka Lassila, Niku Määttänen and Tarmo Valkonen



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Eläketurvakeskus
PENSIONSSKYDDSCENTRALEN

Eläketurvakeskus
00065 ELÄKETURVAKESKUS
Puhelin 029 411 20 • Faksi 09 148 1172

Pensionsskyddscentralen
00065 PENSIONSSKYDDSCENTRALEN
Telefon 029 411 20 • Fax 09 148 1172

Finnish Centre for Pensions
FI-00065 Eläketurvakeskus Finland
Telephone +358 29 411 20 • Fax +358 9 148 1172

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Jukka Lassila, Niku Määttänen and Tarmo Valkonen

ABSTRACT

This study analyses how pension policy reforms that aim at extending working lives affect working lives, income distribution, and fiscal sustainability of both the earnings-related pension system and overall public finances. The research focuses on the economic impacts of increasing the statutory retirement age and establishing a link between the retirement age and longevity. Raising the earliest eligibility ages for old-age pensions, part-time pensions and the unemployment pathway to retirement by two years would extend the average working lives by about six months. Another change increases the statutory retirement age initially by 10 months and in the future by about two thirds of the increase in life expectancy, resulting in an increase of one month per year, were the most recent population projection to come true. The reform also eases the current longevity adjustment of pensions and converts the current accelerated accrual rate from age 63 to an increase for deferred retirement. This reform would lower the pension contribution rate by one and a half percentage points on average and reduce the sustainability gap of public finances by 0.9 percentage points.

Key words: working lives, longevity, retirement age, fiscal sustainability

JEL: H55, J11

CONTENT

Executive Summary and Conclusions

This study investigates the impact that pension policy measures aiming to extend working lives have on working lives, retirement ages and income distribution, as well as on the fiscal sustainability of the earnings-related pension system and public finances. Our research report is divided into four articles, each addressing various research questions. The first article focuses on the impact of pension reforms on working lives and income distribution. The second article ponders ways in which to link the earliest pensionable age to life expectancy, while the third looks at how this linking affects the size and financing of pensions and the fiscal sustainability of overall public finances. The articles are linked, so that the third utilizes the results of the first two. In the last article, the described reform is compared to reforms in the other Nordic countries and the reform proposals featured there.

Next we will present the most important results and conclusions from each article.

Pension reforms, careers and income distribution

The first article evaluates the impact of policies aiming to extend working lives on the employment decisions and income distribution of employees close to the earliest eligibility age for retirement. The reforms investigated have raised the eligibility ages for old-age pension, part-time pension and the so-called unemployment pathway to retirement. We also evaluate the impacts of cutting the monthly pension.

When it comes to extending working lives, the most important conclusions are the following:

- If the eligibility age for old-age pension (earliest pensionable age) is raised, it also becomes necessary to limit access to the unemployment pathway and part-time pension. The impact on working lives would otherwise be scant, since raising the retirement age increases the use of the unemployment pathway and part-time pension.
- According to the model, removing the part-time pension and the unemployment pathway altogether extends working lives by about two months. If the earliest pensionable age is subsequently raised by two years, working lives will be further extended by about 8 months. The combined effect is thus 10 months. A relatively large proportion of individuals that are close to the eligibility age for old-age pension are disabled. That limits the impact of raising the eligibility age on working lives. Raising the eligibility age would also increase unemployment among the elderly.
- Raising the eligibility age for old-age pension especially serves to extend the working lives of the well-educated (high-income bracket). This is partly due to the fact that, from their point of view, the unemployment compensation is small compared to their salary. Those who are highly educated are thus usually better off trying to extend their working lives rather than rely on unemployment compensation. In addition, the highly educated become disabled less seldom than others.
- Cutting monthly pensions does not extend working lives significantly, but still boosts public finances. At the same time, however, the consumption possibilities of retired individuals are diminished.
- If the so-called accelerated accrual rate is replaced by the actuarial increase for deferred retirement, the size of the increase should be at least 6 per cent per year in order for it to work as an incentive for extending working lives.
- Instead of raising the earliest pensionable age, the age of ‘full pension retirement’ could be raised. The effect on working lives is similar as when raising the earliest eligibility age for old-age pension, but depends largely on the size of the deduction for early retirement.

From a distributional perspective, the most important conclusions are the following:

- Raising the eligibility age for old-age pension is not particularly problematic from a distributional perspective. There are at least three reasons for this. Firstly, those in the worst position are usually long-term disability pension retirees. Raising the earliest pensionable age does not weaken disability pensions. On the contrary, raising the eligibility age for old-age pension may improve disability pensions by way of raising the so called projected pension rights. Secondly, raising the earliest pensionable age does not weaken unemployment security, which is also more important for low-income than high-income individuals. Thirdly, raising the earliest pensionable age postpones the starting age of the accelerated accrual rate. The accelerated accrual rate is particularly beneficial to those with a high income.
- Limiting the unemployment pathway mainly weakens the position of those with a comparably low income.
- Raising the eligibility age for old-age pension increases old-age unemployment, especially in sectors with a high layoff risk.
- From the perspective of income distribution, cutting monthly pensions is problematic to some degree, particularly if it means smaller disability pensions.
- Cutting monthly pensions affects the benefits received by women over a lifetime in particular, since women live longer than men on average..

The impact of policies has been measured using a simulation model that depicts the decision-making of wage earners in different situations. The model groups individuals based on age, gender and education. The decision to continue working, or to use one of the various exit routes from working life, is made with the insecure future in mind. Wage earners face the risk of losing their jobs, the risk of becoming disabled and the risk of a surprisingly long life. The size of these risks has been evaluated based on statistics. For instance, people with a low education have a higher disability risk and shorter average life cycle than others.

The model contains a detailed description of the rules based on which pension benefits in Finland are determined. It also takes into account unemployment security and the taxation of earnings. These rules affect working life decisions.

Our results are based on comparing individual working lives in the model, within the framework of different pension systems. Distributional impacts are evaluated in several ways. We considered how pension reforms affect, for example, income transfers and taxes, consumption and average annual pensions of various individuals with differing wage levels. We also evaluate the impact of reforms on relative poverty and unemployment in different groups.

Extending life cycles and the earliest eligibility age for retirement

The second article investigates methods of linking the general retirement age of the earnings-related pension system to life expectancy and evaluates the resulting impacts. There are two main reasons why raising the general retirement age is desirable as life expectancy increases. The first is the adequacy of pensions. If working lives are not extended while life cycles are, the longevity indicator will cut monthly pensions and they may become very small in view of the goals of the pension system. The second reason is that the length of working lives affects central and local government finances – the longer the working lives, the greater the taxation income.

Indexation to life expectancy is better than setting a discretionary retirement age, since each cohort can more easily predict his or her earliest eligibility age for retirement. In this context, indexing the retirement age can be compared to the longevity indicator, which is also not discretionary but depends on the observed decreasing mortality rates and can easily be predicted for many years ahead.

We review three different principles of determining the general retirement age that are related to longevity, adulthood age expectancy and the estimated number of working years. They appear to lead to a fairly identical increase in the retirement age, provided that life cycles develop as expected. Based on the current population forecast, the retirement age would rise by about a month per year over the next 50 years. The choice of starting point for comparison will have very large significance for future retirement ages.

When the retirement age is dependent on the development of life expectancy, one must consider adapting the longevity indicator or possibly replacing it with a less invasive version. If it is not mitigated, the longevity indicator, together with a rise in the earliest eligibility age for old-age pension, will lead to lowered rates of compensation as life cycles grow longer. Removing the indicator altogether, on the other hand, would raise the rate of compensation continually as retirement ages are postponed, which is not the intent. The mitigated longevity indicator linked to the retirement age (the current longevity indicator to which an increase for deferred retirement is made when the retirement age rises) appears to function well, at least based on the rate of old-age pension compensation and capital values, and at least for those who work right up to the earliest eligibility age for old-age pension. The earnings-related pension system would then work so that extending life cycles would raise the general retirement age, and the increase in the general retirement age would expand the longevity indicator, in other words, decrease the cut in monthly pensions.

According to the study, linking retirement age to longevity can be carried out so that the capital value of the old-age pension increases if you work until retirement age, but pension contributions collected from additional work would increase more. This way, an extended working life would also improve the finances of the earnings-related pension system in addition to the central and local government finances. This impact is reviewed in article 3.

Linking retirement age to longevity: economic assessment

The third article reviews how the linking of the retirement age to longevity affects pension size, pension financing and the fiscal sustainability of public finances.

The reviewed pension reform includes the following amendments to the current earnings-related pension rules:

- The earliest eligibility age for old-age pension is tied to adulthood life expectancy (by definition, adulthood begins at age 18) so that the retirement age divides the adulthood life expectancy in the same proportion each year. When the linking is introduced, the retirement age is raised by 10 months. If the life expectancy of a 63-year-old grows by an ample six years over a period of 50 years, the retirement age is raised by four years as a result of making this link. The earliest eligibility age for part-time pension and the unemployment pathway to retirement are raised in the same manner since, based on the reviews presented in the first article, raising only the general retirement age would not significantly extend working lives.
- The current longevity indicator is mitigated, cutting monthly pensions to a lesser degree than the current longevity indicator does. The mitigated longevity indicator is also applied to the earned part of the disability pension.
- The current starting age for the accrual rate of 1.9 per cent rises by 75 per cent of the increase to the retirement age.
- The accelerated accrual rate (4.5%/year) is abolished and deferred retirement is awarded by a deferral increase. If a person continues working past the earliest eligibility age, pension accrues at a rate of 1.9 per cent of the earnings. Alternatively, the accelerated accrual rate remains, but its starting age is raised in parallel to the raise of the retirement age. In terms of the financing of pensions and national economy, both alternatives have an equal effect, and the results of this article apply to both. In our opinion, the first alternative is better because of its more equal treatment of persons with various income possibilities, as stated in the second article with reference to Nicholas Barr's (2013) report.

The reviewed pension reform is an example of how the earnings-related pension system can be adapted to the development of longevity. The aim of the example is pedagogical and outlines which issues should be taken into account if the retirement age is linked to longevity. The aim is also to show how certain technical problems relating to this issue can be solved. The example illustrates the magnitudes of the effects.

The reform is compared with a baseline projection, which has been calculated based on current rules on how the pension is determined and on pension financing, under the assumption that earnings-related pension contributions are flexible when necessary. The working lives of the baseline projection will be extended with two years by 2060. The pension reform will extend working lives even further.

The earliest eligibility age for retirement would rise by approximately one month per year if life expectancies rise as projected. The lower retirement age would rise to 65 years by 2030 and 67 years by the end of the 2050s. At the end of the 2020s, the earliest eligibility age for retirement would be clearly below the typical general retirement age of the EU-15 Member States.

Linking the retirement age to longevity extends working lives and thus increases the labour supply. In assessing the lengthening of working lives, we have made use of the results of the long-term impacts on working lives presented in the first article of this report. Based on this, we conclude that working lives will be extended by 1 year and three months by 2060 as a result of the pension reform. The economy adjusts to higher employment rates in many ways. In addition to increasing production, investments also increase so that the capital stock corresponds to the larger work supply. A reduction of the earnings-related pension contributions allows for an increase in wages, but the impact of the increasing labour supply is higher, so wages will decrease slightly compared to the baseline projection. This will also reduce consumer prices. Although the wages are reduced, the increase in working hours and the falling prices improve the wage earners' purchasing power and hence increase consumption. Part of the benefit will spill abroad, through a weakening of the terms of trade.

The extending of working lives raises the government and local government tax income through growing tax bases. The sustainability gap of public finances will decrease by nearly one percentage point.

The described pension reform is assessed to reduce earnings-related pension expenditure in relation to the wage sum and to reduce the earnings-related pension contribution by less than one percentage point as of 2018 and by two percentage points by 2050. Future pensions will not change significantly due to this measure.

The impact of the reform on intergenerational income distribution is minor. All generations entering working life after the reform will benefit financially to a slight degree, while the current working-age cohorts will lose slightly.

Nordic comparison of pension reforms

The fourth article presents a brief overview of how the pension systems in other Nordic countries are adjusted to longevity and how they compare to the proposed Finnish reform.

Already in 1999, Sweden presented a model in which the retirement age is flexible and the amount of the pension is adjusted according to the retirement age selected by the individual and the life expectancy of his or her birth cohort. The earlier the individual retires and the longer the cohort is expected to live, the smaller the pension. This solution is well suited for a defined contribution pension scheme, in which a certain pension capital is collected during the working life and consumed in retirement. In its pension reform in 2005, Finland introduced the flexible retirement age and the life expectancy coefficient, but chose the accelerated accrual rate instead of an increment for deferral as a reward for continued working. Norway copied the Swedish reform in closer detail in this respect. The idea in all three models was that the citizens would understand to retire later as the retirement age is flexible and the pension is cut due to longer life expectancies.

Denmark chose a different route. In the future, the national pension retirement age in Denmark will be determined so that the expected number of years of pension payment is fixed at 14.5 years. The increase in longevity raises the retirement age with the same amount, albeit with a 15-year delay. Before making this link to longevity, the earliest eligibility age for retirement will be raised.

The Swedish pension committee that submitted its proposal in the spring 2013 came to similar conclusions as Denmark. In Sweden, the limits of the flexible retirement age are suggested to be linked to longevity after a discretionary raising of the limits. One key justification for this is the observation that the retirement has not been postponed markedly during the more than ten years that the flexible retirement age and the adjustment of pensions to life expectancy have been in force. The model presented in this report emulates the Swedish proposal in that it maintains a flexible retirement age but links its limits to life expectancy. What remains to be examined is whether Finland should also raise the retirement age in a discretionary manner before making this link.

Niku Määttänen

Evaluation of Alternative Pension Policy Reforms Based on a Stochastic Life Cycle Model

Introduction

In this article I assess the impacts of various pension reforms on working lives and the income distribution based on a life cycle model that depicts the individual's labour supply decisions. The model includes a detailed description of the rules based on which the pension benefits are determined in Finland. In addition, the model takes into account unemployment benefits and taxation of earnings.

The individuals described by the model face uncertainties. One source of uncertainty relates to wages. The model includes a stochastic wage process, estimated based on Finnish data. In addition, the individuals depicted by the model face uncertainties relating to the layoff risk, unemployment and extended life expectancy.

The realisation of the above risks for different individuals at different points in time means that the model includes a large number of individuals in different situations. For example, due to wage shocks and layoffs, individuals of the same age may have a very different employment history. The differences in employment history are reflected in the pension accrual and in how large an unemployment benefit the individual would receive in the event of becoming unemployed. Due to these differences, individuals of the same age will make different labour supply decisions. The pension reforms affect individuals in differently situations differently.

The so-called preference parameters underlying the individual decisions have been selected so that the average labour supply of people of different ages corresponds as closely as possible to reality. For example, the age-employment profile produced by the model is very similar to the profile calculated based on Statistics Finland's Labour Force Survey.

I assess the impacts of pension reforms on labour supply by changing the rules for pension benefits in the model and by examining how the changes affect the individuals' labour supply decisions in the model. I assess the impacts on income distribution by examining how the pension reforms affect the taxes, income transfers and consumption of individuals with different earnings possibilities in the model.

In the following section, I describe the model in greater detail. After that I compare, among other things, employment and unemployment in the model and in the empirical data. Finally, I present the results of various pension reforms and compare them with results from other research.

Stochastic life cycle model

In this section, I present the life cycle model used in this study and its calibration. A formal description of the individual's decision-making problem and an overview of a literature relating to similar models are presented in Hakola and Määttänen (2009).

General

The model combines estimated wage dynamics and disability risks with the rules of the Finnish pension, taxation and unemployment benefit systems into an optimization model that is based on economic theory. In the model, the individuals aim at maximising the welfare throughout the entire life cycle, which consists of consumption and leisure time. The income transfer systems partly determine the consumption level that the various labour supply alternatives allow for. Individuals' wage development, future work ability and life cycle are subject to uncertainty.

The model is a so-called partial equilibrium model. It does not include budget constraints of the earnings-related pension system or of other public finances. Thus the model does not take into account how pension reforms affect, for example, earnings-related pension contributions or the taxation of earnings. The pension reforms' final impacts on welfare also depend on in which way the extending of working lives is reflected in earnings-related pension contributions and taxation.

The parameters relating to preferences are selected so that the behaviour of the model individuals prior to the reform corresponds as closely as possible to the behaviour observed in empirical data. I assume that these parameters do not change in connection with the pension reforms. The results concerning the pension reforms are based on a comparison of individuals who are identical in terms of their preferences and their earnings possibilities within the frames of different pension systems.

The model used is based on a life cycle model (Hakola and Määttänen 2007, 2009) describing the impacts of the incentives of the Finnish pensions system. The model in question has been extended for this study in two ways. The first expansion is the division of the individuals into six groups based on gender and educational level. The groups differ from each other in the model in terms of average wages, mortality rates and disability risk rates. The groups are the following: 1) men with a basic-level education, 2) men with a secondary-level education, 3) men with a higher-level education, 4) women with a basic-level education, 5) women with a secondary-level education and 6) women with a higher-level education.

The other extension involves taking into account the layoff risk and making a difference between layoffs and resignations. In the model used in this study, the labour supply decision may depend on whether the individual has been laid off from the previous workplace or not. Employees who have been laid off are more likely than others to be unemployed also in the next period. There are two reasons for this. Firstly, an individual who has been laid off receives a better unemployment benefit than a person who has resigned since the unemployment benefit for those who have been laid off does not include a qualifying period. Secondly, I assume that resignation also entails a utility cost. This utility cost reduces further the proportion of those individuals who are left unemployed without being laid off. This utility cost can be thought to reflect, for example, a social norm according to which living on an unemployment benefit is not acceptable without a good cause.

The aim of the extension relating to layoffs is to add realism to the model when it comes to the labour supply decisions. For example, the individuals ending up in the unemployment pathway to retirement in the model are mainly those who have been laid off and whose earnings possibilities in working life are relatively weak. If there no utility cost was associated with resigning, an unrealistically large proportion of the individuals would easily end up in the unemployment pathway. This is the case because the unemployment pathway is quite attractive for many if viewed solely on the basis of consumption opportunities. The earnings-related unemployment benefit is usually of the same size as the old-age pension.

The most important simplifying assumption of the model is that the individuals cannot save or borrow money. Thus the annual consumption of the individuals is always as high as their net income. This assumption has been made mainly for computational reasons. Including the savings decision would require simplifying the model in some other way.

The fact that the model does not include a savings decision probably overemphasises the role of current available income for labour supply decisions. For example, in the model, the impact of raising the earliest eligibility age for old-age pension is partly based on the fact that the individuals cannot finance their consumption with their own savings.[1] On the other hand, most Finnish households have most of their wealth tied to housing, while the value of their financial assets is generally fairly low in relation to the average annual earnings. Releasing housing wealth in order to finance consumption is rare in Finland, at least so far. (Määttänen and Valkonen, 2008.)

1 Määttänen and Valkonen (2010) consider the labour supply impacts of pension reforms using a life cycle model that is simpler in some respects but includes the savings decision. In their model, the impact of an increase in the retirement age on working lives depends on wealth. However, their estimate of the impact of raising the earliest eligibility age for old-age pension on the average labour supply is of the same size as that found in this study.

Empirical data

The empirical baseline scenario produced by the model can be picked from the Labour Force Survey. For this survey, we combined the data from the Labour Force Surveys of 2008, 2009 and 2010. The sample consists of 30–68-year-olds, who were divided by educational level and gender into the six groups defined above. The self-employed and the category 'others outside the workforce' were excluded.

The group-specific mortality rates come from the mortality tables of Statistics Finland. Group-specific age-wage profiles and the parameters of the stochastic component of the wage process have been estimated based on the private-sector wage data from the Confederation of Finnish Industries.

Alternative decisions of the individuals and state variables

In the model, the individuals make decisions periodically. One period in the model corresponds to one year. In the model, the individuals begin their working lives at age 30 and end it at the latest when they have turned 69 years.

Regardless of the individual's age or the age limits of the pension system, the individual have at most seven alternatives that are mutually exclusive: 1) to be unemployed, 2) to work part-time, 3) to work full-time, 4) to be on a partial pension, 5) to work part-time and draw old-age pension, 6) to work full time and draw old-age pension, and 7) to draw old-age pension without working. In addition to these alternatives, the individual can be on a disability pension. However, retiring on a disability pension is not done based on the individual's own choice but is a result of the realisation of an exogenous disability risk. In the model, disability completely prevents working and is a permanent state.

Alternatives 1–3 are open for individuals of all ages. The other alternatives are relevant only once the age limits defined by the pension system are met. For example, alternatives 5)–7) are available according to current regulations only as of age 63. Alternatives 2) and 3) include the presumption that the individual cannot draw old-age pension even when being eligible for it in terms of age. In other words, if an individual aged above 63 selects alternative 2) or 3) in the current system, he or she does not draw old-age pension but accrues pension at the so-called accelerated accrual rate.

Prior to turning 69, the individuals can always engage in gainful employment if they so wish. However, the wage received for the work may be very small. In that case, it is natural to interpret unemployment as non-voluntary, even though it is technically always the individual's own choice in the model.

The individual's decision depends on her financial status, described by the so-called state variables. In addition to age, the following state variables are included

in the model: 1) pension accrual *b*, 2) the earnings level of the previous employment w_{-1} , 3) the length of the current unemployment period *nU*, 4) the stochastic component of the wage process *z*, 5) 0/1 variable *tk*, which expresses whether the individual is disabled or not, and 6) 0/1 variable *ir*, which expresses whether or not the individual's previous employment was terminated.

The pension accrual defines the amount of the old-age pension and partly also of a potential disability pension. The pension accrual develops according to the regulations of the pension system and it reflects the entire previous working life. For example, for the earned income received under the age of 53, pension accrues at an accrual rate of 1.5 per cent. The pension accrual thus develops as follows:

$$b_{j+1} = b_j + 0.015 w_j l_j$$

in which *j* (<53) refers to age, *w* to the wage and *l* to the time spent working (0.5 or 1). (The equation above lacks the pension entitlement indexing. How that is taken into account is explained below).

The earnings level of the previous employment and the length of the unemployment period are needed to define the unemployment benefit. For example, if the individual is employed in this period, the value of the state variable w_{-1} in the next period is the same as the wage level for this period and the value of the state variable *nU* is 0 in the next period. On the other hand, if the individual is unemployed, the value of the state variable w_{-1} in the next period is the same as in this period but the value of the state variable *nU* grows by one. The prerequisite for earnings-related pension provision is usually $nU \leq 1$, i.e. that the current unemployment period of the individual has lasted for a maximum of one year before the period in question. The so-called unemployment pathway to retirement forms an exception to this rule. Thanks to the additional days of unemployment security, an elderly unemployed person can receive an earnings-related unemployment benefit for several years until retiring on old-age pension. An unemployed person who does not receive an earnings-related unemployment allowance receives in the model an income transfer of the same amount as the so called labour market benefit.

In the model, the earnings-related unemployment benefit depends also on whether the individual's employment has been terminated or not at the end of the previous period. If an individual, who has not been laid off, chooses unemployment (alternative 1 above), his or her unemployment benefit is reduced by 25 per cent. The reduction corresponds to the qualifying period clause of the unemployment benefit. How the risk of being laid off and the risk of disability are determined will be described below.

Wage process and the layoff risk

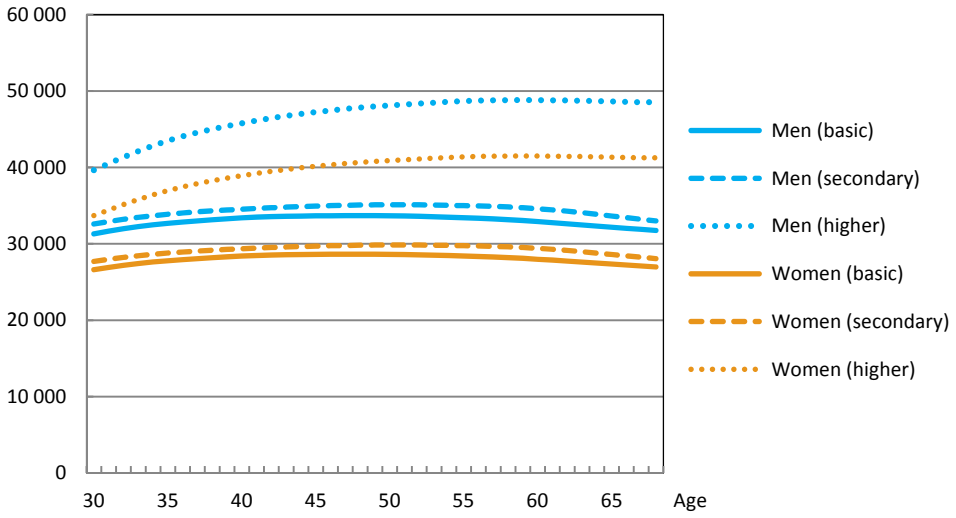
The wage process is of the following form:

$$w_j^s = \exp(h_j^s + z_j)$$
$$z_j = \rho z_{j-1} + \varepsilon_j$$

in which w_j^s is the wage of the individual belonging to group s at age j, h_j^s the logarithm of the average wage of those belonging to group s at age j and z the stochastic component. The shock term ε adheres to normal distribution with mean zero. The parameters of the stochastic component are assumed to be the same in all groups.

The wage profiles were calculated from the data until age 65. The average wages of 66–68-year-olds were extrapolated from the estimated profiles. In addition to these wage differences per specific educational level, we assume, based on Statistics Finland's statistics on earnings and wages, that the average wage level of women (groups 4–6) is 15 per cent lower in each age group than that of men (groups 1–3). Finally, we scale the wage profiles so that the average monthly wage for full-time work is EUR 3,300. The age-wage profiles per educational level are presented in Figure 1.

Figure 1.
Average annual wage for full-time employment, EUR.



Based on the estimations made of the data, we set the value of the correlation parameter at 0.89 and the variance of the shock term at 0.02 (Olkinuora, 2011).[2] Thanks to the stochastic component, the model has a reasonably realistic wage distribution.

In the model, an unemployment period reduces the wage level in the future. (Empirical results on the impact of unemployment on wages in Finland have been presented by Kyyrä [1999]). In the model, each year of unemployment reduces the next year's wage offer by 5 per cent.

The above-mentioned layoff risk is modelled by assuming that, if an individual is employed during this period, there is a certain probability that his or her employment will have been terminated by the beginning of the next period. (Only the employed can be laid off). If the risk is realised, its state variable will receive the value *ir=1*. In all other cases, the state variable has the value *ir=0*. As described above, this state variable affects, for example, the amount of the potential unemployment benefit. It has been estimated that approximately every tenth post in the private sector is eliminated annually (Ilmakunnas and Maliranta, 2013). Public sector posts are considerably more permanent, and the data used also includes public sector posts. That is why I set the annual risk of layoff at 5 per cent.

Disability risk

In addition to the uncertainty relating to the wage level, individuals face the risk of becoming permanently disabled. In the model, the disability risk depends on age, educational level and gender. I have determined these disability risks based on the Labour Force Survey.

Figure 2 presents how large a proportion of the 30–62-year-olds who were interviewed for the Labour Force Survey are either on disability pension or chronically ill. As Figure 2 shows, the proportions vary greatly between the different groups and also from one age group to another. The fluctuation between age groups reflects at least partly a sample variation.

The transition probabilities needed in the model are calculated based on these disability proportions as follows. The proportions in Figure 2 are first smoothed by fitting a third-order polynomial on them. I define the proportions after age 62 by extrapolating them with the same polynomial. After that, I define the transition probabilities needed in the model so that they produce the proportions thus received, assuming that disability is always a permanent state. I have excluded from the model the cases in which the individual has become disabled already under the age of 30.

2 These figures are fairly close to estimates received based on data from the United States and Sweden, see, for example, Floden and Lindé (2001) and Heathcote *et al.* (2010).

Figure 2.
Disability pension or long-term illness, proportion of age group.

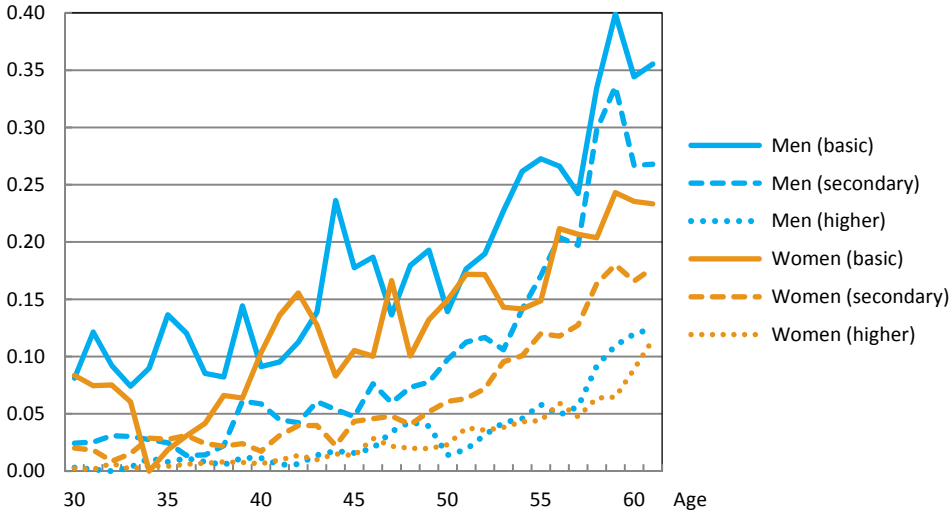


Figure 3.
Proportion of disabled, by group.

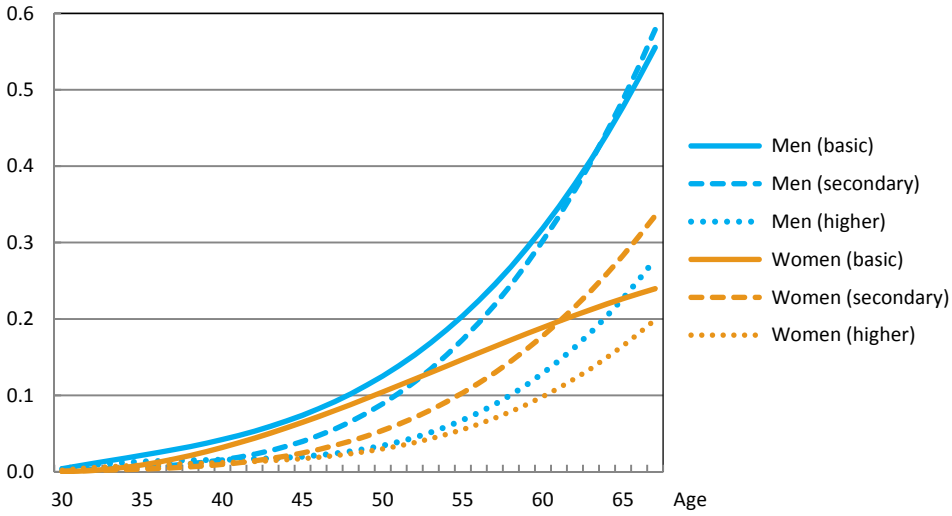


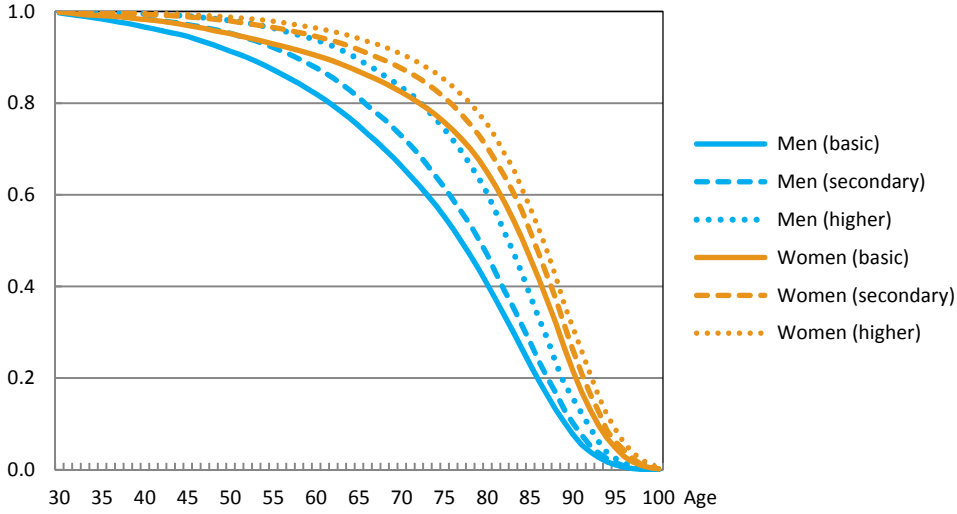
Figure 3 presents the proportions for the disabled that follow from the transition probabilities counted in this way.[3] Figure 3 show that more than 50 per cent of men with a basic or secondary level education are disabled in the model after the age of 67.[4] As described above, the proportions of the disabled in the model after age 62 are based on an extrapolation of the observed proportions before age 62.

However, these transition probabilities are important in terms of the results concerning pension reforms because they define directly how many individuals could postpone, if they so desire, their exit from working life.

Mortality

Figure 4 presents how large a proportion of 30-year-olds are alive in later age groups. These proportions are a result of the conditional survival probabilities used in the model, calculated based on the mortality tables for 2008–2011 of Statistics

Figure 4.
Proportion of living individuals.



3 I also compared the proportion of the disabled with the proportion of men and women on full disability pension under the age of 63 years included in the registers of the Finnish Centre for Pensions in 2011. The average proportions calculated based on these registers were relatively close to the proportions in the model. However, the percentage of women on a disability pension at age 62 calculated based on the registers of the Finnish Centre for Pensions was approximately five percentage points higher than the equivalent percentage in this model.

4 In the model, the disabled who are aged 63 or above are not drawing disability pension but old-age pension. Even if they wanted to, they do not have the ability to work.

Finland. Figure 4 shows how mortality varies between groups. The extremes are men with a basic education, on the one hand, and highly educated women, on the other. For example, of men with a basic-level education, approximately 44 per cent are alive at age 80, while the equivalent figure for women is circa 78 per cent. Based on these probabilities, we can also calculate that a 68-year-old man with a basic-level education has an average life expectancy of 14 years. For a highly educated woman of the same age, however, the average life expectancy is 19 years.

Preferences

Consumption at age j is denoted by c_j and working time by l_j. The periodic utility is defined as follows:

$$u = \log(c_j) - \mu_j \kappa_1 I_1 - \mu_j \kappa_2 I_2 - \kappa_3 I_3,$$

in which the indicator function I_1 receives the value 1 when l_j=0.5 and otherwise the value 0, I_2 receives the value 1 when l_j=1 and otherwise the value 0, and I_3 receives the value 1 when the individual resigns and becomes unemployed and otherwise the value 0. The parameters κ_1, κ_2 and κ_3 are utility costs relating to part-time working, full-time working and resignation.[5] The utility cost relating to resignation is realised when the individual selects unemployment when the value of the state variable *ir* is zero. Parameter μ_j describes how the cost benefit of working depends on age. I assume that the utility cost of working grows steadily as of age 58. To be specific, μ_j wis determined as follows:

$$\mu_j = \begin{cases} 1 + \mu(j - 58), & \text{for } j > 58 \\ 1, & \text{for } j \leq 58 \end{cases}$$

in which parameter μ is the annual growth of the utility cost.

The expected life time welfare is the discounted sum of periodic utilities. The subjective discounting factor is marked by the parameter β. The discounting takes also into account the survival probabilities.

5 Instead of assuming a utility cost relating to working I could assume utility increases with leisure time. The utility increase associated with leisure time could be defined so that the results remain unchanged.

Income transfer systems

Regarding the pension system, the model includes old-age pension, part-time pension and disability pension of the earnings-related pension system and the old-age pension and the guarantee pension of the national pension system. Of the other income transfers, the model takes into account the earnings-related unemployment allowance, including the unemployment pathway, the labour market support and the progressive taxation of earnings. When defining income transfers, the individuals in the model are presumed to live in single households.

The income transfers have been defined as closely as possible in line with legislation valid in 2013. However, the calibration of the preference parameters of the model is done within the frames of the age limits preceding the 2010 labour market agreement on the pension and unemployment benefit reform (hereinafter the social contract), since the data of the Labour Force Survey mainly stems from the times before the coming into force of the decisions in the social contract. (The calibration of the preference parameters will be described below). Other income transfers or, for example, the wage level have not been adjusted to correspond to the times before the social contract.

The average tax rate of various earnings has been defined using the tax calculator of the Taxpayers' Association of Finland. The model takes into account the slightly different tax treatment of pension income and earnings.

The unemployment allowance is defined according to the definition rules of the labour market support and the earnings-related unemployment allowance. The basis for the earnings-related unemployment allowance is a status variable describing the earnings level in the previous employment. The earnings-related unemployment benefit can be paid out until the individual turns 65 years. This age limit remains unchanged in the pension reform alternatives reviewed below with the help of the model. The unemployment benefit depends also on whether the individual has been laid off or not. If the individual has resigned, there is a three-month qualifying period, which reduces the unemployment allowance by one fourth during the first year of the unemployment period. If the unemployment period has already lasted for at least two years and the individual is not in the so-called unemployment pathway to retirement, he or she will receive only the labour market benefit while unemployed.

The old-age pension is determined with the help of the state variable defining the pension accrual as described above. For persons under the age of 53, pension accrues at a rate of 1.5 per cent of the annual earnings. As of age 53, the accrual rate is 1.9 per cent of the annual earnings. In the current system, the so-called accelerated accrual rate (4.5 per cent) starts at age 63. To receive the accelerated accrual rate, the individual must defer his or her old-age pension. Pension accrues also for the earnings-related unemployment benefit up to the age of 63. When calculating

the pension, the accrual rate is always 1.5 per cent and the earnings it is applied to amount to 75 per cent of the unemployment allowance. No pension accrues for the labour market benefit.

The national pension and the guarantee pension also affect the amount of the old-age pension. In this respect, some compromises have to be made in the model because I cannot model the amount of the national pension completely correctly.[6] In the current system, an individual can draw a full national pension as of age 65 and an earnings-related old-age pension as of age 63.[7] A reduction for early retirement is applied to a national pension withdrawn prior to age 65. On the other hand, earnings-related pension accrued after age 63 does not reduce the national pension. The model cannot take into account how large a proportion of the earnings-related pension of a 65-year-old person has accrued after the age of 63. Nor does the model allow for the drawing of an earnings-related pension without the drawing of a national pension, or vice versa, for those who are entitled to a national pension.

I add the reduced national pension to the state variable that depicts the accrued earnings-related pension as of age 63. In addition to the reduction for early retirement, the national pension is reduced by previously accrued earnings-related pension: for each euro of earnings-related pension, the national pension is reduced by 50 cents. As of age 63, the earned wages accrue pension on top of the above-described pension amount either at the accelerated accrual rate of 4.5 per cent or an accrual rate of 1.5 per cent (if the individual earns wages while drawing a pension). The old-age pension is thus determined straight from the pension accrual so calculated, which includes the national pension.

As a result, the incentives are correct in the model in so far as the pension accrued as of age 63 does not reduce the amount of the national pension. Nevertheless, in some cases the amount of the national pension is slightly too low in the model. If an individual defers his or her pension, the amount of the national pension is underestimated by the amount of the deduction for an early retirement (and later by the potential increase for deferred retirement).

The amount of the old-age pension in the model is always at least the size of the guarantee pension. If the individual retires before the age of 65, an annual reduction for early retirement of 4.8 per cent is applied to the guarantee pension.

The amount of the disability pension is defined in the model with a state variable defining the accrued earnings-related pension and the earnings level of the last employment. The amount of the disability pension is calculated by adding to the accrued pension the pension determined based on the projected pensionable service.

6 A precise modelling of how the national pension is determined would require a new state variable.

7 To be specific, in reality the early old-age pension be drawn at age 62 in 2013. However, the early old-age pension is about to disappear.

This pension is calculated based on the previous earnings-level multiplied by a 1.5 accrual rate from the individual's current age until the lower retirement age (63 years in the current system). The amount of the unemployment pension is at least the size of the unreduced guarantee pension.

The part-time pension amounts to half of the amount of the loss of earnings. As the time spent working part-time is exactly half of a full-time working day, the part-time pension is one fourth of the wage that an individual would receive for full-time work. The earnings for partial retirement also contribute to the pension accrual.

In the model, the price and wage levels are kept constant and tied to the level of 2013. For example, the general nominal wage level, the earnings-related unemployment allowance, the labour market support and the basic component of the national pension remain constant in the model throughout time. This is a simplifying assumption. For example, the progression in taxation thus remains unchanged without annual adjustments of the tax rate schedule. A general rise in the earnings level would not affect the individuals' labour supply decisions in the model, assuming that all income transfers and tax schedules have been indexed in full in relation to the earnings level.

The indexing of pensions and accruals are taken into account by assuming that, with the index being composed of, for example, 80 per cent of the earnings development index, the value of the accrued pension rights is reduced by 20 per cent * 1.75 per cent per year. The value of previously earned pensions is reduced annually by this much *relative to* the general earnings level, assuming that the real wages grow by 1.75 per cent per year (as they have done on average in the past).

Calibration of preference parameters

To solve the individuals' optimal labour supply decisions, the values for the preference parameters have to be defined. They include the discount factor β, the utility cost parameters κ_1, κ_2 and κ_3 and the annual growth rate of utility costs relating to part-time and full-time employment as of age 58, i.e. parameter μ.

I set the discount factor at $\beta = 0.92$, which equals an annual discount rate of approximately eight per cent. Based on experiments, I find that a relatively low discount factor (a high subjective discount rate) makes the working lives more realistic. A higher discount rate easily leads to an excessively high employment rate in older ages when the incentives for working are in many cases relatively favourable (due to the accelerated accrual rate). This supports the notion that, when making labour supply decisions, individuals are relatively "impatient" and emphasise their future welfare relatively little compared to their current welfare (see e.g. Barr 2013).

The remaining parameters are selected so that the proportions of employed and partially retired individuals of all individuals in the model are as realistic as possible. I also attempt to capture the importance of the unemployment pathway to retirement as correctly as possible by trying to replicate the growth of the proportion of the unemployed as of the earliest eligible age for the unemployment pathway.

To be more specific, I attempt to replicate the following proportions: 1) the proportion of employed of all aged 30–68, 2) the proportion of employed of all aged 58–68, 3) the proportion of part-time retirees of all aged 58–68, 4) the growth in the proportion of unemployed when comparing age groups 55–59 and 60–64.

The empirical counterparts for the first three indicators can be computed from the above-described data based on the Labour Force Survey. However, the Labour Force Survey is not well suited to analyse the unemployment pathway to retirement since all individuals in the pathway do not define themselves as unemployed job seekers. In addition, some of them are drawing an unemployment pension, which is generally considered to be part of the unemployment pathway. As part of the 2005 pension reform, the unemployment pension was replaced by the earnings-related unemployment allowance, but the benefits related to the unemployment pathway have not changed fundamentally.

Jauhiainen and Rantala (2011) have studied unemployment and the unemployment pathway of the elderly using the register data of the Finnish Centre for Pensions and the employment statistics of Statistics Finland. According to Table 2.2 in their report, the proportion of unemployed in 2007–2009 in age group 55–59 was approximately 10 per cent. In age group 60–64, the combined proportion of unemployed individuals and individuals drawing unemployment pension was circa 18 per cent.

The utility costs related to full time and part-time work directly affect the proportion of the employed in all age groups. Their relation in turn determines the proportion of individuals that make use of the part-time pension. By boosting the growth rate of utility costs relating to work we can also calculate the proportion of employed elderly compared to the proportion of employed persons of the entire population. How quickly the unemployment pathway increases unemployment depends on the utility cost relating to the resignation. Increasing the utility cost in question reduces the proportion of individuals entering the unemployment pathway. When that utility cost is high, only individuals that have been laid off go to the unemployment pathway.

Working lives: Model vs. data

In the following section I compare employment and unemployment between the model and the data. In this connection, I assume that the age limits of the pension system and the earliest eligibility age for additional days of the unemployment allowance correspond to those valid in 2008.

Table 1 presents some statistics about employment and unemployment. The figures in brackets relate to the Labour Force Survey, while the other figures relate to the model. The second and the third columns state the percentage of employed individuals of the population aged 30–68 years and 58–68 years, while the fourth column states the percentage of 58–68-year-olds on a part-time pension. Columns five and six show the percentage of unemployed individuals in the age groups 55–59 and 60–64. The last column indicates the percentage of individuals in full-time employment in age group 63–68. The last row is the average value weighted with the groups' population shares.

The last row in the table indicates that the model broadly replicates the proportions of employed in the age groups 30–68 and 58–68 and part-time retirees in the age group 58–68 calculated from the data. Looking at the table it is also evident that the percentage of employed in age group 63–68 is, on average, of the correct size in the model, even though the preference parameters were not set with this particular proportion in mind.

As observed above, the relevance of the unemployment pathway cannot be determined in a reliable manner based on the Labour Force Survey. This is why we do not present comparative figures concerning unemployment among the elderly in the table. However, the rise in the proportion of unemployed when moving from the age group 55–59 to the age group 60–64 is realistic in the model. As observed above,

Table 1.

Population shares in the model (in the data) before the social contract, %.

Group	Employed, age 30-68	Employed, age 58-68	Partially retired, age 58-68	Unemployed, age 55-59	Unemployed, age 60-64	Full-time employed, age 63+
1 (men basic)	73 (49)	29 (23)	5 (3)	2	9	3 (5)
2 (men secondary)	75 (74)	30 (30)	4 (3)	2	7	3 (7)
3 (men higher)	80 (83)	43 (45)	2 (5)	3	5	8 (11)
4 (women basic)	74 (46)	31 (24)	5 (4)	5	16	4 (3)
5 (women secondary)	76 (75)	33 (36)	5 (6)	4	14	5 (5)
6 (women higher)	80 (85)	43 (46)	1 (9)	3	7	10 (5)
All	77 (83)	36 (34)	3 (5)	3	9	6 (6)

the percentage of unemployed in the latter age group is approximately 8 percentage points higher than in the first age group. In the model, the difference comes to approximately six percentage points.

The proportion of employed changes in the same direction in the model and in the data when moving from a lower educational level to a higher one. One significant difference between the model and the data is that the proportion of employed in groups 1 and 4 (persons with a basic education) in ages 30–68 is clearly too high in the model. Another significant difference is that, in the model, the percentage of part-time retirees declines as the educational level rises. Based on the Labour Force Survey, the highly educated make use of the part-time pension the most.

Based on the Labour Force Survey we can also compare group-specific unemployment rates at specific age groups with the reservation that some of the people in the unemployment pathway are most likely missing from the figures. According to the 2010 Labour Force Survey, the unemployment percentages of groups 1–6 in the age group 60–64 were approximately 8 per cent (group 1), 7 per cent, 3 per cent, 8 per cent, 4 per cent and 4 per cent (group 6). In other words, the unemployment of the elderly is the highest in the lowest educational level groups both in the model and the data. This is explained by the fact that the replacement rate of unemployment security is reduced as the earnings increase. In other words, compared to earnings from work, the unemployment allowance is the smaller the higher the earnings are. This means that the so-called participation tax rate is higher for the low-income people than for the high-income ones. The participation tax rate measures how large a proportion of the wage income is lost because paid taxes increase and income transfers, in this case the unemployment allowance, decrease when an unemployed person is employed.

Present value of benefits and taxes

The average present values of taxes and benefits paid per person in the model during an individual's life cycle are presented in Table 2. The discount rate used is 1.75 per cent. The benefits include unemployment benefits and all pensions. The taxes include income tax, consumption tax and income-based social security contributions. The consumption tax is assumed to amount to 20 per cent of the consumption (net income) and the social security contributions at 23 per cent of the gross wages.

The highly educated (groups 3 and 6) pay, on average, 80 per cent more in tax than do individuals with a basic education (groups 1 and 4). This is explained by, among other things, the higher employment rate, higher income, longer life cycle and progressive taxation of earnings of the highly educated. The highly educated also receive considerably more benefits, which is explained in particular by the

Table 2.

Present values of taxes paid and benefits received during a life cycle. The figures in the last column indicate ratio, the others are EUR 100,000.

Group	Taxes	Benefits	Taxes-Benefits	Taxes/Benefits
1 (men basic)	6.7	2.9	3.8	2.3
2 (men secondary)	7.5	3.2	4.3	2.3
3 (men higher)	12	4.9	7.1	2.5
4 (women basic)	5.9	3.3	2.7	1.8
5 (women secondary)	6.6	3.6	3.0	1.8
6 (women higher)	10.2	5.0	5.2	2.0

earnings-related nature of earnings-related pensions and a longer life expectancy. On the other hand, a larger proportion of individuals with a basic education receive disability pensions. The ratio of taxes and benefits do not deviate much between educational groups. The shorter life expectancy of women (groups 4, 5 and 6) slightly raises the present value of their benefits compared to those of men.

Later, I will review how the different pension reforms affect the income distribution between groups. One indicator for distributional effects is the impact of the reforms on the above-described taxes paid and social benefits received by the different groups. A certain pension reform can be viewed problematic in terms of its distributional effect if it implies that those with the lowest income pay increasingly more taxes and receive less benefits.

Impact of pension reforms

In this chapter I present the results regarding various pension reforms. First I examine reforms which lead to a raise in the earliest eligibility ages for part-time pension, the unemployment pathway and the old-age pension of the earnings-related pension system as well as reforms in which pension levels are cut. After that, I will evaluate the model suggested by Barr (2013), in which the accelerated accrual rate is replaced by an increase for deferred retirement, as well as compare a reduction for early retirement with the raising of the earliest eligibility age for old-age pension. Furthermore, I will assess how extended life expectancy affects the lengths of working lives and the impacts of pension reforms. Finally, I assess the significance of the layoff risk and compare my results to the results in some previous studies.

Changing eligibility ages and cutting pensions

A condensed description of the pension systems that are compared in this chapter is presented in Table 3. System 1 equals the regulations valid in 2008. System 2 also takes into account the changes in the eligibility ages of the unemployment pathway and the part-time pension that have been agreed later in the so-called social contract and the Work Career Agreement. In system 2, the earliest eligibility age for both the part-time pension and the earnings-related additional days of unemployment allowance (unemployment pathway) is 61 years. The raising of the earliest eligibility age for the additional days of unemployment allowance is to come into force in 2014. Since system 2 includes the changes that have already been agreed on, I will refer to it henceforth as the "current system".

System 3 equals system 2 in all other respects except that it excludes the part-time pension and the unemployment pathway. In addition, in system 4, the earliest eligibility age for old-age pension has been raised to 65 years. In system 5, the monthly pensions are cut by 10 per cent, but the earliest eligibility age for old-age pension remains at the level of the current system. The pension cuts apply to the national pension, the old-age pension and the disability pension. I assume, however, that the cuts will not apply to the guarantee pension. Thanks to the guarantee pension, the smallest pensions are protected from the pension cut. The pension cut does not apply to the part-time pension, which continues to amount to half of the loss of earnings.

Systems 6 and 7 equal systems 4 and 5 with the exception that, in systems 6 and 7, the part-time pension and the unemployment pathway are included in their current form. By comparing employment in, for example, systems 4 and 6, we get an idea of how the effect of raising the earliest eligibility age for retirement depends

on the unemployment pathway and the part-time pension. In system 8, the part-time pension and the unemployment pathway are not completely abolished. Instead, their earliest eligibility ages are raised by two years compared to the current system. The earliest eligibility age for old-age pension is also raised by two years.

The age limit associated with the accelerated accrual rate is linked to the earliest eligible retirement age. In systems 4, 6 and 8, the accelerated accrual rate is thus applied as of age 65, and in all other systems as of age 63. In systems 4, 6, and 8, the accrual percentage at ages 63 and 64 is 1.9 per cent. The so called projected pensionable service affecting the amount of the disability pension is also linked in the model to the earliest eligibility age for old-age pension. Raising the earliest eligibility age for old-age pension will increase disability pensions by extending the so-called pension component for projected pensionable service.

***Table* 3.**
Compared pension systems.

	System							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Eligibility age for additional days of unemployment allowance	59	61	-	-	-	61	61	63
Eligibility age for part-time pension	58	61	-	-	-	61	61	63
Eligibility age for old-age pension	63	63	63	65	63	65	63	65
Pension cut	0	0	0	0	10%	0	10%	0

Impact on labour supply

Table 4 describes the impact of the pension reforms defined above on the number of working hours. It explains by how many months working lives will be extended on average in relation to a given baseline system. When calculating the impact on working life, one part-time working year equals half a full-time working year. (Extending working lives does not necessarily mean that individuals defer the exit from working life since the reforms may also reduce the unemployment periods. In practice, however, the impact of the reforms reviewed in this report is visible mainly towards the end of the working lives, i.e. as a rise in the employment exit age.)

The impact on working lives of the reforms agreed on in the social contract and the Work Career Agreement is approximately one month in the model (system 2 vs. system 1). In particular, the working lives of those with a low education level will be extended. This is mainly due to the fact that, from the point of view of unemployment, the most crucial part of the reform is the raising of the earliest eligibility age

for the unemployment pathway. Only a relatively small proportion of those with a high income are in the unemployment pathway at the onset. The same effect is due to the fact that, in the model, particularly those with a lower-level education will choose part-time pension. Abolishing the unemployment pathway and the part-time pension altogether (transferring into system 3) will extend working lives in the model by comparison to the current system (system 2) by an ample two months.

Raising the earliest eligibility age for old-age pension will extend working lives by approximately 8 months if the raising of the eligibility age is realised after the part-time pension and the unemployment pathway have been abolished (system 4 vs. system 3). In particular, the working lives of highly educated men and women will be extended (groups 3 and 6). This is the case for two reasons. First of all, these groups have the lowest disability risk and hence also the highest potential for extended working lives. Raising the earliest eligibility age does not extend the working lives of disabled individuals. Second, these groups have the highest wage level. As described above, the replacement ratio of the unemployment benefit is reduced as the wage level increases. In other words, the unemployment benefit is less generous compared to the wage for those with a high income than for those with a low income. Therefore, the highly educated are usually better off working rather than drawing an unemployment benefit.

Raising the earliest eligibility age for old-age pension does not extend working lives at all in the model if the part-time pension and the unemployment pathway continue in their current form (system 6 vs. system 2). In fact, raising the earliest eligibility age for old-age pension would make at least the unemployment pathway more attractive in relative terms than before. After the reform, the unemployment pathway allows for a clearly earlier exit from working life than the old-age pension. Raising the retirement age without limiting the unemployment pathway extends, in

Table 4.

Effect of changing eligibility ages on average working lives, months.

	Systems compared						
Group	**2 vs. 1**	**3 vs. 2**	**4 vs. 3**	**5 vs. 3**	**6 vs.2**	**7 vs. 2**	**8 vs. 2**
1 (men basic)	1.3	2.7	6.2	0.5	-1.8	-0.3	5.8
2 (men secondary)	0.8	2.5	6.4	0.5	-1.8	-0.2	5.3
3 (men higher)	0.1	1.3	11	1.5	2.4	0.8	7.1
4 (women basic)	2.2	3.5	6.5	0.3	-2.6	-0.0	6.4
5 (women secondary)	1.8	3.1	6.6	0.5	-2.9	0.2	6.0
6 (women higher)	0.4	1.2	10	1.5	0.6	1.1	6.0
All	1.0	2.2	7.9	0.9	-0.9	0.3	6.0

practice, the unemployment pathway. As a result of the reform, a larger proportion of the individuals whose employments have been terminated will enter the unemployment pathway. The unemployment pathway is also made more attractive by the fact that it secures a steady income flow until retirement. In fact, working lives are reduced in all other groups than that of the highly educated. This result also reflects the fact that the current accelerated accrual rate considerably improves the labour supply incentives for many. Correspondingly, deferring the accelerated accrual rate will vitally weaken the labour supply incentives for some individuals.

Cutting pensions will extend working lives regardless of whether the unemployment pathway and the part-time pension is still in use (system 7 vs. system 2) or not (system 5 vs. system 3). However, the impact in both cases is minute. Also cutting pensions extends the working lives of the highly educated in particular.

As observed above, raising the earliest eligibility age for old-age pension does not, on average, extend working lives if the unemployment pathway and the part-time pension exist in their current forms. On the other hand, the table also shows that the impact on working lives if the unemployment pathway and the part-time pension are abolished, without further reforms (system 3 vs. system 2), is relatively small. These results speak more generally of the fact that in the model especially the unemployment pathway and old-age pensions are substitutive routes through which to exit working life. If only one route is limited, individuals will begin using the remaining route to a higher degree. The impact on working lives becomes significant only when both routes are limited. Hakola and Määttänen (2009) came to the same conclusion.

Comparing systems 8 and 2 shows by how much working lives are extended if all earliest eligibility ages (part-time pension, unemployment pathway, old-age pension) are raised by two years. The combined impact in the model is 6 months.

Tables 5 and 6 review the impacts of raising the retirement age on an individual level. The table shows how large a proportion of individuals change their behaviour solely based on the fact that the pension system rules change. Here I assume that, prior to raising the retirement age, the unemployment pension and the part-time pension have been abolished altogether. In other words, I compare the choices of individuals that are identical regarding wage development, dismissals and unemployment in pension systems 3 and 4. The tables include a cross-tabling of the labour market states of 63- and 64-year-old individuals. Raising the earliest eligibility age for old-age retirement by two years affects most directly individuals of these ages. However, raising the eligibility age for retirement has some impact on individuals' choices also before age 63 and after age 64. Table 5 concerns group 1 (men with a basic education) and Table 6 group 3 (highly educated men). For the sake of clarity, I have omitted such labour market states (unemployment and part-time work) which are not affected by (i.e. do not become more or less common as a result of) a

raise of the retirement age. (After abolishing the part-time pension, the elderly will not work part-time at all). The unit in the Table is the percentage of person-years.

Table 5 shows, for example, that 48 per cent of the person-years of 63–64-year-olds (excluding the unemployed) are spent in full-time work both before and after raising the earliest eligibility age for retirement. As a result of raising the retirement age, 17 per cent of person-years change from old-age pension years to full-time employment years. The average extension of working lives is largely based on this impact. On the other hand, 35 per cent of the person-years are converted from old-age pension years to unemployment years. As a result, the proportion of unemployment years grows considerably. In other words, some of the earlier retirement years at age 63–64 will be replaced by unemployment years. This impact will reduce the labour supply effect of raising the retirement age.

Table 5.

Impacts of raising the earliest eligibility age for old-age pension (systems 4 vs. 3) an on individual level in group 1, percentage of person-years of 63–64-year-olds.

	After			
Before	**Unemployed**	**Full-time employment**	**Old-age pension**	**All**
Unemployed	0	0	0	0
Full-time employment	0	48	0	48
Old-age pension	35	17	0	52
All	35	65	0	100

Table 6.

Impacts of raising the earliest eligibility age for old-age pension (systems 4 vs. 3) on an individual level in group 3, percentage of person-years of 63–64-year-olds.

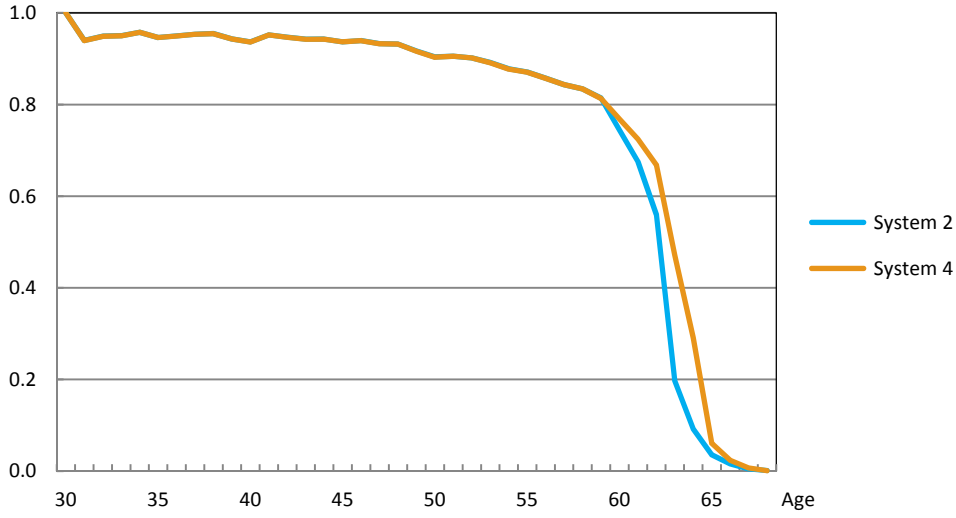
	After			
Before	**Unemployed**	**Full-time employment**	**Old-age pension**	**All**
Unemployed	1	0	0	1
Full-time employment	0	39	0	39
Old-age pension	19	40	0	60
All	21	79	0	100

Before raising the retirement age, a higher percentage (48 per cent) of the 63–64-year-olds with a basic-level education (who are fit to work) are in full-time employment compared to the highly educated men of the same age (39 per cent). This is because the unemployment pathway has been abolished already prior to raising the retirement age. Nevertheless, after raising the retirement age, the percentage of full-time employees is higher in the group of the highly educated (79 per cent) than in the group of those with a low-level education (65 per cent). Comparing Tables 5 and 6 shows that the proportion of unemployment years in group 3 grows clearly less than in group 1. Correspondingly, in group 3, a larger proportion of the years spent on old-age retirement before the reform is spent in full-time work after the reform.

As described above, one explanation to why group 3 reacts to the raising of the retirement age in a better way, from the point of view of public finances, than group 1 relates to the progressive nature of the unemployment security. For the highly educated, the unemployment benefit is usually relatively small compared to the wage level. If the earliest eligibility age for old-age retirement is raised, it is generally better for them to try to remain in the work force.

In Figure 5, the age profile of the proportion of the employed in systems 2 and 4 are compared. Figure 5 shows that abolishing the part-time pension and the unemployment pension and raising the earliest eligibility age for old-age pension by two years increases employment in the age group 60–64. The changes in all other age groups are virtually non-existent.

Figure 5.
Proportion of employed invididuals by age in systems 2 and 4.



Distributional effects

The distributional effects of the aforementioned pension reforms can be evaluated in many different ways. In the following, I will present the impact of reforms on the difference between taxes paid and benefits received during the life cycle (Table 7), the life cycle consumption (Table 8) and net pensions (Table 9). Using all these variables, I will calculate how the group-specific average value will change as a result of the pension reforms.

Table 7 shows us, first of all, that raising the lower eligibility age for part-time pension and the unemployment pathway (system 2 vs. system 1) or removing these systems altogether (system 3 vs. system 2) will, in particular, raise the "net taxes", i.e. the difference between taxes paid and benefits received during the life cycle, of relatively low-income groups (groups 1, 2, 4 and 5). Removing the unemployment pathway and the part-time pension completely will, for instance, tighten the net taxation of group 1 by 1.2 per cent, while the life cycle taxation of group 3 will increase by only 0.4 per cent. This result can largely be explained by the fact that these reforms will increase the labour supply, especially once the unemployment pathway has become limited. In the model, it is particularly the low-income bracket (individuals with low education) that uses the unemployment pathway. This being the case, limiting the unemployment pathway will increase the working hours of those with a relatively low income, increasing the taxes paid by this group and decreasing their benefits. As mentioned above, the use of part-time pension goes against reality in the model, by being the most common in the low-education bracket.. In reality, removing the part-time pension would presumably decrease the benefits of the relatively high-income bracket in particular. However, the unemployment pathway is more important than the part-time pension in terms of its effect on labour supply and the present value of benefits.

On the other hand, raising the retirement age (system 4 vs. system 3) would increase the net taxation of the well-to-do in particular. This result naturally reflects the impact the reform would have on the labour supply. As stated above, raising the retirement age would particularly increase the employment of the well-educated. The result is also affected by the fact that raising the retirement age would not decrease the level of disability pensions. Quite the opposite; raising the lower eligibility age for old-age pension works to increase disability pensions. As stated above, I presume that the right to projected pensionable service is always calculated right up until the earliest eligibility age for old-age retirement. Raising the lower eligibility age would therefore mean that the right to projected pensionable service increases individual's disability pensions more than before.

If the retirement age is raised without first removing the part-time pension and unemployment pathway (system 6 vs. system 2), the taxes paid by the low-income

bracket will become smaller, at least in comparison to the benefits they receive. This is due to the increased unemployment caused by the unemployment pathway.

Cutting pensions (system 5 vs. system 3) would tighten net taxation over the life cycle as described in table 7, for all education levels, clearly more for women (groups 4–6) than for men (groups 1–3). This can be explained by the fact that women live longer than men on average, and thus all pensions constitute a relatively more important income transfer for women than it does for men.

The effect that cutting pensions will have on the net taxation over the life cycle, as described in Table 7, is relatively similar regardless of education level. However, underlying this result are mechanisms going in different directions. For instance, the highly educated live longer on average than those with a low level of education. Cutting pensions this way would put pressure especially on the net taxation of the highly educated. On the other hand, those with a low education run a higher risk than others of becoming disabled. This being the case, cutting disability pensions affects the low-income bracket in particular.

As described above, working lives are not significantly extended by cutting pensions. In view of that, it is interesting to note that its impact on the net taxation described in Table 7 is relatively large. At the same time, cutting pensions naturally improves public finances. According to Table 7, cutting pensions by 10 per cent would tighten the average net taxation by approximately 4.5 per cent, while raising the retirement age would tighten it by approximately 3.6 per cent. From this we can deduct that, evaluated based on the difference between taxes and benefits, cutting monthly pensions by circa 8 per cent would improve public finances by roughly as much as raising the pensionable age by two years (assuming that part-time pension and the unemployment pathway have first been removed).

Table 7.

Change in difference of taxes and benefits during life cycle, %.

	Systems compared						
Group	**2 vs. 1**	**3 vs. 2**	**4 vs. 3**	**5 vs. 3**	**6 vs. 2**	**7 vs. 2**	**8 vs. 2**
1 (men basic)	0.5	1.2	2.1	3.6	-2.2	3.1	1.6
2 (men secondary)	0.4	1.1	2.3	3.6	-2.0	3.2	1.5
3 (men higher)	0.0	0.4	5.0	3.8	1.3	3.4	3.0
4 (women basic)	1.3	2.3	2.9	5.7	-3.7	5.6	2.4
5 (women secondary)	0.9	1.9	3.0	5.6	-3.5	5.5	2.2
6 (women higher)	0.2	0.5	5.4	5.0	0.8	4.9	3.2
All	0.5	1.1	3.6	4.5	-1.3	4.2	2.3

Pension reforms affect life cycle consumption (the present value of consumption over the entire life cycle), by changing benefits as well as impacting the working hours. Table 8 shows that the impact of the reforms on life cycle consumption is practically the same in all groups. For instance, removing the part-time pension and the unemployment pathway (system 3 vs. system 2) increases life cycle consumption by between 0.1–0.3 per cent depending on the group. Removing them has a diminishing effect on the benefits of the low-income bracket in particular. On the other hand, working lives will extend in these exact same groups as a result of the pension reform. Cutting pensions decreases life cycle consumption in all groups. In other words, the individuals in this model do not increase the labour supply sufficiently to compensate for the drop in consumption possibilities caused by pensions being cut.

It is perhaps surprising that, according to Table 8, raising the retirement age will raise average consumption in all groups even without the discontinuation of the unemployment pathway and the part-time pension (system 6 vs. system 2). As depicted above, the reform would still slightly decrease the number of working hours, in all but the highly educated groups. The fact that consumption would still increase can be explained by two different factors. First of all, thanks to the unemployment pathway, those left unemployed as a result of the reform would receive a relatively good unemployment benefit. Secondly, as already explained above, raising the retirement age will raise the disability pension.

Table 9 shows how an average annual pension (at the age of 69, before income tax) will change as a result of the reform. The change in average pension partly reflects changes in the labour supply. For example, removing the unemployment pathway and the part-time pension (system 3 vs. system 2) will proportionally raise the average pension of groups 1, 2, 4 and 5 the most, since these groups will extend their working lives the most as a result of the reform. Raising the retirement age (system 4 vs. system 3) will, however, raise the average pension of the highly educated proportionally the least, despite the fact that it extends the working lives of the highly educated in particular. This can at least partly be explained by the rise in

Table 8.

Change in average value of consumption, %.

	Systems compared						
Group	**2 vs. 1**	**3 vs. 2**	**4 vs. 3**	**5 vs. 3**	**6 vs. 2**	**7 vs. 2**	**8 vs. 2**
1 (men basic)	0.1	0.3	1.2	-1.7	0.4	-1.8	1.1
2 (men secondary)	0.1	0.2	1.2	-1.7	0.3	-1.8	1.0
3 (men higher)	0.0	0.1	1.4	-1.7	0.4	-1.7	0.9
4 (women basic)	0.2	0.3	1.1	-2.0	0.2	-2.0	1.1
5 (women secondary)	0.1	0.3	1.1	-2.0	0.1	-2.0	1.0
6 (women higher)	0.0	0.1	1.2	-1.8	0.1	-1.8	0.7

Table 9.
Average change in annual pension, %.

	Systems compared						
Group	**2 vs. 1**	**3 vs. 2**	**4 vs. 3**	**5 vs. 3**	**6 vs. 2**	**7 vs. 2**	**8 vs. 2**
1 (men basic)	0.1	0.6	4.7	-9.3	2.8	-9.5	4.5
2 (men secondary)	0.1	0.5	4.4	-9.4	2.4	-9.5	4.0
3 (men higher)	0.0	0.3	3.2	-8.6	1.0	-8.7	2.1
4 (women basic)	0.3	0.4	4.1	-9.3	2.2	-9.4	3.8
5 (women secondary)	0.2	0.4	3.8	-9.3	1.8	-9.4	3.4
6 (women higher)	0.1	0.2	2.3	-8.6	0.2	-8.6	1.3

disability pensions, which would raise the pension of the highly educated proportionally less than the pension of other groups. The highly educated run the lowest risk of disability.

The income distribution effect can also be evaluated with the rate of poverty or low income. In Finland, a person defined as relatively poor or of low income is often someone whose available funds per person in the domestic household is less than 60 per cent of the median of disposable income.[8] The low income rate is the share of people who live in low-income households according to this definition.

According to Statistics Finland, the low income rate in Finland in 2011 was 13.2 per cent (Income distribution statistics 2011). The corresponding low income rate of the model is only 2%. It should not come as a surprise that the model contains fewer persons of low income than in reality. Students, for instance, are missing from the model and many of them are categorized as having a low income.

In order to be able to evaluate the impact of pension reform on the number of persons of low income, I use a higher limit for what constitutes low income. I define 60% of the average disposable income as the low income limit. Using this definition, 9.8 per cent of individuals in the model have a low income under the current pension system (system 2). Table 10 shows how the low income rate, defined in this manner, varies in the pension systems under review.

The results of the Table are in line with the income distribution effect described above. Raising the retirement age (the lowest pensionable age is 65 in systems 4 and 6) decreases the low income rate, while cutting pensions (systems 5 and 7) increases it. A large share of individuals beneath the low income limit receive disability pension. Raising the retirement age will improve their income level by slightly rais-

8 Specifically, consumption is calculated per consumption unit. For instance, children between 0–13 each correspond to a consumption unit of 0.3.

Table 10.
Proportion of individuals whose available income is less than 60% of the average income, %.

System							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
10	9.8	9.5	6.8	13	6.5	13	6.4

ing disability pensions as the so-called projected pensionable service is extended. Cutting monthly pensions will obviously have the opposite effect.[9] A large share of low-income pension recipients in the model is close to the low income limit. For that reason, even a small change to the disability pension may have a relatively large impact on the low income rate. Changes pertaining to the part-time pension and the unemployment pathway do not really affect the low income rate.

Accelerated accrual vs. increase for deferred retirement

Nicholas Barr criticised the current accelerated accrual (4.5 per cent pension accrual from the age of 63 onwards) in his report evaluating the Finnish pension system (Barr, 2013). The accelerated accrual rate can reasonably be considered a compensation for deferring to draw the pension. From the perspective of the pension system, the savings created by deferring retirement corresponds to the value of the pension left not drawn. It would therefore be natural for the compensation received from deferring the pension to be in relation to the pension accrued. The compensation determined based on the accelerated accrual is based on the wage level, not the previously accrued pension.

According to Barr, it would be better to separate the accrual of new pension from the compensation received for deferring to draw the pension. Deferring the pension ought to be rewarded by an increase for deferred retirement that solely depends on the pension accrued by that time. In that case, the accrual rate could be the same after the lower pensionable age as before it. Such a model is reminiscent of the system in force in Finland prior to the pension reform of 2005. If, for instance, the increase for deferred retirement is 6 per cent and the accrual from the wages is 1.9 per cent per year, deferring to draw the pension would increase the pension accrual as follows:

9 As described earlier, I assume that the cutting of pensions will not apply to guarantee pensions. However, the guarantee pension is lower than the low income limit used here. This being the case, it does not protect everyone in the low-income bracket from having their pensions cut.

$$b_{j+1} = 1.06 b_j + 0.019 w_j .$$

where b refers to pension accrual, w to wages and j (≥ 63) to age.

Next I will briefly describe the impact of a reform where the accelerated accrual rate would be replaced by an increase for deferred retirement, as proposed by Barr. However, first of all it is necessary to make a host of detailed assumptions. First of all I assume that the accrual rate will be 1.9 per cent from the age of 63 onwards, in other words the same as between ages 53–62. It is not clear at which level the increase for deferred retirement should be placed exactly. As Barr states in his report, an increase for deferred retirement of approximately 6 per cent, combined with a regular accrual, roughly corresponds to the current accelerated accrual in a typical situation where the pension accrual accounts for approximately half of the wage level. I will test two different rates of deferral around 6 per cent, in other words 5.5 per cent and 6.5 per cent. This allows me to evaluate how the size of the deferral rate will affect the results. I assume that the increase for deferred retirement cannot be combined with an unemployment allowance or a part-time pension. Of the aforementioned alternatives, the change will thus only affect alternatives 2 and 3.

Table 11 presents how replacing the accelerated accrual with the increase for deferred retirement will affect working lives and income distribution. The income distribution is evaluated here with the help of taxes paid during the life cycle, and the present value of income transfers received (same as in Table 7). As a summary of these results we can conclude that replacing the accelerated accrual with a cor-

Table 11.

Impact of increase for deferred retirement on working lives (months) and net taxes paid during life cycle (%).

	Impact on working lives		**Impact on life cycle taxes**	
	Increase for deferred retirement		**Increase for deferred retirement**	
	5.5	**6.5**	**5.5**	**6.5**
Group				
1 (men basic)	-0.4	-0.0	-0.1	0.0
2 (men secondary)	-0.5	0.1	-0.1	0.1
3 (men higher)	-0.7	0.6	0.1	0.3
4 (women basic)	-0.7	0.0	-0.2	0.1
5 (women secondary)	-0.6	0.1	-0.1	0.2
6 (women higher)	-0.8	0.9	0.2	0.5
All	-0.6	0.3	-0.0	0.2

respondingly large increase for deferred retirement does not carry great significance for a typical wage earner, regarding either working lives or income distribution. However, an increase for deferred retirement that is too small will easily shorten working lives and simultaneously decrease the accumulation of taxes.

Raising the retirement age vs. reduction for early retirement

Instead of raising the lowest pensionable age, it is possible to raise the eligibility age for "full pension" and define a reduction for early retirement that cuts the monthly pensions of persons retiring prior to this eligibility age. Such a system corresponds to the early old-age pension that was still in use in 2013 but is about to disappear.

I will next briefly evaluate the impact of a pension reform where the eligibility age for full pension would be raised to 65 years. If a person begins receiving old-age pension at the age of 63 or 64, a reduction for early retirement is made to the pension. The reduction permanently reduces the monthly pension. The reduction for early retirement used during the period 2005–2013 was 7.2 per cent per year. The size of the reduction for early retirement is dependent on how big a "punishment" one wishes to give for retiring early, in the form of a lower monthly pension. I will try three different reductions for early retirement: 6, 8 and 10 per cent per year. I assume that the accelerated accrual in this system will begin at age 65. I also assume that the part-time pension and unemployment pathway have first been abolished.

Notice that not even an extremely large reduction for early retirement would have the exact same effect as raising the lower old-age retirement limit. There are two reasons for this. First of all I assume that the reduction for early retirement does not apply to the guarantee pension. In other words, the very smallest pensions are protected from the reduction for early retirement. On the other hand, in system 4, where the earliest eligibility age for old-age pension is 65 years, it is not possible to receive old-age pension before the age of 65, not even at the size of the guarantee pension. Second, implementing the reduction for early retirement would not, in this case, affect disability pensions, as I assume that the projected pension share would be calculated up until the age of 63. Raising the pensionable age, on the other hand, slightly improves disability pensions through the projected pensionable service.

Table 12 presents how this kind of pension reform affects working lives and the difference of taxes paid and benefits received during the life cycle ("net taxes") compared to system 3. These results are worthwhile comparing to results arising from a comparison of systems 4 and 3 in Tables 4 and 7.

The comparison shows that the reduction for early retirement has similar impact on both working lives and life cycle taxes as the raising of the lower pensionable age. The reduction for early retirement particularly extends the working lives of the

Table 12.
Impact of reduction for early retirement on working lives (months) and net taxes paid during life cycle (%).

	Impact on working lives			Impact on net taxes		
	Increase for deferred retirement			Increase for deferred retirement		
	6	8	10	6	8	10
Group						
1 (men basic)	0.9	2.4	3.8	2.4	3.3	3.6
2 (men secondary)	1.2	2.9	4.4	2.6	3.5	3.9
3 (men higher)	3.3	7.0	9.6	4.0	5.4	5.7
4 (women basic)	1.2	3.1	4.8	5.2	6.2	6.4
5 (women secondary)	1.5	3.2	5.3	5.0	5.8	6.1
6 (women higher)	3.9	7.4	9.2	5.5	6.6	6.4
All	2.2	4.6	6.5	4.2	5.2	5.4

highly educated. At the same time, it tightens net taxation, especially in the high-income bracket. However, the impact on working lives will be somewhat smaller than if the retirement age had been raised, even with a large reduction for early retirement. For example, a 10 per cent reduction for early retirement extends working lives in the model by approximately 6.5 months, while raising the retirement age by two years would extend working lives by 7.9 months (Table 4). On the other hand, the impact on life cycle taxes easily becomes larger than by raising the retirement age. This is explained by the fact that a large reduction for early retirement decreases the sum of pensions paid during the life cycle more than raising the retirement age would.

Extended life expectancy and working lives

The growing average life expectancy is likely to extend working lives also without pension reforms. The impact of longer life expectancy is, however, significantly dependent on how disability risks develop.

With the help of a model I will review a scenario where the mortality rate decreases in line with the 2030 population forecast. That means extending the life expectancy by approximately three years. At the same time, the longevity indicator cuts pensions by about 10 per cent compared to the current situation. I do not have access to group-specific mortality forecasts. I therefore assume that mortality will decrease relatively as much in all groups.

I assume that extended life expectancy will increase the number of years spent in full health. I introduce this assumption to the model by shifting the disability risk forward by three years. In other words, the risk of e.g. 60-year-olds becoming disabled is the same following the extended life expectancy as it is for 57-year-olds in the current situation.

The decrease in mortality and disability risks based on these assumptions extend working lives in the model by six months on average within the current system. This result comprises the impact of the longevity indicator.

Layoff risk and discount factor

The most important expansion of the model, compared to earlier research, has to do with modelling the layoff risk. It is clear that the layoff risk varies depending on the field, and most likely also based on education level. Earlier we assumed that the layoff risk is equally large in all groups. In the following I will quickly evaluate how changing the layoff risk will affect results. I will try raising the annual layoff risk from 5 to 10 per cent, keeping all other parameters intact.

Table 13 reports employment and statistics for rates of employment in the current system, when the layoff risk is 10 per cent per year. For the sake of comparison, corresponding figures in the baseline model are presented in brackets (from Table 1).

A higher layoff risk naturally lowers employment and raises unemployment, although the changes are not that great. As concluded earlier, the model does not explain all differences in employment between different education groups. One possible explanation for this is that the layoff risk of those with a low education level is, in reality, higher than that of the highly educated. In the model, the likelihood of employment termination is equally great in all groups in the model.

Table 13.

Population shares (%) in a model with a 10% likelihood of layoffs. Population shares in the baseline model in brackets, with a 5% likelihood of layoffs.

Group	Employed, 30–68	Employed, 58–68	Partially retired, 58–68	Unemployed, 55–59	Unemployed, 60–64	Working, 63+
1 (men basic)	69 (73)	29 (29)	4 (5)	5(2)	8 (9)	3 (3)
2 (men secondary)	72 (75)	30 (30)	4 (4)	5(2)	8 (7)	4 (3)
3 (men higher)	77 (80)	42 (43)	2 (2)	5 (3)	6 (5)	9 (8)
4 (women basic)	72 (74)	32 (31)	5 (5)	7(5)	15 (16)	4 (4)
5 (women secondary)	74 (76)	34 (33)	5 (5)	7(4)	13 (14)	5 (5)
6 (women higher)	77 (80)	43 (43)	2 (1)	7(3)	9 (7)	10 (10)
All	74 (77)	35 (36)	3 (3)	6(3)	9 (9)	6 (6)

A higher layoff risk does not significantly alter the results concerning pension reforms. For instance, the impact of raising the retirement age (system 4 vs. system 3) on the average length of working lives is 7.7 months with the higher layoff risk. The corresponding impact in the baseline model was 7.9 months (Table 4). Group-specific changes also come close to the results of the baseline model. In every group, the impact on working lives is slightly smaller than in the baseline model.

The reason why the impact on working lives is slightly smaller with a higher layoff risk than in the baseline model has to do with the increase in unemployment. In a model where the likelihood of employment termination is high, raising the retirement age will increase unemployment among older workers more than in the baseline model. In this respect, raising the retirement age is problematic, especially for people working in sectors where the layoff risk is high.

The degree to which individuals weigh their current benefit or welfare to their future benefit may also be significant to the results. The degree to which individuals emphasize their future benefit when making decisions is captured by the subjective discount factor β. In the baseline model, the value of the discount factor was $\beta = 0.92$. In order to evaluate the effect of changes in the discount factor, I calculated the effect of raising the retirement age and cutting pensions assuming $\beta = 0.96$. Since a higher discount factor leads to a higher average employment, I simultaneously assumed that the utility cost parameters would be somewhat higher than in the baseline model.

The impacts of raising the retirement age (system 4 vs. system 3) and cutting pensions (system 5 vs. system 3) on working lives are similar to the impacts in the baseline model. However, compared to the baseline model cutting pensions is now slightly more effective in extending working lives (even though the effect of raising the retirement age is still clearly greater). Individuals who place special emphasis on future welfare also work more in order to compensate the cut in pensions.

Comparison with previous research

Estimates regarding the labour supply and distributional effects of pension reforms always depend on the initial situation and the details of the pension system under review. That is why fully comparable research results to those presented above do not exist.

The most recent empirical analysis of reforms connected to the Finnish pension system is the study by Uusitalo and Nivalainen (2013) on the employment impact of the 2005 pension reform. According to their estimate, the most important part of the 2005 reform, when it comes to working lives, was raising the lower limit of the unemployment pathway by two years. According to the study, raising the earliest

eligibility age for the unemployment pathway together with abolishing the individual early retirement pension helped extend working lives by about one month. Kyyrä (2010) has evaluated the effect of previous reforms. For instance, the earliest eligibility age for the unemployment pathway was raised by two years in 1997, which extended working lives by 1.3 months on average according to his study.

Based on the model results described above, raising the earliest eligibility ages of the unemployment pathway and the part-time pension by two years would raise employment by a total of two months. A more detailed review of the model shows that slightly more than half of this effect comes from the unemployment pathway. The order of magnitude of the impact is in line with the aforementioned empirical results. According to Kyyrä (2010), raising the earliest eligibility age for the unemployment pathway would increase employment, especially among factory workers with a low education level. In the present model, raising the earliest eligibility age for the unemployment pathway also raises employment especially for the low-education bracket.

Apparently there are no evaluations about an increase in the retirement age using Finnish data. In Sweden, an extensive study was recently made in support of pension policy decision-making. As part of the study, a literary review was made of empirical studies on the impact that raising the retirement age has had on employment in different countries (Sjögren Lindquist 2011). The review summarizes the results by concluding that raising the retirement age usually extends working lives by between 20–50 per cent of the increase in retirement age. In other words, raising the retirement age by, for example, two years would extend working lives by between 5–12 months. Our results regarding the impact of raising the lower pensionable age are in line with this conclusion.

Concluding remarks

I have evaluated the effect of various pension reforms on labour supply and income distribution with the help of a life cycle model that is adapted to the Finnish data. It is self-evident that all quantitative results must be viewed with caution. For instance, it is impossible to exactly predict by how many months working lives would be extended as a result of some specific pension reform. Unfortunately, it is hard to evaluate the degree of uncertainty that is related to the results.

However, certain results of the model can be compared to empirical results. The empirical results are somewhat uncertain as well, but at least the results of the model appear to be in line with the most relevant related empirical studies. It is also significant that results achieved with the model are fully comparable between each other. Above all, the model analysis brought forward several mechanisms that are worth noting when designing the next Finnish pension reform and that are hardly very sensitive to changes in the model assumptions. The most important results and conclusions have been presented at the beginning of this report.

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Jukka Lassila

Linking Pensionable Age to Life Expectancy

Introduction

Raising the pensionable age as life cycles extend is worth aiming for, for two reasons. The first is the adequacy of pensions. If working lives are not extended while life cycles are, the longevity indicator will cut monthly pensions at an increasing rate. In light of the aims of the pension system, pensions may become too small. The other reason is that the length of working lives affects the central and local government finances – the longer the working life, the greater the tax revenue.

This article looks at different ways of linking the lowest pensionable age of the earnings-related pension system to the life expectancy, and evaluates the consequences of that. The different ways of linking follow the general principles laid out by Nicholas Barr (2013), who has evaluated the Finnish pension system. According to him, the automatic adaptation of the retirement age should be based on three principles (Barr, 2013, p. 76):

- "The rules should relate to date of birth, not to the date of retirement; otherwise there will be a wave of retirements just before any reduction in the generosity of benefits. Such an incentive to retire is inefficient.
- Changes should be made annually, to avoid large changes in benefit levels across nearby cohorts. Large changes are inequitable and politically difficult, since benefits could differ significantly between people born only days apart. The combination of large changes and rules determined by date of retirement would exacerbate the inefficient incentive to early retirement.
- Rules for changing benefits should be explicit. Automatic adjustment with explicit rules leads to greater predictability and decreased political pressure. Automatic adjustments may function better if based on actual mortality outcomes rather than projections. Nevertheless, there always remains the option of legislation to change whatever the automatic rules produce, as with the indexation of income tax brackets."

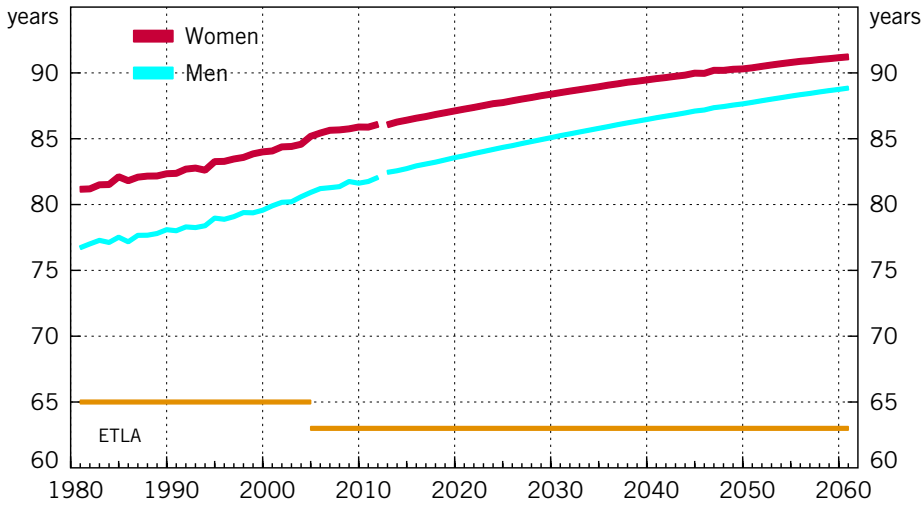
Figures and calculations are based on a population forecast where baseline assumptions are in accordance with the population forecast of the year 2012 by Statistics Finland. The forecast, with the baseline scenario being the Finnish population on 1 January 2013, has been prepared for ETLA by professor Juha Alho (University of Helsinki). Figures and calculations have been prepared by Eija Kauppi at ETLA.

Increase in life expectancy and the effect on current rules governing earnings-related pensions

Life expectancies in Finland have been growing and are expected to continue to rise in the future, as Figure 1 shows. The pensionable age, on the other hand, was lowered in the 2005 pension reform from 65 to 63 years. However, due to various possibilities of early retirement, it has been possible to draw the pension already prior to the eligibility age for old-age pension. Possibilities of early retirement (excluding disability and part-time pensions) have gradually been removed after 2005, and the last such possibility will be discontinued in 2014.

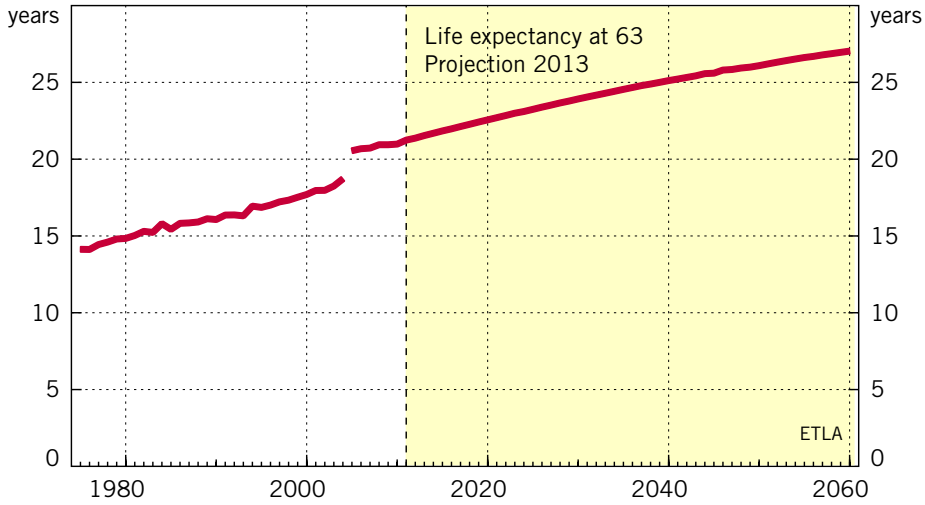
Figure 2 shows the expected number of retirement years between 1975–2011, if the individual in question has retired at the pensionable age, as well as the forecast for the years 2012–2060 if the retirement age remains the same as now. The retirement period was extended by four years between 1975–2004, and skipped two years as a result of the drop in retirement age in 2005. If the retirement age is not raised, the expected time spent in retirement will rise by seven years from 2005 to 2060, according to the most recent population forecast.

Figure 1.
The total life expectancy and old-age retirement age.*



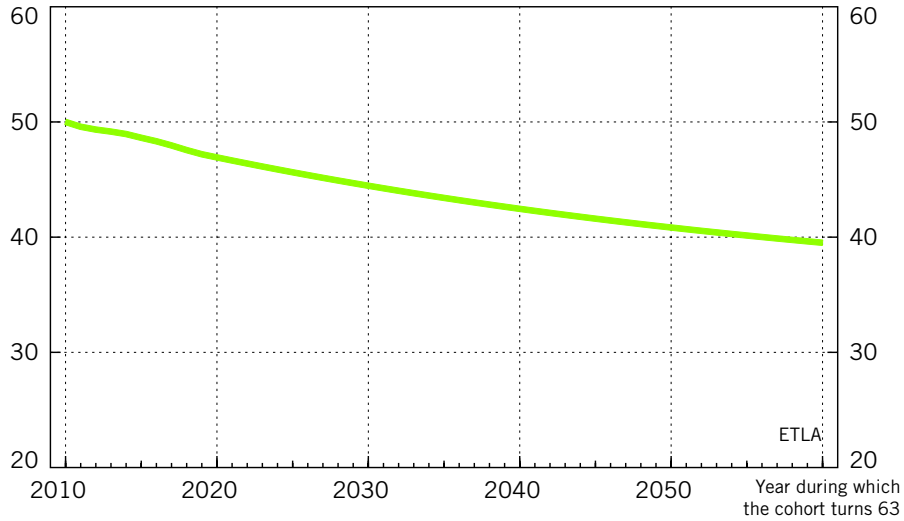
* The life expectancy is the number of years an individual of a certain age would reach if mortality rates remain unchanged. The report primarily reviews the total life expectancy of a 63-year-old, in other words the number of years a 63-year-old is expected to live + 63 years. Life expectancies for men and women are not reviewed separately hereafter.

Figure 2.
Life expectancy at the old-age retirement age.



The old-age retirement age is 63 since 2005, prior to that it was 65.

Figure 3.
Replacement rate at the old-age retirement age.



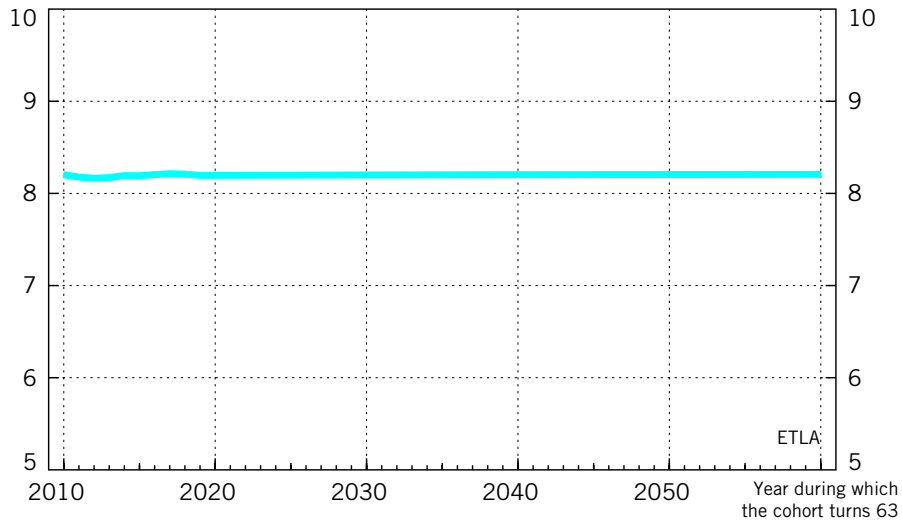
According to current rules, the individual will retire at the age of 63. The replacement rate without the life expectancy coefficient is 50 per cent of the comparative wage.

If, in the future, pension will be drawn at the age of 63 under the current rules, without continuing to work, the longevity indicator will exceedingly cut benefit rates as life expectancy increases. Figure 3 shows the rate of compensation for different cohorts in the assumption that the rate of compensation without the longevity indicator would be 50% of the comparative wage. For those retiring in 2060, the rate of compensation would be less than 40 per cent.

Figure 4 shows the expected capital value of the old-age pension according to cohort. If the annual wage was EUR 40,000, an individual will receive pension at a 50 per cent compensation rate of EUR 20,000 per year. Calculated based on the entire expected retirement period, the estimated capital value of the pension is a wage of roughly 8 years, in other words approximately EUR 330,000. The capital value does not really change from one cohort to another. This can be explained by the discounting, to which a 2% interest rate has been applied, as well as likelihoods of survival from the age of 63 onwards. Discounting almost completely cancels the effect of the longevity indicator; the only difference is that the calculation is begun at the age of 62 in the longevity indicator. In this calculation – as in the other calculations of this article – we have, for simplicity's sake, assumed that monthly pensions and wages will remain stable in their real value.

Figure 4.

Expected capital value of old-age pension in relation to annual wage.



According to current rules, the individual will retire at the age of 63. The replacement rate without the life expectancy coefficient is 50 per cent of the comparative wage.

Basis for selecting retirement age indexation

The pensionable age linked to life expectancy will only change when the life expectancy changes. If life expectancy increases, the lower pensionable age will rise. The connection to the life expectancy, in other words indexation, makes the pensionable age specific to the age cohort.

Even small contemplation will give rise to various ways of specifying the links. The way I see it, there is no conclusive logical reason why it would be necessary to choose a certain method of indexation. However, some methods of linking have a simpler and clearer basis than others. Next, I will specify three ways of indexation.

The link can be made using a purely *demographical basis*, by determining the pensionable age e.g. by the ratio at which it divides the life cycle. In other words, if you retire at the pensionable age, the expected number of retirement years is in constant ratio with the total number of expected years of life for all cohorts.

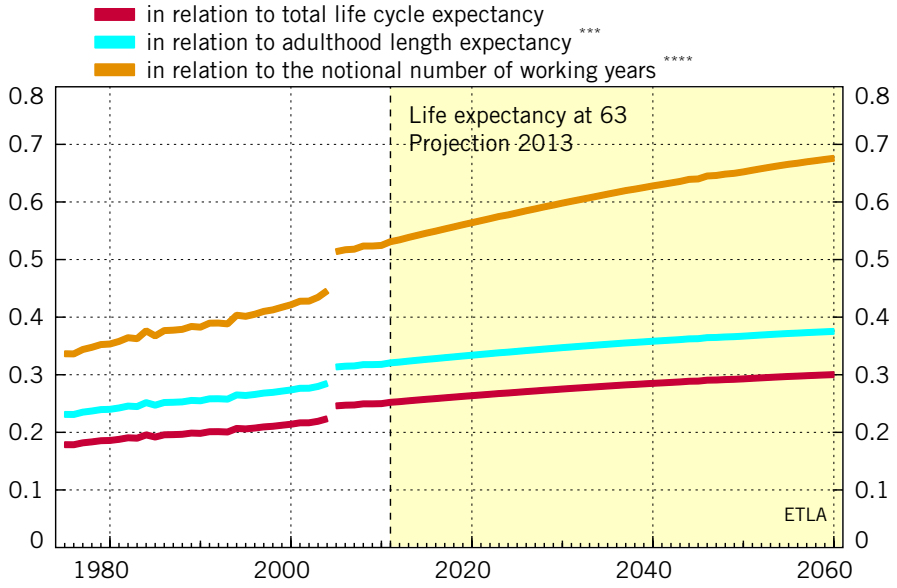
There are different phases to a life cycle that you do not necessarily wish to include when determining retirement age. Such a phase is childhood, for instance. A *social basis* could be attached to the demographic basis, namely adulthood. In the second alternative, pensionable age is determined so that is divides the lifetime spent as an adult per cohort in a constant ratio. The lower limit of adulthood that I use going forward is the legal age of 18 years.

The demographic basis may also be extended to *financial bases* in indexation. As such a basis, we here select the variable describing the number of years spent working. It is unavoidably discretionary, since the number of working years varies based on the individual and time. We presume that working years have begun accumulating at the age of 23 and continue to do so until the pensionable age. In the third alternative, we define pensionable age as the number of expected retirement years in a constant ratio with the notional number of working years for all age cohorts.

Financial bases can also be found in the pension system itself. The pensionable age could be determined so that the impact of the life expectancy is compensated; example calculations have been carried out at the Finnish Centre for Pensions following the 2005 pension reform. The calculations require a specification of what the accumulated pension right by the age of 63 is in relation to the wage, and what the accrual from the age of 63 is. This report does not review such indexations, as they demand new assumptions. Furthermore, due to problems with measuring, we do not ponder health-related bases, for instance the number of healthy years of life, for determining retirement age.

We thus choose three different bases for indexing the pensionable age. The aim of each is to standardize the ratio of life expectancy to some reference line. Figure

Figure 5.
Life expectancy at the old-age retirement age**.*



* Total life cycle expectancy at the old-age retirement age minus the old-age retirement age
** The old-age retirement age prior to 2005 was 65 years, now 63.
*** Adulthood length expectancy = total life expectancy of a 63-year-old minus 18 years.
**** Notional number of working years = the old-age retirement age minus 23 years.

5 presents the change in these ratios if the pensionable age remains at the age of 63 also in the future.

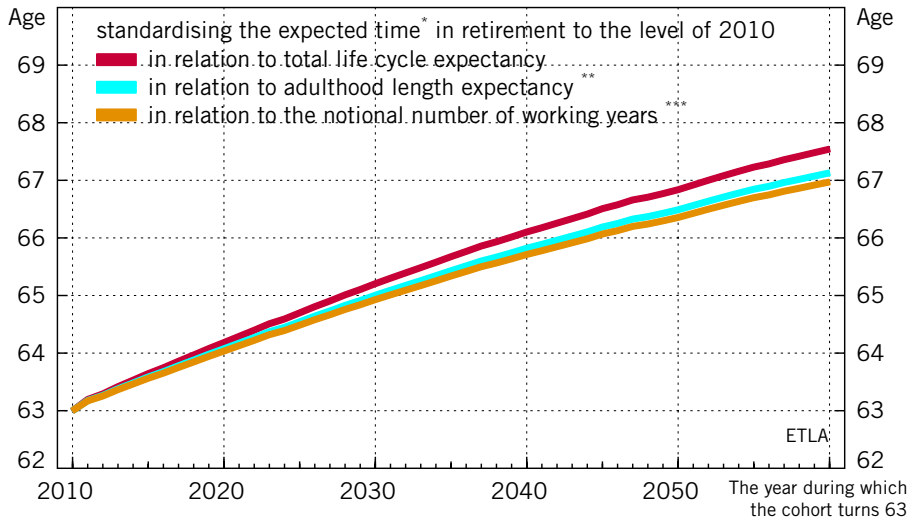
Figure 6 shows how the pensionable age would develop according to each basis if the population forecast is realized. The starting point is the situation in 2010, with the assumption of a change in retirement age already from 2011.

The three retirement age options differ fairly little from each other where the expected retirement age is concerned. In 2060, the difference between the highest and the lowest is well below a year. The retirement age would rise from one year to the next, in other words from one cohort to the next, by approximately one month. The level of retirement ages is also quite low compared to the decisions and plans made in many other European countries, where a retirement age of 67 will be reached or exceeded already in the 2020s.

However, the choice of bases does not, in practice, limit the chance of shaping the results as desired. When pondering the future retirement age, the possibility of choice comes from the selection of a reference line based on the aforementioned bases. For example in Figure 7, the situation in 2004 has been selected for comparison, before the retirement age dropped from 65 to 63 years.

Figure 6.

Old-age retirement age per cohort.



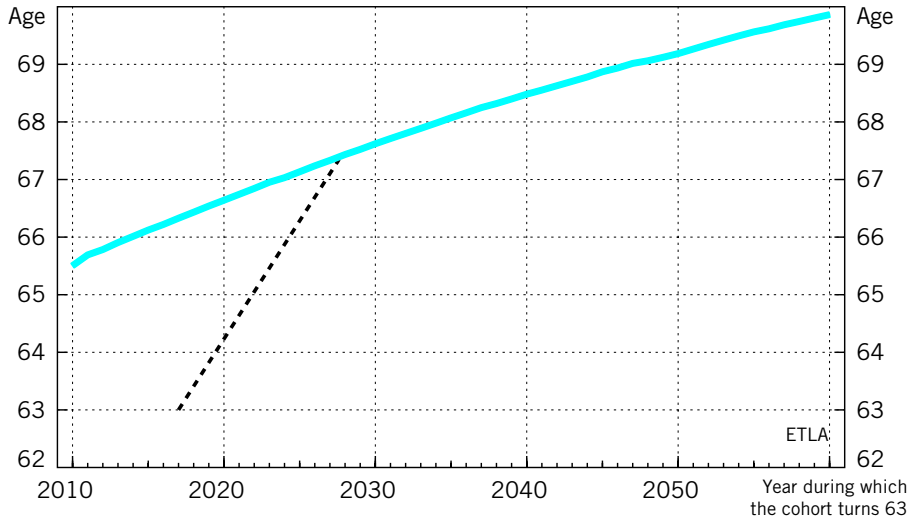
* Expected time spent in retirement = total life expectancy of a 63-year-old minus the old-age retirement age

*** dulthood length expectancy = total life expectancy of a 63-year-old minus 18 years.

**** Notional number of working years = the old-age retirement age minus 23 years.

Figure 7.

Old-age retirement age per cohort, standardising the relation of the expected time spent in retirement to the expected length of adulthood to the level of 2004.



See explanations in Figure 6.

The duration of adult age was then slightly over 65 years (calculated for a 63-year-old, the total expected lifetime was roughly 83 years, of which 18 years had passed before the start of adulthood) and retirement years following the pensionable age of 65 numbered just over 18, in other words 28% of the length of adulthood. Using this ratio figure, the retirement age would be 67 already in 2027. At the cut-off line, a discretionary path to an indexed working life has been sketched out. For instance in Denmark, where a reform took place in 2011, the time of comparison selected was the expected retirement period for the years 2004–2005, and in the reform now proposed in Sweden, the reference line would be the 1997 life expectancy for 65-year-olds.

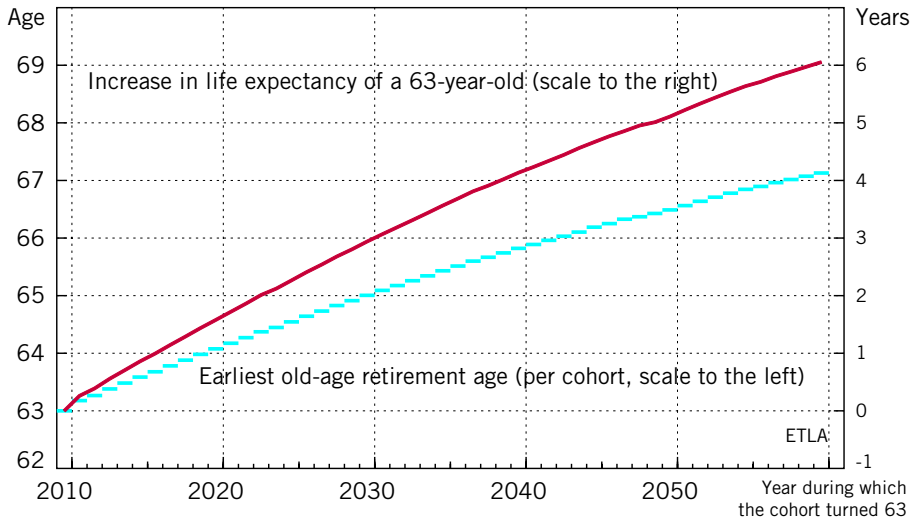
Since the choice of reference line allows one to create the desired pensionable age using any of the indexation alternatives we have examined above, it is not necessary to ponder any alternatives that are more complex. Presenting such reasons is more difficult, and they have not been perceived to bring any added value.

Based on the above review, we draw two conclusions: 1. regardless of indexation, the choice of reference line is decisively important. 2. since the choice of reference line is decisively important, indexation can be carried out based on a simple and easily described basis.

For continued examination, we select a pensionable age indexed based on the duration of adulthood. It is a standard depicted in Figure 8 for each age cohort and

Figure 8.

The earliest old-age retirement age tied to the length of adulthood.



See explanations in Figure 6.

compared to the increase in life expectancy. The duration of adulthood was almost 66 years in 2010 (the calculated total lifetime of a 63-year-old was approximately 84 years, of which 18 had passed before the start of adulthood) and retirement years after the old-age retirement of 63 were approximately 21, in other words almost 32% of the length of adulthood. Using this ratio, the retirement age will rise by just over four years, in other words by approximately one month per year by the year 2060. In the same time period, the life expectancy of a 63-year-old will increase by just over six years.

Why not just raise the retirement age discretionarily?

A good question is whether indexing the pensionable age is at all necessary, if the choice of reference line is of decisive importance. Why not just raise the retirement age discretionally for future years? This method has been applied in some countries. At least four things can be said in defense of indexation. Firstly, *indexing provides an exact basis for the difference in retirement age between two consecutive cohorts* (compare with the longevity indicator, which is also not discretionary).

Secondly, the scope of the increase in life expectancy in the future is not something that is easy to predict, and *it is good to prepare for errors in projections* (Appendix 1 contains examinations of uncertainty factors). Indexation automatically adapts the retirement age to the development in life expectancy, and most probably stabilizes the financial position of the pension system and other public finances. Thirdly, indexation contains a precise, conditional decision to raise the retirement age whenever life expectancy increases. In the alternative, i.e. *a series of discretionary decisions to raise the retirement age, difficulties and slowness in making decisions would be recurring problems and the development of retirement ages would most certainly be riddled with greater uncertainty.* Fourthly, *indexation can be fully included in long-term financial calculations, but discretionary retirement age decisions that have been left unmade cannot be included*. Such calculations include sustainability gap calculations of public finances; of growing significance in EU countries where economic policy is concerned, and the long-term financial calculations of the earnings-related pension system itself, which will also increase in significance if the aim is for the pension contribution to be on a stable long-term level. Denmark opted for a combination, where the pensionable age was first raised discretionally and later linked to life expectancy with a long delay.

The impact of indexing retirement age on pensions

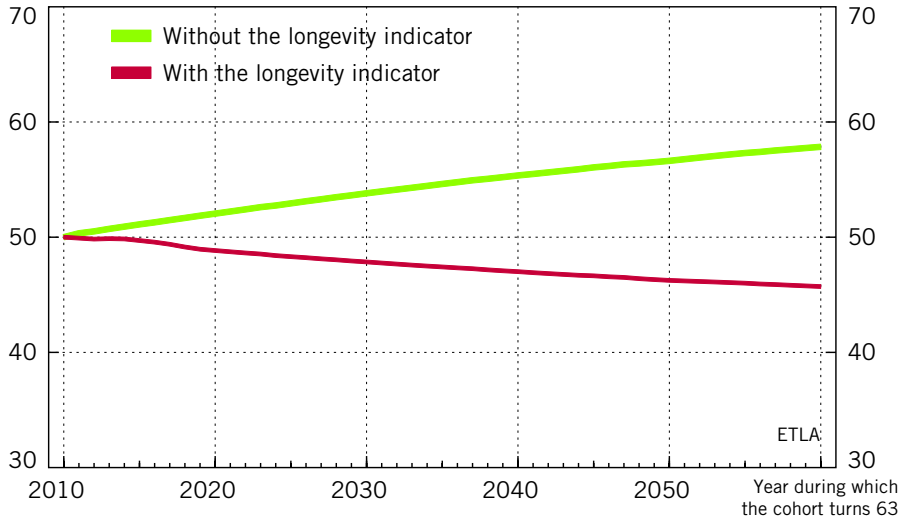
Replacement rates and the longevity indicator

Raising the pensionable age may give rise to the need to alter other parameters in the pension system. Indexes for working lives and retirement years, in other words the wage coefficient and the pension index, will be kept as they are in the follow-up reviews. The results of the reviews also do no indicate any need for change. The situation is different with accruals, and specifically with the longevity indicator.

Let us first investigate what would happen if the accrual prior to the eligibility age for old-age pension is assumed to be the same as nowadays, in other words 1.9 per cent, and the longevity indicator is in place. Let us consider an individual who begins drawing pension at the pensionable age and no longer accrues pension after that. The replacement rate is assumed to be at 50% in relation to the comparative wage, for instance the wage from the last year of work. The pensionable age has been tied to the expected duration of adulthood.

The lower graph in Figure 9 is the replacement rate after the longevity indicator has reduced it. Replacement rates decrease from one cohort to the next. According

Figure 9.
The replacement rate at old-age retirement age, when the old-age retirement age has been linked to adulthood length expectancy.



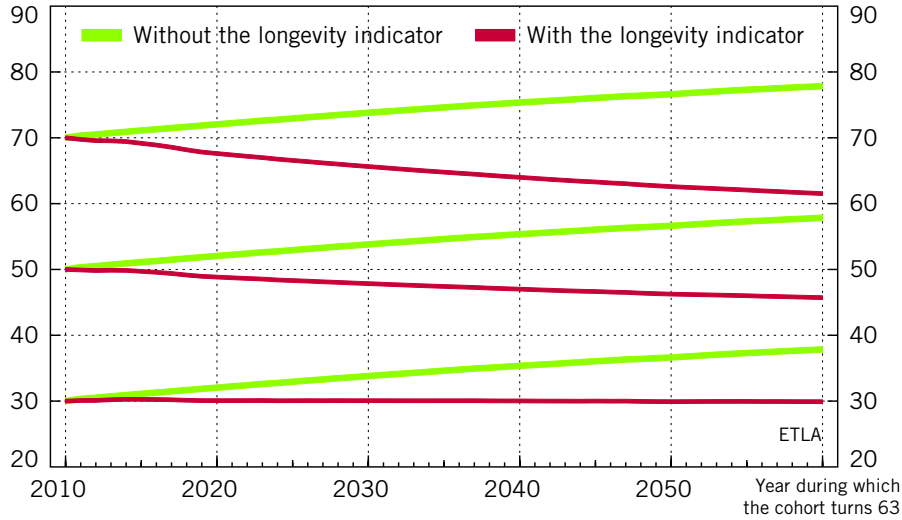
Accrued pension right is 50% of the wage at age 63. Accrual from the age of 63 is 1.9%.

to, for example, Barr (2013), preventing this kind of development is an important reason for raising the retirement age. The upper graph in Figure 9 shows the simple fact that without the longevity indicator, the replacement rate would increase by 1.9 percentage points for each additional year of work. However, the aim of raising the retirement age is to prevent the replacement rate from falling, not to increase it. What is thus needed is some way of cutting the pension right that accrues by the current accrual rates, if the retirement age is linked to the development in life expectancy.

In Figure 10, the review is extended to also cover two other replacement rates. From a 30 per cent baseline, the replacement rate remains the same with the longevity indicator, but a 70% replacement rate will be lowered by almost 10 percentage points by the year 2060. May it be noted that the replacement rates of Figure 10 do not reflect an individual's status in the income distribution. A 70% replacement rate means that an individual's wage from the age of 63 onwards is small in relation to previous earnings. The individual may still have a good income across the life cycle and receive a large pension, or have a medium-size or small income. If the individual has a small income in terms of the life cycle, the earnings after age 63 will be very small. A 30% replacement rate could be typical for a person whose working life has been intermittent and results in a small pension, or for a person

Figure 10.

Replacement rates at the time of old-age retirement age, when the old-age retirement age has been linked to the expected length of adulthood.



Accrued pension right is 30%, 50% or 70% of the wage at age 63. Accrual from the age of 63 is 1.9%.

who returns home to Finland from abroad during the last few years of the working life, and whose total pension may be large.

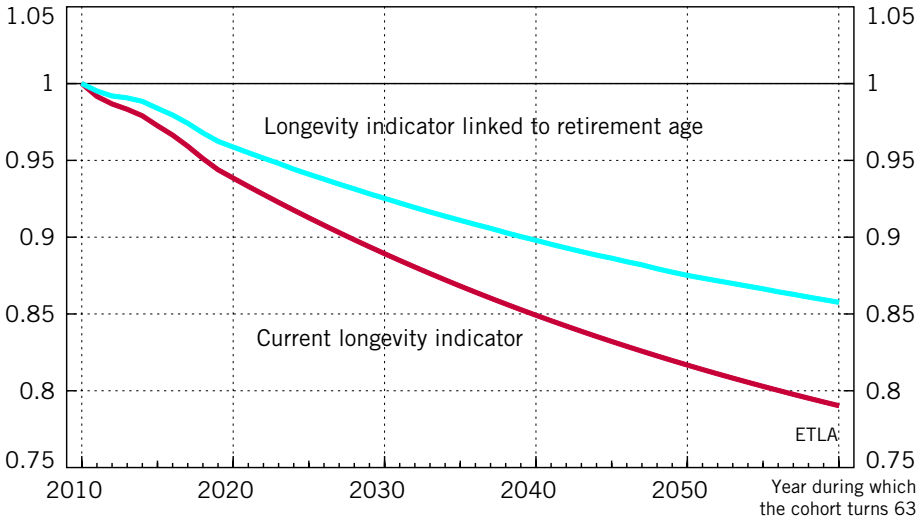
Figures 9–10 may give rise to the opinion that, with the current accrual prior to the pensionable age (1.9% per year), the longevity indicator makes a deep cut in connection with the indexed pensionable age. There is thus reason to consider the bases and aims of the longevity indicator as the retirement age changes.

Longevity indicator linked to retirement age

In the memorandum by the retirement age work group (Lindell, 1999), the longevity indicator and raising the retirement age were seen as alternatives, and a combination of the two was not considered.

The longevity indicator is based on a comparison of capital values between pensions. When the pensionable age rises, one could consider that an increase for deferred retirement is calculated on the capital value connected to the retirement age of 63 years, until the new pensionable age. This increase would soften the effect of the longevity indicator. It turned out, however, that such a procedure would lead to

Figure 11.
Longevity indicator linked to retirement age, when the old-age retirement age has been linked to the expected length of adulthood.



rising replacement rates. Instead, a simple change to the longevity indicator was made by increasing it by two per cent for every year the retirement age increases. Two per cent is the interest rate used in calculating the longevity indicator.

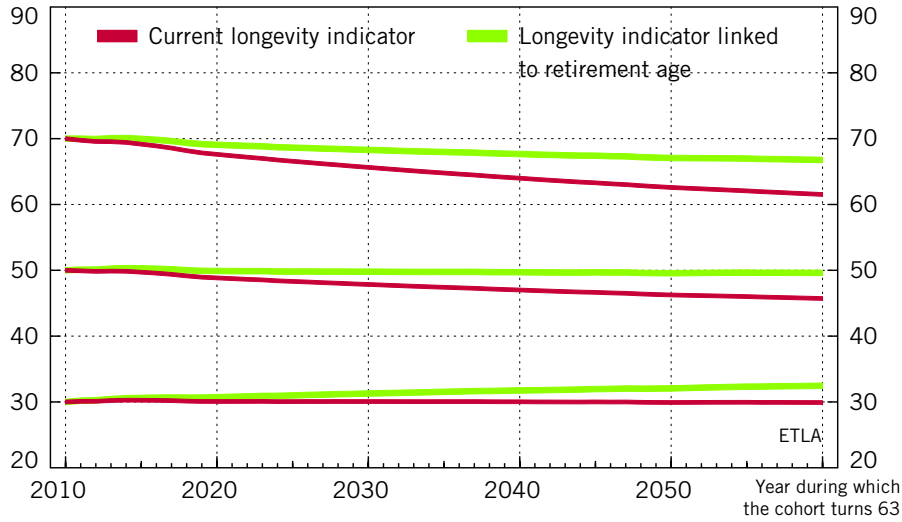
From here on we will review a pension system where extending life expectancy raises the pensionable age, and the increase in pensionable age expands the longevity indicator with the interest factor. In other words, the increase softens the cutting effect that the indicator has on monthly pensions. From now on, we use the terms "longevity indicator tied to retirement age" or "moderated longevity indicator" when talking about the indicator.

Figure 11 presents the longevity indicator tied to retirement age per cohort, when the retirement age increases in relation to the length of adulthood. The time axis shows the year when the cohort turns 63.

Replacement rates rise if the current longevity indicator is replaced with an indicator tied to retirement age. Replacement rates remain roughly the same from one cohort to the next if the pension right by age 63 has accrued at 50% of the wage and the individual works until the pensionable age.

Figure 12.

Replacement rates at the old-age retirement age, when it has been linked to adulthood length expectancy.



The accrued pension right is 30%, 50% or 70% of the wage at age 63. Accrual from the age of 63 is 1.9%.

Capital value of the old-age pension

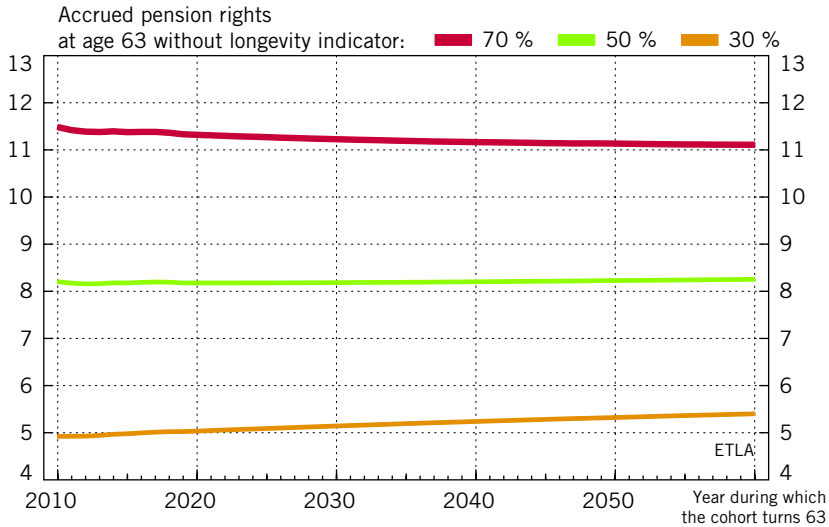
Figure 13 contains the forecasted capital value of the old-age pension, when the pensionable age has been tied to adult age expectancy while other pension rules are the same as now. The accrual is thus 1.9% and the longevity indicator cuts the monthly pension. The discounting has been done to the pensionable age.

Individuals with a 50% replacement rate (without the effect of the longevity indicator) at the age of 63, will receive a capital value on their pension that is roughly the same from one cohort to the next, even if later cohorts have a longer working life than earlier cohorts. Since they also have more years in retirement, their monthly pension (measured with the replacement rate) is also smaller from cohort to cohort, which is apparent from Figures 10 and 12. Capital values decrease per cohort for persons whose replacement rate at the age of 63 is 70%, and increase if the replacement rate is 30%.

The capital values of the old-age pension will rise from one cohort to the next at all replacement rates under review if the current longevity indicator is replaced with a longevity indicator that is linked to the retirement age (Figure 14).

Figure 13.

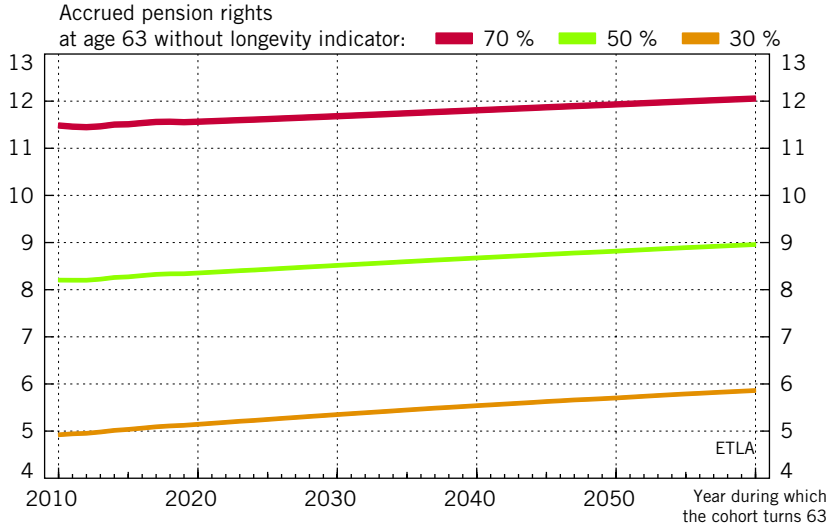
The expected capital value of the old-age pension in relation to the annual wage, when the old-age retirement age has been linked to adulthood length expectancy (the current longevity indicator).



Accrual from age 63 is 1.9%.

Figure 14.

Expected capital value of the old-age pension in relation to the annual wage, when the old-age pension has been linked to adulthood length expectancy (mitigated life expectancy coefficient).



Accrual from age 63 is 1.9%.

Replacement rates and capital values when the retirement age is raised discretionally

When taking the current longevity indicator as given, replacement rates for those working until retirement age can be increased by raising the pensionable age high enough. This naturally does not help those who do not continue working until the pensionable age. However, we shall look more closely at the situation of those who continue their working lives.

Let us assume that the basis for the pensionable age is the situation in 2004 and the ratio of expected retirement years and expected length of adulthood, if retirement takes place at the pensionable age. Figure 7 depicts this situation. Let us further presume that the desired retirement age will be approached steadily from 2017, so that the retirement age for the cohort turning 63 in 2027 will be 67 years. Following that, the retirement age will rise as shown in Figure 7, if the expected lifespan development follows the forecasts.

Figure 15 presents such a longevity indicator linked to pensionable age, together with the current longevity indicator. The rise in retirement age is fast at first, and the increase for deferred retirement calculated based on it raises the longevity indicator

tied to retirement age slightly above one. The indicator will begin to drop following the year 2027.

Figure 16 presents the replacement rates per cohort. With the longevity indicator linked to retirement age, replacement rates will rise steadily until 2027, in other words, the time period during which retirement age will rise relatively quickly. Following that, replacement rates will remain fairly stable. The current longevity indicator, on the other hand, would first lead to a slow increase in replacement rates until 2027, and then to a slow decline. The replacement rate of the cohort turning 63 in 2060 would already have a replacement rate of slightly less than 50%.

Figure 17 contains expected capital values for old-age pension, connected to replacement rates in Figure 16. With the longevity indicator linked to the retirement age, capital values will rise steadily until 2027, and then slow down. The current longevity indicator, on the other hand, would first lead to a slow decline in capital values, after which they would stabilize. The capital value of the old-age pension of the cohort turning 63 in 2060 would be slightly smaller than that for the cohort turning 63 in 2010. When this is compared to the fact that the life expectancy of the cohort turning 63 in 2060 is 6 years longer than for the cohort turning 63 in 2010, but with a working life expectancy almost 7 years longer, it becomes clear that the current longevity indicator can be problematic, especially where raising the retirement age discretionally is concerned. An indicator linked to the retirement age is clearly better, although it may also seem unfair for various cohorts when the retirement age is raised discretionally.

Figure 15.

The mitigated longevity indicator when the retirement age is at first raised in a discretionary manner and the old-age retirement age is thereafter linked to the expected length of adulthood.

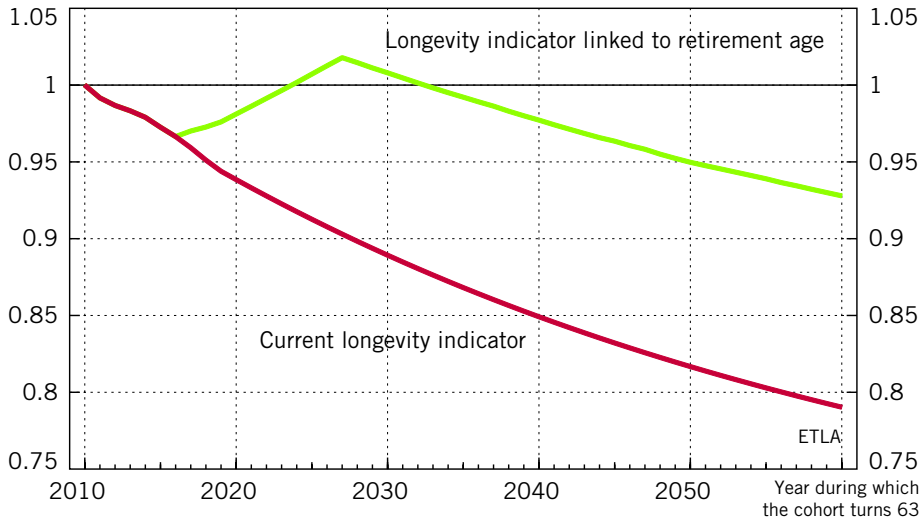
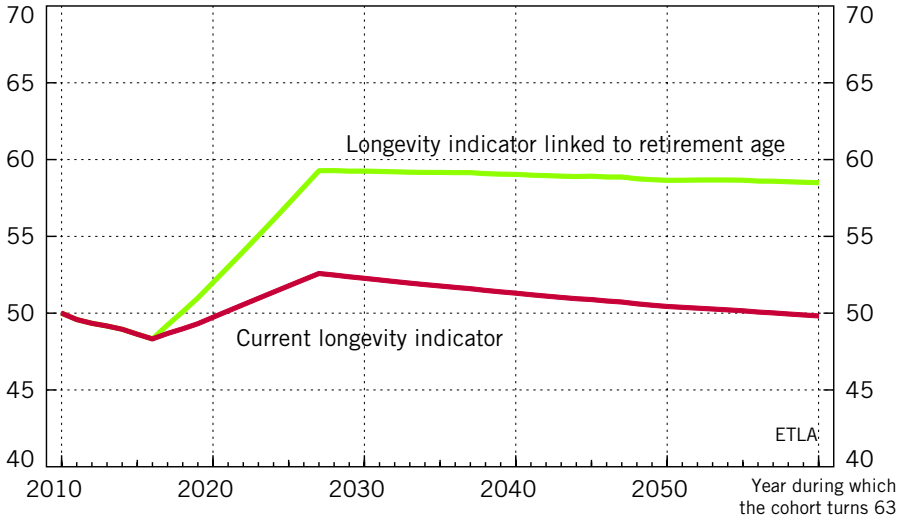


Figure 16.

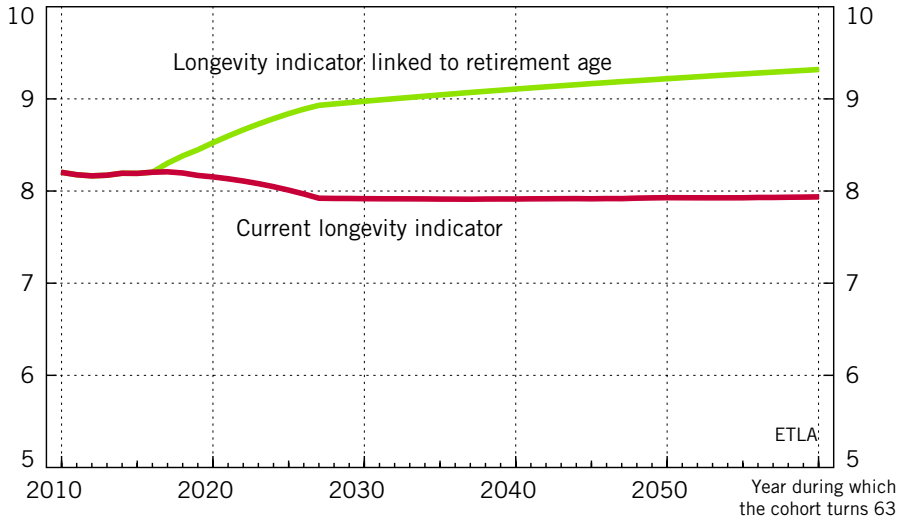
The replacement rate at the old-age retirement age, when the retirement age is first raised in a discretionary manner and the old-age retirement age is thereafter linked to the expected length of adulthood.



Accrued pension rights are 50% of the wage at age 63. Accrual from age 63 is 1.9%.

Figure 17.

The expected capital value of the old-age pension in relation to the annual wage, when the retirement age is first raised in a discretionary manner and the old-age retirement age is thereafter linked to the expected length of adulthood.



Accrued pension rights are 50% of the wage at age 63. Accrual from age 63 is 1.9%.

Cost effects of retirement age indexation

The impact that indexing retirement age has on the expenditure and income of the pension system will next be evaluated with the help of individuals who retire exactly at the pensionable age. Retiring at this stage means that the individual does not continue in working life and begins drawing a pension. If retirement takes place only later, the significant cost effects may be prevented by removing the accelerated accrual rate that follows the pensionable age, and by compensating actuarially for the accrued pension right, according to the suggestion of Barr (2013). This is described at the end of this chapter.

Retiring before the pensionable age

The number of disability pensions may increase if the pensionable age is raised. On the other hand, growth may be small, for two reasons. Firstly, the retirement age will rise fairly evenly and slowly if it is indexed with the expected adulthood. The rate of increase is roughly one month per year. Secondly, disability risks are partly the same as risks affecting the length of life. It is the decrease of these risks that lies behind the extended life expectancy.

Other early retirement routes (the unemployment pathway and part-time pension) ought to be processed so that the desire to use them does not increase as the retirement age rises (see Määttänen's article in this report.) The slow rate of increase in pensionable age does not require any dramatic measures in this respect. The part-time pension could also be made fully actuarial, or removed.

A more detailed estimate of the cost effect of indexing the retirement age (and the effects on the average age of retiring) can only be made through more extensive calculations, as are indeed made in the next article of this report.

Net pension expenditure from the age of 63

As the pensionable age rises from the current 63 years, we can review the capital value of not only the old-age pension but also of the net pension expenditure from the age of 63 onwards. All individuals pay earnings-related pension contributions until the pensionable age, and receive pension thereafter. Contributions include both those of the insured and the employer.

Figure 18 shows the capital values of net pension expenditure that corresponds to individuals in Figure 13. Discounting has been made to the age of 63. Example:

the cohort born in 1980 has been marked for the year 2043, which is when they will turn 63 years of age. Those belonging to this cohort will pay pension contributions until the age of 66, which is the pensionable age (see Figure 8). After that, they will receive a pension for 23 years on average. The net pension expenditure is the present value of the received old-age pension, discounted up to the age of 63, from which the present value of pension contributions paid over the ages 63–65 (contribution of employer and the insured put together) has been deducted.

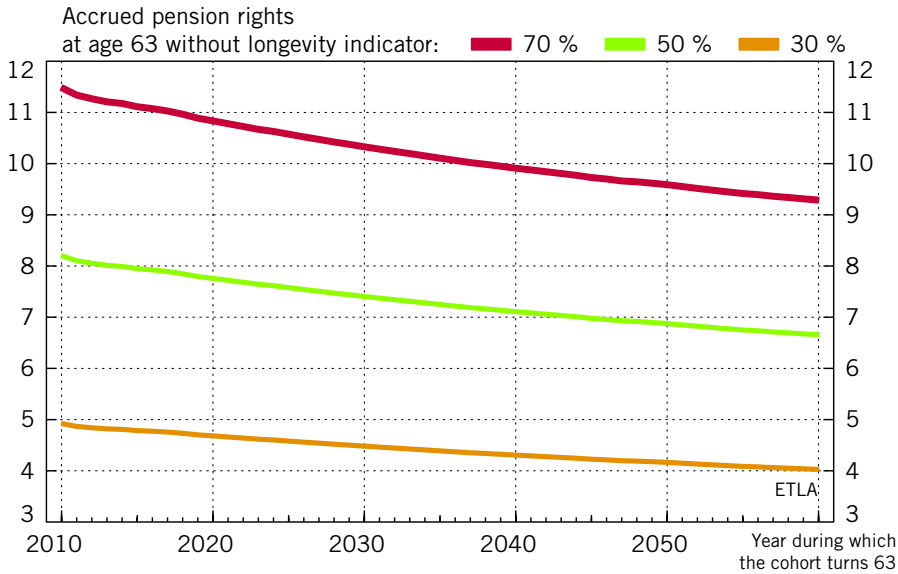
Net pension expenditure decreases from one cohort to the next. In other words, the pension system saves money, compared to persons retiring at 63 under the current rules.

Figure 19 repeats the calculation of Figure 18, but so that the current longevity indicator has been replaced by a longevity indicator linked to retirement age.

The scenarios presented in Figure 19 are desirable in the sense that the capital value of net pension expenditure will decrease even if the capital value of old-age pensions increase, as noted earlier in Figure 14. With the current longevity indicator, net pension expenditure would decrease even more, but the capital value of old-age pensions does not increase in all groups (Figure 13).

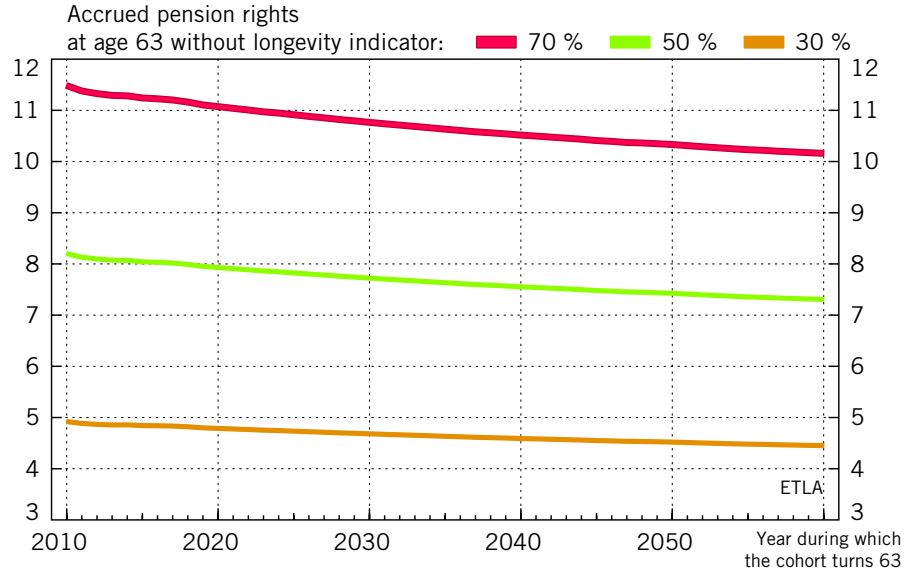
Figure 18.

The capital value of net pension expenditure in relation to the annual wage, when the old-age retirement age has been linked to the expected length of adulthood (the current longevity indicator).



The accrual from the age of 63 is 1.9%

Figure 19.
The capital value of net pension expenditure in relation to the annual wage, when the old-age retirement age has been linked to the adulthood length expectancy (mitigated longevity indicator).



The accrual from the age of 63 is 1.9%

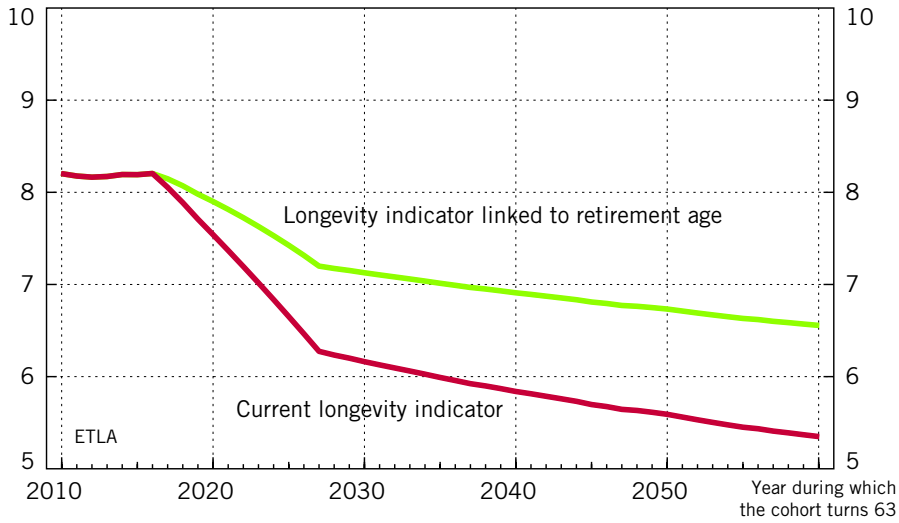
Linking the pensionable age to life expectancy development can thus be carried out so that, when working until pensionable age, the capital value of the pension will grow as a result of the extra work, and at the same time, additional work results in more income than expenditure for the pension system. The rise in pensionable age increases the amount of work in the calculations, and the economic benefit produced is divided between the employee and the pension system.

Net pension expenditure when the retirement age is raised discretionarily

Let us once again examine the alternative where the basis for the pensionable age is the situation in 2004 and the ratio of expected retirement years and expected length of adulthood, if retirement takes place at the pensionable age. It is presumed that the desired retirement age will be approached steadily from 2017, so that the retirement age for the cohort turning 63 in 2027 will be 67 years. Following that, the retirement age will rise as shown in Figure 7, if the expected life cycle development follows the forecasts.

Figure 20 shows the cohort-specific net pension expenditure connected to this alternative; in other words, the present values of old-age pensions that have been discounted to the age of 63 and from which the present value of pension contributions paid (the contributions of employer and the insured combined) from the age of 63 onwards has been deducted. The figure shows the same as Figure 17 did earlier: discretionary increases to the retirement age may result in great differences in how the earnings-related pension system treats consecutive cohorts.

Figure 20.
The capital value of net pension expenditure in relation to the annual wage, when the old-age retirement age is first raised in a discretionary manner and the old-age retirement age is thereafter linked to adulthood length expectancy.



Accrued pension rights are 50% of the wage at age 63. Accrual from age 63 is 1.9%.

What about working after the pensionable age?

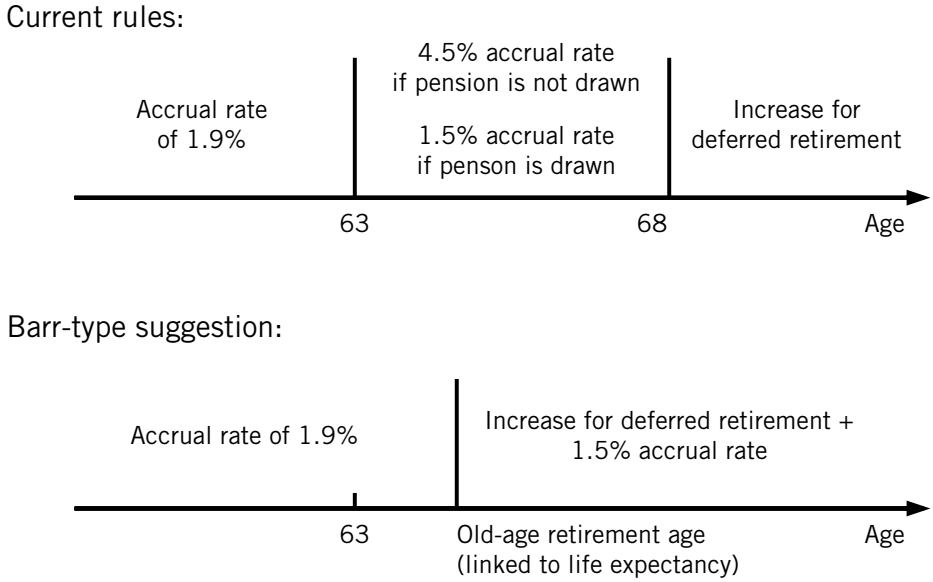
Following the 2005 pension reform, it is easier to plan for retirement in a more flexible manner than before. However, postponing the pension is not always compensated fairly. Simply postponing the pension is nowadays not compensated until after the age of 68. From then onwards, the pension will grow by 0.4% for each month it is postponed. Between the ages of 63–67, the compensation comes in the form of a higher accrual rate, provided you continue working. The accelerated accrual rate creates a large compensation for those whose earnings from the age of 63 are large compared to previously accrued pension rights, and a small compensation for those

whose situation is the opposite. If you do not continue to work, the postponement is not compensated at all.

Professor Nicholas Barr suggests that the capital value of the pension right that has already accrued would remain if retirement is postponed. The pension that has accrued by the age of 63 could grow by, for example, 0.4% for each deferred month (the exact figure would need to be calculated based on mortality likelihood and interest assumptions), in other words by almost 5%, if drawing the pension was postponed by a year. The gainful employment carried out during the year of deferral would accrue more pension, but the accrual rate would be smaller than the current accelerated accrual, which is 4.5 per cent.

Combined with raising the pensionable age, a Barr-type change has been presented in Figure 21. If the pension is drawn after the pensionable age, there is an actuarial increase for the deferred period, and continuing to work will increase the pension in the usual manner.

Figure 21.
Accrual of earnings-related pension (excl. longevity indicator).

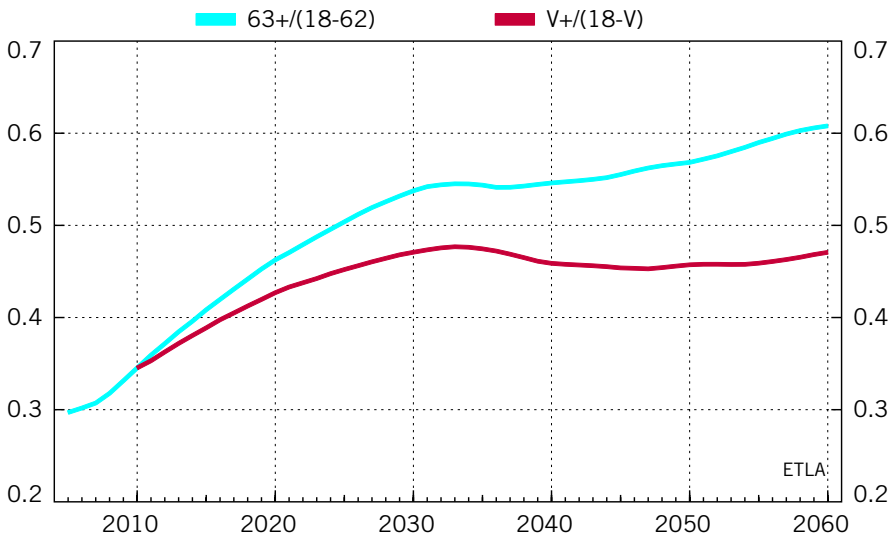


Age dependency ratio based on pensionable age

The development of the capital value of the net pension expenditure gives an indication of the impact that the indexing of the pensionable age would have on the finances of the earnings-related pension system. As a variable at the individual level, it does not provide information on the number of people retiring. Changes in numbers may be observed by calculating the age dependency ratio, based on pensionable age.

The pensionable age linked to the length of adulthood appears to more-or-less standardise the age dependency ratio from the 2030s onwards.

Figure 22.
Age dependency ratio based on old-age retirement age, when the old-age retirement age has been linked to adulthood length expectancy.



Conclusions

There are many alternatives when it comes to linking the pensionable age to the development of life expectancy, and comparing them requires us to make assumptions and choices, for instance when it comes to accruals and the longevity indicator. This report primarily deals with the alternative where the pensionable age is linked to the length of adulthood. The alternative is a faster, discretionary increase in retirement age. Accruals have been kept at their current level in the calculations. The longevity indicator is also kept intact in the calculations, or made subject to an increase linked to changes in the pensionable age.

The central conclusions of this report are:

- Three bases of determining the pensionable age are first reviewed in the report, and they all lead to a similar rise in retirement age, providing that life expectancies develop as expected. As a basis for calculations of pension percentages and the capital value of pensions, we select a retirement age linked to the length of adulthood. Based on the current population forecast, the retirement age would rise by approximately one month per year for the next 50 years.
- The choice of baseline situation has great importance for future retirement ages. The more distant past the selected baseline year, the greater the increase in retirement age that will follow in the years following the implementation of the reform.
- Indexing to the life expectancy is better than a discretional raising of the retirement age, in at least four different ways. First of all, indexing provides a precise reason for the difference in retirement age between two consecutive cohorts. Second, indexing is a good way of preparing for errors in the forecasts. Third, indexing diminishes the need to make new decisions on retirement age, thus making future retirement ages more easy to predict. Fourth, indexing can be fully taken into account in long-term financial calculations, the economic policy significance of which is growing.
- When the retirement age depends on life cycle development, it will be necessary to consider decreasing or possibly replacing the longevity indicator with a mitigated version. Some kind of cutting function is needed, however.
- The longevity indicator linked to the retirement age, in other words the current longevity indicator to which a small increase for deferred retirement is made, appears to be functioning well based on pension percentages and the capital value of old-age pensions – at least for those who work right up until old-age retirement.

- The earnings-related pension system would then work so that extending life cycles would raise the retirement age, and the increase in retirement age would expand the longevity indicator, in other words diminish its cutting effect on pensions.
- The report shows that the retirement age can be linked so that the capital value of the old-age pension would increase for someone who keeps working until retirement, while the net pension expenditure caused by the additional work would become less. If the average pensionable age also rises, indexing the retirement age can thus also improve the finances of the earnings-related pension system, in addition to those of the central and local governments.

In time, the logical aim would be to get rid of all accrual steps, or to link their eligibility ages to the life expectancy (as in the next article). Accrual rates of 1.5% and 1.9% will not, however, cause any significant problems for a long time where amounts are concerned. On the other hand, retaining a 4.5% accrual rate from the age of 63, despite extending life expectancy, would fairly quickly create a growing distortion as the working life is focused to different stages of age. If the 4.5% accrual rate is considered to begin only at the indexed pensionable age, the criticism of Barr (2013) is worth taking into account.

References

Barr, N. (2013): The pension system in Finland: Adequacy, sustainability and system design. The Finnish Centre for Pensions.

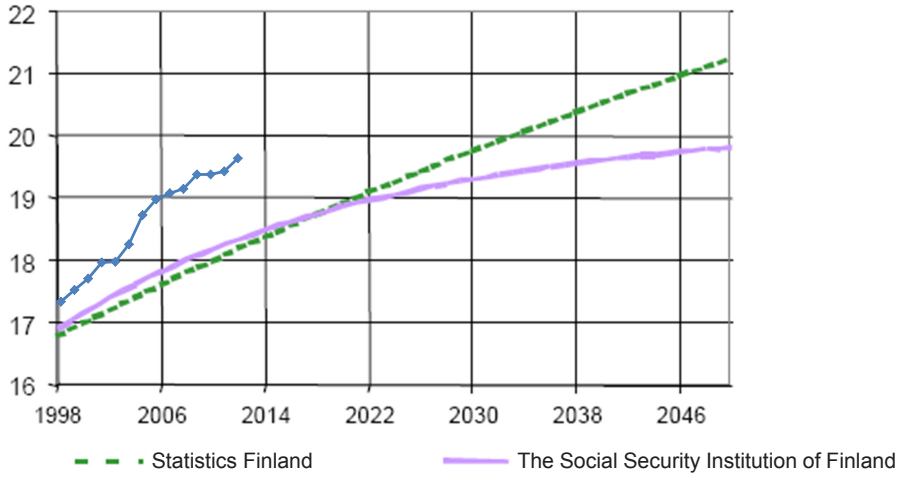
Lindell, C. (1999): Elinaika pitenee: miten käy eläkeiän? Finnish Centre for Pensions, Reports 1998:18.

Appendix: Forecasts and uncertainties

Life expectancy is not easy to predict, and therefore the retirement age linked to it will not develop according to the examples in this report. The basis for Figure A1 comes from the report of the work group preparing the longevity indicator (Lindell, 1999), to which the realized life expectancy of a 65-year-old until the year 2011 has been added. The forecasts for life expectancy in Figure A1 are approximately from the year 1995. An estimate made by the Social Insurance Institution of Finland on the expectancy level in 2050 has almost been reached already, and the estimate of Statistics Finland for the year 2011 has been exceeded by a year and a half.

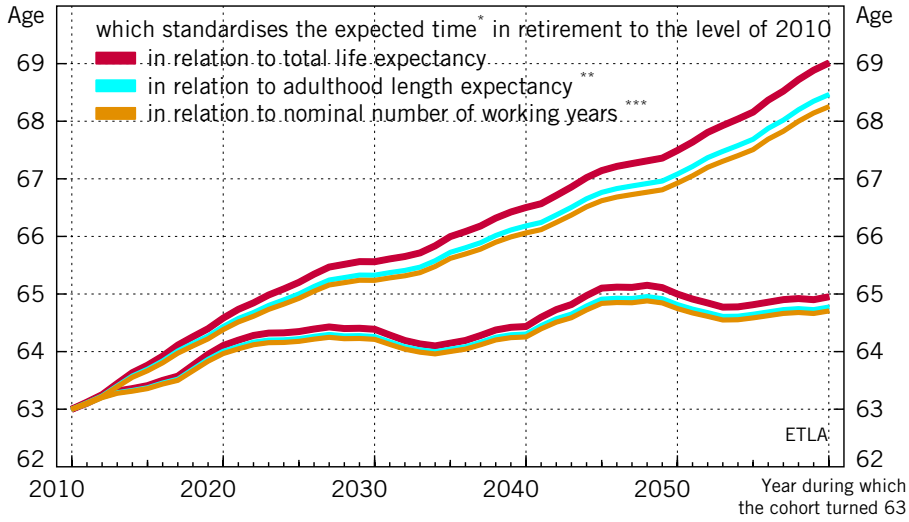
The retirement age will not rise steadily if life expectancy does not rise steadily. The expectancy could also drop. Figure A2 has been made with the help of a population path selected from two stochastic simulations. In these paths, the life expectancy of a 0-year-old in 2060 follows the confidence interval limits of 80%, calculated from 9,000 simulations. 10% of observations exceed the expectancy for population A, and 10% goes below the expectancy for population B. Assuming a strong correlation between the expectancy for a 0-year-old and a 63-year-old, the pensionable age linked to adulthood will be 64.8 and 68.5 years in 2060, with an 80 per cent likelihood. It is not possible to infer likelihoods from observations of other years.

Figure A1.
Life expectancy of a 65-year-old in the years 1998–2050 (Lindell, 1999) and realised life expectancy for 1998–2011.



According to Figure A2, the average rate of increase in retirement age, from one cohort to the next, would with 80% per cent probability lie between just under half a month and just under a month and a half.

Figure A2.
Cohort-specific old-age retirement age (populations A and B),



See explanations in Figure 6.

Jukka Lassila

Example Calculation of the Financial Effects of the Pension Reform

Introduction

In light of an example, this article looks at linking the pensionable age to the development of life expectancies, and the effects it will have on the national economy, the earnings-related pension system, earnings-related pensions and different generations, as well as on the financial sustainability of the entire public finances. The example is described in the previous article in this report: linking the earliest pensionable age to adulthood length expectancy. Linking and other related changes to the pension rules are here called a reform of the pensionable age. The impact of the reform is investigated using a numerical simulation model of general balance, a so-called Finnish Overlapping-Generations (FOG) model. One of the main inputs in the model is the estimate of the impact that raising the retirement age would have on working lives; this estimate is based on the research presented in the article by Määttänen.

The FOG model is a dynamic general equilibrium model, developed in co-operation between ETLA and the Ministry of Social Affairs and Health. In solving the model, the aim is to find time paths for prices, wages and interests so that the work, commodity and capital markets of the economy are stabilized. As a result of economic policy measures, such as the pensionable age reform, the economy settles into a new kind of balance. The model depicts the states of balance as well as the transitional stages in between. In addition to the markets, another core element is the forward-looking decision-making of companies and domestic households, based on optimisation. The FOG model depicts an open economy that trades with foreign countries in commodities as well as capital. The model has been used in, for example, the impact analysis of the 2005 pension reform (Lassila and Valkonen, 2005).

The pension reform of the example calculation extends working lives, thus increasing labour supply. The economy adapts to higher employment rates in many ways. In addition to growth in production, investments increase in order for the capital stock to better correspond to greater work supply. Lower earnings-related pension contributions allow for wages to rise, but the impact of a growing workforce is greater, which means that wages will decrease somewhat compared to the baseline scenario. Consumer prices will also drop. Even though wages decrease, the

increase in number of working hours and decrease in prices will improve the purchasing power of wage earners and thus increase consumption. Some of the benefit spills abroad due to a weakening of the terms of trade.

Extended working lives increase the taxation revenue of the state and municipalities due to growing tax bases. The sustainability gap of the entire public finances will decrease by almost one percentage point.

According to the estimate, the depicted pension reform will decrease earnings-related pension expenditure in relation to the wage sum and lower the earnings-related pension contribution by just under one percentage point from 2018 onwards, and by two percentage points by 2050. Future monthly pensions will not really change as a result of this measure.

The impact of the reform on income distribution between generations is very small. All generations entering working life following the reform will, however, benefit financially to some degree, and the cohorts currently in working life will lose a little.

Baseline scenario

The pension reform is compared to a baseline run, calculated based on rules determining current pensions and pension financing, presuming that earnings-related pension contributions are flexible if need be. The starting point for pension funds is the situation at the end of 2012. The annual rate of return of funds is assumed to be 3.9 per cent and the trend growth on labour productivity in the private sector is assumed to be 1.75 per cent per year. Due to changes in the education structure, the average productivity will grow even a little faster.

The baseline scenario of the population is, practically speaking, in accordance with the 2012 forecast of Statistics Finland. The starting point is more recent; the start of 2013. The update of the population forecast has been made by Juha Alho. The five-year period population of the model is the population forecasted at the start of the period. The first period solved by the model is 2013–2017, and the population of this group is according to the start of 2013.

According to the estimates of Niku Määttänen (see article in this report), an additional 3 years to the life cycle expectancy of a 30-year-old would extend working lives by 6 months, assuming that any health problems are likewise postponed by 3 years. This information has been used in the model in such a way that the change in life expectancy automatically affects the length of working lives at the ratio depicted, even if pension rules were left unchanged.

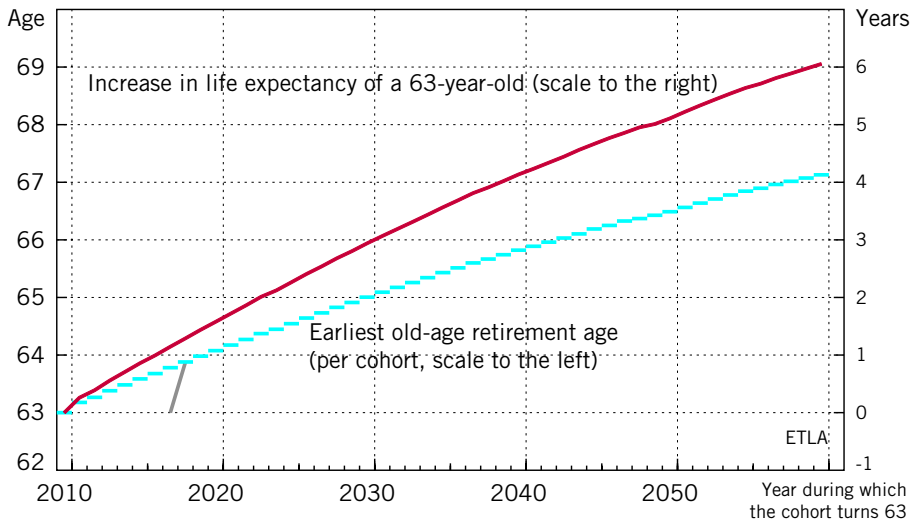
Due to the aforementioned method of simulation, the realized retirement age in a baseline scenario will rise by a year and a quarter at every education level from 2013 to 2063. Together with changes in the education structure, the average retirement age will be postponed by approximately 1.5 years. From the period 2008–2012, the pensionable age will rise by 0.5 years to the period 2013–2017 based on the impact of previous reforms. The final result is an approximate increase in the pensionable age by about two years in 50 years (see Figure 2).

Pensionable age reform

In the retirement age reform, the earliest pensionable age is linked to the adulthood expectancy. Adulthood is defined as having begun at age 18. The pensionable age divides the expectancy for time lived as an adult at the same ratio every year. If the life expectancy of a 63-year-old grows by just over six years over a period of 50 years, this method of linking would raise the pensionable age by four years. Of this time, 10 months occur at the beginning of 2018 (Figure 1). The earliest eligibility age for the part-time pension and the unemployment pathway are changed to the same degree as the pensionable age, since, based on the research in this article, simply raising the pensionable age would not really extend working lives due to an increased use of other exit routes from working life.

Linking retirement age to life expectancy affects the length of working lives. Based on the model used by Määttänen, raising the eligibility ages of the pensionable age, the unemployment pathway and the part-time pension by two years would extend working lives by 7 months. (This estimate has been calculated in a situation where life expectancy has already been extended by three years from the current situation. The effect would be slightly smaller if the current life expectancy was used.) Extending working lives are included in the FOG model, starting in 2018

Figure 1.
The earliest old-age retirement age linked to adulthood length expectancy.



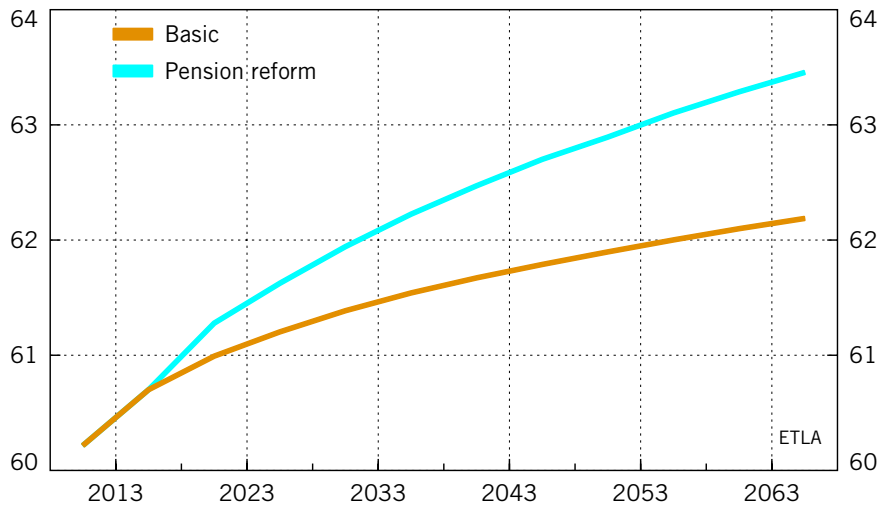
through the pensioner proportion, since the model does not contain pensionable age as a variable.

Figure 2 shows the average retirement age in periods. The retirement age of the first year in each 5-year period (from Figure 1) determines the share of period pensioners in the model so that working lives are extended as assumed. The average retirement age is also affected by the number of people in different age cohorts, making it different from the retirement age expectancy. The retirement age reform raises the average retirement age by over a year by the 2060s, compared to the baseline scenario.

In evaluating the pension contingency reform, three other changes are also made to the pension system of the FOG model. All changes are made to the pension rules of both the private and the public sector.

1. The longevity indicator is mitigated by introducing a small increase for deferred retirement. The method has been described in more detail in the previous article. Figure 3 presents a longevity indicator according to current rules as well as a milder version that is linked to retirement age, providing life expectancy develops according to the population forecast.
2. The accelerated accrual rate (4.5%/y) is removed and postponing the withdrawal of pension past the pensionable age is compensated by an increase for deferred retirement. If a person continues to work past the earliest eligibility

Figure 2.
Average age of retirement.

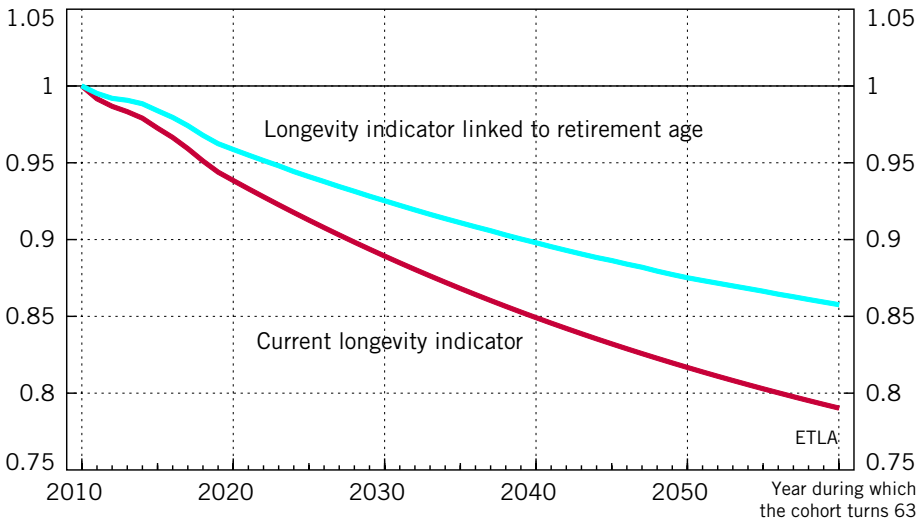


age for old-age retirement limit, pension will accrue at 1.9% of earnings. the accrual rate will change from the current 53 years to ¾ year for each year of change in retirement age. If the development is as predicted in population forecasts, the accruals will become smaller on average.

3. In calculating the earnings-based share of the disability pension, the milder version of the longevity indicator will be used. This is to retain comparability with the old-age pension, if disability sets in close to the pensionable age. The length of projected pensionable service will not be altered.

An alternative to removing the accelerated accrual rate would be for it to remain but for the starting age to rise at the same rate as the pensionable age. From the perspective of public finances and pension financing, the alternatives are roughly the same, and the results of this example calculation apply to both. We find the first alternative to be superior since it treats individuals with different income possibilities more justly, as noted in the report of Nicholas Barr (2013).

Figure 3.
Longevity indicator linked to retirement age and the current longevity indicator.



Macro-economic effects of the pensionable age reform

Linking the pensionable age to life expectancy will extend working lives and therefore increase the labour supply. Adapting to an increase in the labour supply changes all central macro-economic variables (Table 1). Production grows, as do investments. Due to growth in labour supply, wages will decrease slightly compared to the baseline scenario, even though a decrease in earnings-related pension contributions will allow for wages to rise. Income from work will increase, since employment will increase more than wages will decrease. Consumption will grow alongside income from work. Some of the benefits spill abroad due to a weakening of the terms of trade[1].

The pensionable age will rise for the first time during the period 2018–22. Expectations on the rise will cause changes already during the period 2013–17. When it is known that working lives will be extended in the future, there comes a time to take things a little easier, and the labour supply will at first shrink, as will production. However, investments will grow immediately, in order for the capital stock to correspond to the increasing workforce in the future. Consumption will also increase immediately, since wages will at first grow, and there is trust in growing income in the future.

Table 1.
Macro-effects of the pension reform (change from the baseline scenario, percentage points).

	Labour supply	Production	Investments	Private consumption	Wage	Consumer prices	Terms of trade
2013-17	-0.2	-0.1	0.7	0.6	0.6	0.2	0.4
2018-22	0.6	0.4	1.2	0.7	0.1	0.1	0.1
2023-27	1.0	0.7	1.5	0.8	-0.1	0.0	0.0
2028-32	1.3	1.1	1.8	0.9	-0.3	-0.1	-0.1
2033-37	1.6	1.4	2.1	1.0	-0.3	-0.1	-0.2
2038-42	1.9	1.7	2.4	1.1	-0.5	-0.2	-0.3
2043-47	2.2	2.1	2.7	1.3	-0.6	-0.3	-0.5
2048-52	2.4	2.3	2.9	1.4	-0.7	-0.4	-0.6
2053-57	2.7	2.7	3.1	1.6	-0.8	-0.5	-0.7
2058-62	2.9	2.9	3.3	1.7	-0.8	-0.5	-0.8
2063-67	2.9	3.1	3.4	1.8	-0.8	-0.6	-0.8

1 The terms of trade are weakened since lower export prices are needed for export to grow in the model. If the flexibility of pricing in exports were assumed to be very large, this effect would not occur.

Effects of the pensionable age reform on the earnings-related pension system and pensions

Effect on the financing of earnings-related pensions

Table 2 depicts the impact that the retirement age reform will have on earnings-related pension contributions. The impact has been calculated separately for extending working lives, easing the longevity indicator (including disability pensions) and changing the accruals. Each section has been compared to the baseline scenario. The column "Total" depicts the total impact of the set of measures. Table 3 shows corresponding effects on the earnings-related pension expenditure of the private sector in relation to the wage sum.

Table 2.

Impact of the pension reform on the TyEL contribution rate (change, percentage points).

Period	Basic	Working life impact	Moderated longevity indicator	Change in accrual	Total
2013-17	24.1	0.00	0.00	0.00	0.00
2018-22	25.4	-0.90	0.13	-0.04	-0.81
2023-27	26.2	-0.78	0.27	-0.28	-0.82
2028-32	26.7	-0.90	0.43	-0.56	-1.09
2033-37	27.0	-0.99	0.61	-0.92	-1.40
2038-42	26.9	-1.02	0.79	-1.24	-1.61
2043-47	26.1	-1.18	0.95	-1.43	-1.84
2048-52	25.7	-1.23	1.13	-1.62	-1.93
2053-57	25.7	-1.38	1.31	-1.76	-2.08
2058-62	26.1	-1.39	1.51	-1.87	-2.04
2063-67	26.3	-1.42	1.68	-1.95	-1.99

Table 3.

Impact of the pension reform on the pension expenditure of the private sector, in relation to the wage sum (change, percentage points).

Period	Basic	Working life impact	Moderated longevity indicator	Change in accrual	Total
2013-17	22.4	0.00	0.01	-0.01	0.00
2018-22	26.2	-0.55	0.11	-0.03	-0.48
2023-27	28.8	-0.68	0.25	-0.27	-0.73
2028-32	30.3	-0.83	0.41	-0.55	-1.03
2033-37	31.1	-0.94	0.59	-0.92	-1.36
2038-42	31.1	-0.99	0.78	-1.24	-1.59
2043-47	30.3	-1.17	0.95	-1.44	-1.84
2048-52	30.0	-1.28	1.14	-1.63	-1.99
2053-57	30.0	-1.42	1.33	-1.80	-2.14
2058-62	30.3	-1.48	1.54	-1.92	-2.15
2063-67	30.5	-1.52	1.72	-2.00	-2.12

Figure 4 shows the earnings-related pension contribution of the private sector in relation to the wage sum. For both the baseline scenario and the retirement age reform, contributions reach a peak in the 2030s, only to decrease and then rise again in the 2050s. There is an assumption in the calculations that contributions are not flattened out by changing the financing policy.

Figure 4.

Earnings-related pension contributions in the private sector, %.

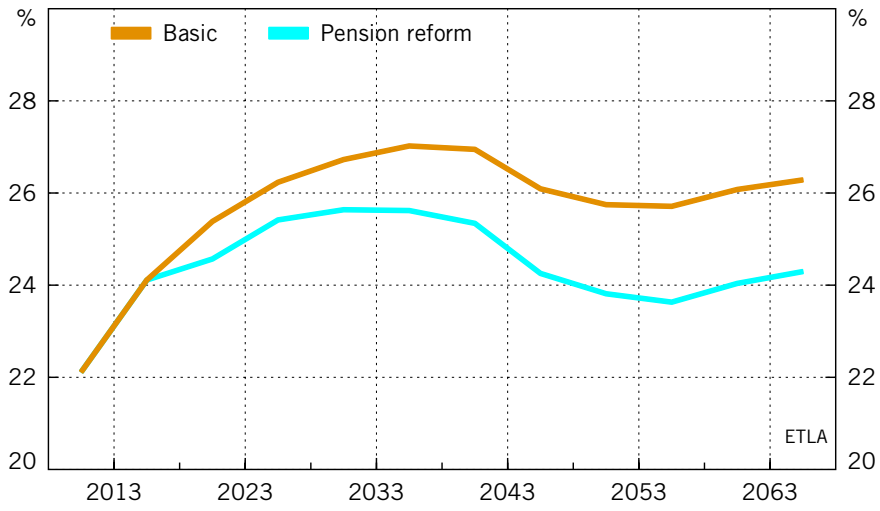
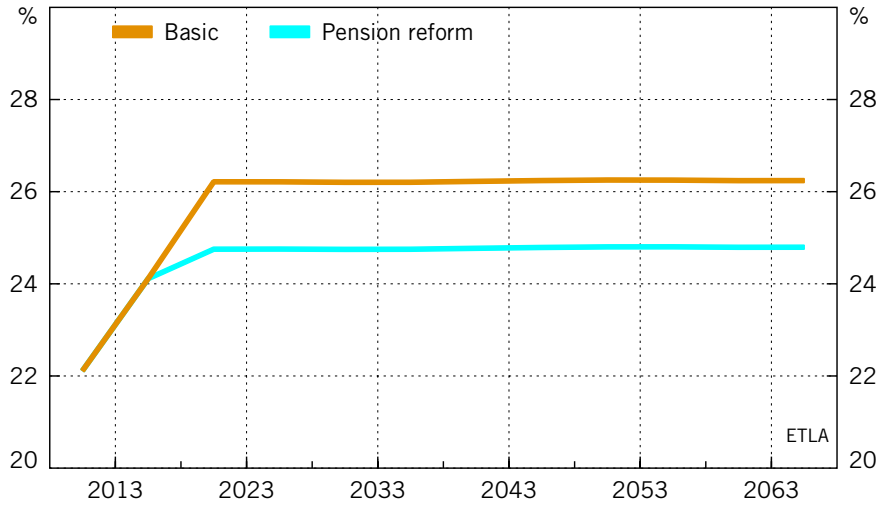


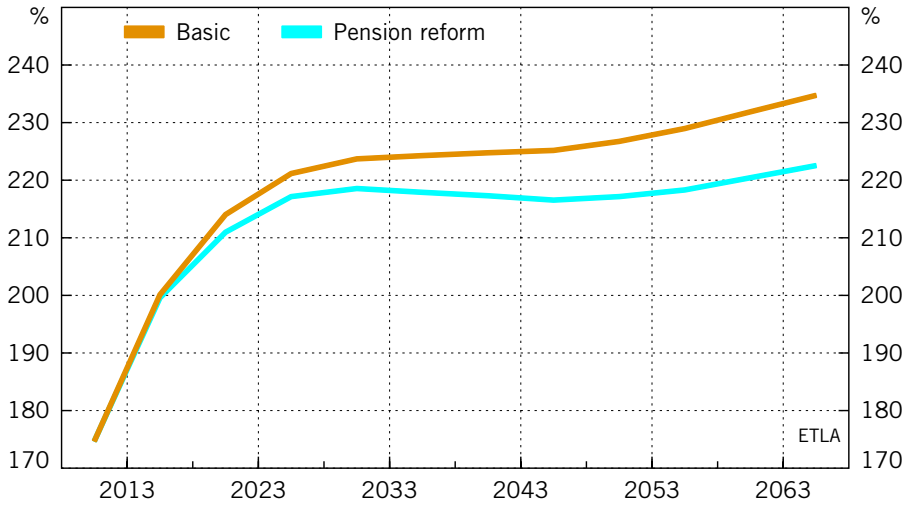
Figure 5 calculates a constant level of contributions from 2018 onwards that would be sufficient for funding pensions over the 50 years under review, and keeping the funds in relation to the wage sum at the same size at the end as they would have been without the contribution being flattened. In the so-called Working Career Agreement, the parties agree that "The earnings-related pension contribution is to be placed on a long-term, stable level of premiums with as stable a development as possible, and with the current division of costs. The aim is a stable situation in 2025." In the pensionable age reform example, such a sustainable contribution level would be aimed for sooner, when the agreed increases to the contributions are implemented. Following the reform, the constant contribution level would be approximately 1.5 percentage points lower than the constant level linked to the baseline scenario.

Figure 5.
Flattened earnings-related pension contributions of the private sector, %.



Earnings-related pension funds would decrease in relation to the wage sum, as a result of the retirement age reform. The reform would extend working lives towards the end, and funds would not accrue for pension rights for those late years with the current rules. The reform would thus expand the pay-go share of the system. Although changes are not that large according to Figure 6, there is also reason to ponder the age limits in the funding rules when changing retirement ages.

Figure 6.
Earnings-related pension funds of the private sector in relation to the wage bill.



The effect on earnings-related pensions

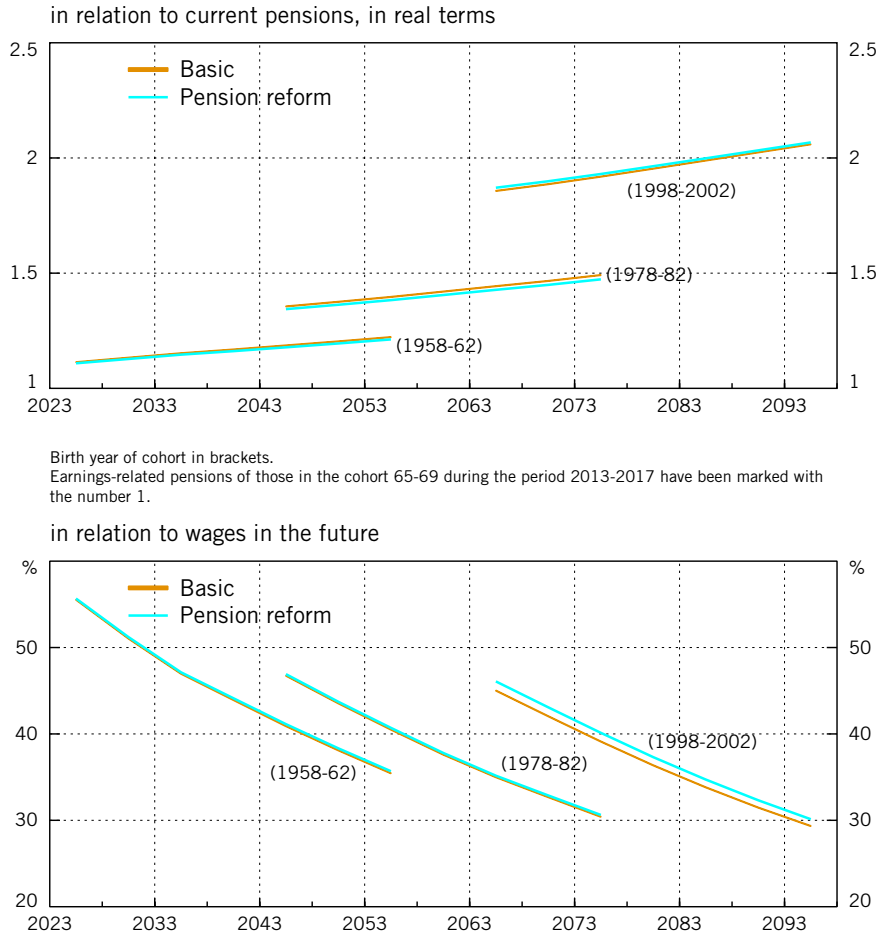
Earnings-related pensions produced by an average working life are examined in Figure 7. It is assumed that the main share of earnings-related pensions is accrued from the private sector, and a smaller share from the public one. In the top part of Figure 7, pensions are compared to earnings-related pensions currently starting. Number one is used to mark the level of earnings-related pensions of the cohorts born 1948–1952 in the years 2013–2017, when the cohorts are between 65 and 69 years of age. Figures for future pensions describe the real value of pensions. In other words, earnings-related pensions for the cohorts born 1998–2002 will, in time, be twice the size of current pensions. This is due to higher salaries. In the calculation, earnings affecting pensions follow productivity in the private sector, which is assumed to grow by over 1.75 per cent per year. The pensions of future cohorts will continue to rise during retirement, in relation to the current level. This is due to the pension index, which partly takes into account the increase in the income level. Figure 7 follows the cohorts until the age of 100 years.

In the bottom part of Figure 7, a comparison is made between pensions and the average wage of the corresponding group of employees paid at the same time. The comparison is thus not focused on the wage history of the individuals themselves. Figure 7 tells us that earnings-related pensions during the first few years of old-age retirement are almost half the wage. As retirement continues, the pension decreases in

relation to the average wage. This is due to the pensioner's index. In reality, pensions do grow, but more slowly than real wages. The longer life cycles grow in the future, the more often individuals will face a situation where the statutory pension is low in relation to the wage level. Since greater pension rights have, in the past, accrued in the public sector than in the private one, starting pensions in, for example, the 2020s will be higher in relation to wages than pensions starting later. Following the 2005 pension reform, the difference in pension rights between the public and the private sector will disappear. This fact, together with the effect of the longevity indicator, is shown in Figure 7 as a gradual decrease in starting pensions in relation to wages.

Figure 7.

Earnings-related pensions of certain example cohorts.



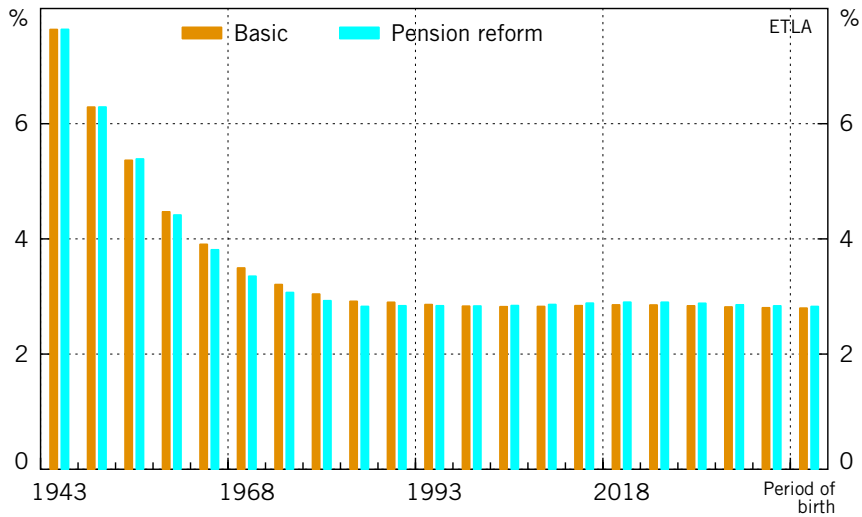
According to Figure 7, the pension reform does not really affect future monthly pensions. The only thing that even slightly stands out from the figure is that the measures will raise the pensions of the cohort born 1998–2002 in relation to the wage level.

Generational effect

The generational effect of the pension reform is evaluated by examining how the rate of return gained from the pension contributions of the earnings-related pension system changes. Figure 8 contains an estimate of the annual rate of return from earnings-related pension contributions to different generations. The contributions include those of both employer and wage earners. Benefits include old-age pensions, disability pensions and all other benefits paid from the earnings-related pension system. Contributions and benefits have been assumed to develop according to current rules in the baseline scenario, and according to renewed regulations in the option. The calculation also takes into account that benefits are continually paid out over an ever-extending life cycle. The rate of return is real, the effect of inflation has been removed. Taxation has not been taken into account.

The cohorts born in the early 1940s are the first to have paid earnings-related pension contribution virtually throughout their entire working lives. They will receive a fairly good yield on their contributions, since contributions paid over their

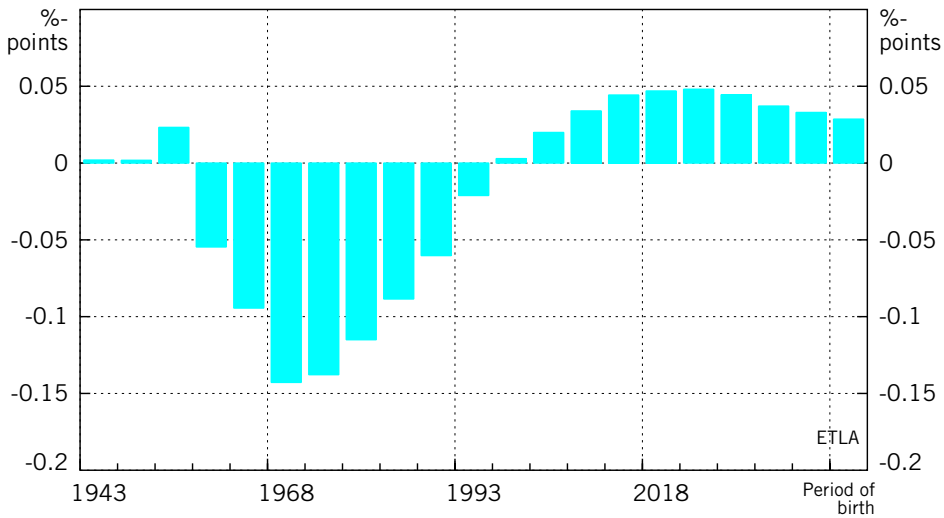
Figure 8.
Generational rates of return of the earnings-related pension scheme.



working lives have been clearly lower than they currently are. The same applies to the large cohorts born towards the end of the 1940s. They have also not had to finance the full pensions of previous generations. Real rates of return decrease over time: the yield of those born in the 1950s is slightly larger than for those born in the 1960s, which, again, is slightly larger than for those born in the 1970s.

The pension reform has very little effect on the generational rates of return. In the scale of Figure 8, changes are hard to discern. They show up more clearly in Figure 9. Although the impact of pension reforms on generational rate of return is small, it is worth noting that the rate is shown at the annual level and the effects last for decades. Those benefiting from the reform will be the cohorts joining the workforce in the future. Those starting to work in the 2030s and 2040s, in other words those born in the 2010s and 2020s, will benefit the most: 0.04-0.05 percentage points added to the annual yield. Another group that will benefit is those joining the workforce before the latter half of the 1970s, but the advantages are smaller. Those joining in the early 1970s will receive a profit exceeding 0.02 percentage points. Everyone joining the workforce at the end of the 1970s and later, up until the present day, will receive a smaller rate of return due to the package. Those starting work at the end of the 1980s and in the 1990s will lose roughly 0.1 percentage points.

Figure 9.
Impact of the pension reform on generational rates of return.



Effect on public finances

In the baseline run, the tax rates of the state are kept stable over time, while the net debt of the state is flexible. The local government debt in relation to overall production is kept stable and municipal taxes fluid, so that the collected taxes are sufficient to finance health and care expenditure and other such costs. Earnings-related pension contributions are flexible around pension financing needs and funding regulations, as described above. The state's gross debt is estimated at 53.3% of GDP at the end of 2017. If we include municipal debt, the public debt is closer to 60%. In the baseline scenario of the population there is a structural surplus in the finances, and the debt will shrink in relation to the total production. The gross public debt is approximately 30% of GDP (that of the state, 23.5%) towards the end of the period 2063–67. The tax rate will go up, however. At the starting point of the baseline calculation, the sustainability gap for a period of one hundred years is 1.7%. How the sustainability gap is calculated has been depicted in the Appendix.

The retirement age reform extends working lives as life cycles become longer. Extending working lives has a positive effect on both the central and local government finances, as tax bases grow. Table 4 shows the impact that the set of measures will have on the main indicators of certain public finances. If the development will take place as predicted in the current population forecast, the sustainability gap will decrease by 0.9 percentage points.

Table 4.

Impact of the pension reform on public finances (change, in percentage points).

Period	Net tax rate	Public debt/GDP	Average municipal tax	TyEL contribution
2013-17	0.0	0.0	0.0	0.0
2018-22	-0.3	-0.4	-0.1	-0.8
2023-27	-0.3	-0.8	-0.2	-0.8
2028-32	-0.4	-1.4	-0.2	-1.1
2033-37	-0.5	-2.0	-0.3	-1.4
2038-42	-0.6	-2.7	-0.3	-1.6
2043-47	-0.7	-3.6	-0.4	-1.8
2048-52	-0.8	-4.5	-0.4	-1.9
2053-57	-0.9	-5.5	-0.4	-2.1
2058-62	-0.9	-6.5	-0.5	-2.0
2063-67	-0.9	-7.5	-0.5	-2.0

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Appendix: Calculating the sustainability gap as taxes and debts change

In the example calculation by ETLA, state taxes have been modelled based on fixed tax rates. The tax accrual varies due to the extent of tax bases and the progressiveness of earnings. The financial assets of the state are kept in standard ratio to the overall production, and the net debt and the gross debt are flexible. Local government debt remains in standard ratio to overall production. The pension funds of the private sector fluctuate in accordance with current funding regulations. The ratio of the state and municipal pension fund to the public wage sum has been fixed. The municipal tax rate is endogenous and balances the economy of municipalities together with state aid to municipalities. Earnings-related pension contributions are endogenous. As a whole, the tax rate and net indebtedness of the large public sector are determined based on a model solution.

The sustainability gap is calculated with the help of results from the model. The calculation looks at the expected long-term disparity between public expenditure determined according to current tax rates and current procedures, and consolidates that into a single figure.

The sustainability gap is the difference between the current tax rate (the situation at the time of the calculation) and the hypothetical constant tax rate. The hypothetical tax rate is such that, if it were transferred to immediately, it would be sufficient to cover the expected public expenditure and to keep public net indebtnedness at the initial level.

More precisely put, the sustainability gap presented in this report describes how much higher than the current tax level such a standard tax level is that, if taxes were raised to said level immediately and permanently, they would be sufficient to finance public expenditure for the next 100 years and return the public net debt in relation to overall production to the starting level. This would occur when 1) surplus collected during different years are invested in obligations, and deficits are covered by selling obligations, 2) the discounted surpluses and deficits cancel each other out, 3) the financial assets of the state and the net assets of local governments remain in standard ratio to the overall production, and 4) pension funds develop in accordance with current funding rules.

The deficit calculation is based on a hypothetic total tax rate. It does not take into account the effect that the immediate and permanent raising of taxes – necessary for reaching a standardized tax rate – would have on the labour supply, household savings and the decisions of companies. This impact is different depending on which specific tax rate is increased. If one wanted to take these effects into account, the

size of the sustainability gap would depend on which taxes would be raised to close the deficit gap.

The gross national product of period t is marked *Y(t)* and the total tax rate with the term $\tau(t)$, public net debt (i.e. the debt of the central and local governments) at the end of the period is marked *V(t)* and the net tax rate at the starting point is marked with the term $\tau(t(0))$. The interest rate *r* is assumed constant. The forward-looking sustainability gap (*s2*) calculated in period *t(0)* to period T is then

$$s2(t(0),T) = \frac{\sum_{t=t(0)}^{t(0)+T} \left[\tau(t) - \tau(t(0))\right] Y(t) D(t) \; + \left[V(t(0)+T) - V(t(0)-1) \frac{Y(t(0)+T)}{Y(t(0))} \right] D(t(0)+T)}{\sum_{t=t(0)}^{t(0)+T} Y(t) D(t)} \quad (1)$$

where the discount term *D(t)* is

$$D(t) = (1+r)^{-(t-t(0))} \quad (2)$$

The first term of the numerator in the first formula describes the effect that changing pension contributions and municipal taxes have on the sustainability gap, and the second term describes the contribution of the change in net public debt.

Tarmo Valkonen

Pensionable Age in Other Nordic Countries

Recent changes to regulations

In the following we will briefly describe the regulations based on which the right to withdraw old-age pension is granted in the other Nordic countries, now and in the future. The pension systems of these countries, and discussions on reform, offer interesting points of comparison to the situation in Finland. The OECD has summarized the retirement age discussion by stating ”67 – or higher – is becoming the new 65” (OECD, 2012), which refers to the general trend of making 67 the pensionable age. The same conclusion is reached in the comparison by the Finnish Centre for Pensions, according to which the retirement age in nine EU15 countries and the United States will be at least 67 in 2030.[1]

In the statutory pension system of **Norway**, old-age pension can be awarded as earnings-based pension and national pension. In addition to vocational pensions, the 2nd pillar covers the AFP system which enables early retirement. A majority of all employees participate in this system.

1st pillar pensions had a pensionable age of 67 prior to the 2011 pension reform. However, it was possible to receive pension from the AFP system between the ages 62–66, even to the extent that the actual retirement age had little impact on the size of the pension. Postponing the pension beyond 67 years also did not produce any increase for deferred retirement (Christensen et al, 2012).

The 2011 pension reform introduced a flexible retirement age between 62–75 for the earnings-related system. Taking the pension early, before 67, does require that the combined earnings-related pension, national pension and reformed AFP pension has accrued to an amount equal to the full national pension prior to retirement. For those receiving national pension only, the retirement age is still 67 years (OECD, 2013).

Earnings-based pension can also be withdrawn in parts (20%, 40%, 50%, 60%, 80% or 100 %) and it is possible to work and withdraw a pension at the same time. The wage earnings forming the basis for accruing earnings-based pension has a comparatively low ceiling (approximately 115% of the average wage). Since the national pension is also reduced based on the pension from earnings, the connection between wages earned and the old-age pension of the 1st pillar is strong only in a narrow wage income range (Valkonen, 2012).

1 http://www.etk.fi/fi/service/eläkeiät/634/eläkeiät.

Since 2011, the old-age pension has been adapted to life expectancy with the help of an annuity divisor. The basis of calculating the annuity divisor is the life expectancy of the cohort at 61 and the retirement age. The divisor is used to actuarially distribute the pension capital accrued for the wage earners in accordance with the expected time spent in retirement. In other words, Norway has begun implementing a technique planned in the Swedish NDC system, where the pension is adapted to the extended life expectancy and the age when the pension is first withdrawn.

In the new system, AFP rights have been changed into supplementary pension that can be drawn from the age of 62 and for the rest of one's life. An annuity divisor is applied also here. Making the AFP actuarially fair, and the notable decrease in the monthly pension, served to significantly decrease incentives and the opportunities for retiring early based on the pension offered by the system.

The new AFP rules apply to the private sector, holding approximately 70% of the workforce. The public sector retained its previous regulations on early retirement. Another issue that narrows the importance of pension reform regarding average effective retirement age is the comparatively easy access to disability pension. Colombino et al. (2012), in their simulation results, suggest that the pension reform decreases the (already low) share of 60–67-year-old retirees in the cohort by 3 percentage points, assuming that consumption can be evened out with the help of the credit markets.

The pension reform evaluation of Christensen et al. (2012) trusts that the implementation of the annuity divisor will significantly raise the retirement age in the future. The estimated change in behaviour is, however, more an assumption than a research result. The greater effect can likely be found in the reform removing incentives for retiring early in the private sector. Retaining generous AFP regulations in the public sector decreases the interest of employees in transferring to the private sector.

In vocational pension systems, the retirement age prior to the reform was generally 67 years. A flexible retirement age has been introduced following the reform. The size of the pension is dependent on the age when the pension is first withdrawn.

In the public pension system of **Denmark**, the emphasis is on a comparatively generous national pension, awarded from the age of 65. The national pension is raised by an additional proportion if other income is scant. The opportunity for early retirement in the form of the *efterlön* system has been important to the realized retirement age. This contribution based early retirement scheme allows currently exit from labour markets from the age of 60 onwards. The number of users has dropped in the last few years but still accounts for close to a third of all 60–64-year-olds.

Over the years 2019–22, the retirement age for national pensions will gradually rise to 67 years. This age will be linked to the life expectancy of a 60-year-old so that the retirement age will be raised in full, but only after a lag of 15 years. The life

expectancy is calculated for the first time in 2015 and will thus be used to determine retirement age in 2030. If the used population projection comes true, the national pension age will rise to 68 years by 2030, due to the life expectancy link.

The aim is to keep the expected retirement period at 14.5 years after 2030, in other words the same as during the period 2004–2005. The retirement age of a certain cohort is determined by calculating the life expectancy at the age of 60 for a cohort born 15 years earlier, and deducting 14.5 years. The age arrived at is then rounded off to the closest half year (Social- og Integrationsministeriet, 2013a). Adjustments to the retirement age are made every five years.

The eligibility age for the early retirement pension (*efterlön*) will rise to 62 years between 2014–17, and to 64 years by 2023. Thereafter it will rise at the same speed as the national pension retirement age, meaning that early retirement may last three years rather than the current five (Social- og Integrationsministeriet, 2013b). The agreement to raise retirement ages and linking them to life expectancy was made already in 2006, but the schedule was made faster in the 2011 reform, and the early retirement period was cut by two years. The Danish Ministry of Finance estimated that this last reform would increase employment by 65,000 persons and lower the sustainability gap by 0.5 percentage points by 2020. The retirement age is rising to 67 years also in 2nd pillar pension systems.

Sweden employs a flexible retirement age between 61–67 years of age in the mandatory earnings-based pension scheme (inkomstpension) that came into force in 1999. For many other social security benefits, such as the guarantee pension, the eligibility age is 65 years. This age has become the norm that is clearly used the most in retiring. The pension can also be drawn in parts, like in Norway. Also the size of the pension is adjusted by an annuity divisor to life expectancy and retirement age, as in Norway. While the life expectancy adjustment has been in force, retirement age has gradually been advanced, but not as much as expected.

The extension of life span and the retirement behaviour has led to discussions in Sweden on the need to reform. The retirement age committee handed in a report to the government in the spring of 2013 (SOU 2013:25, 2013). The report suggests several new ways of extending working lives. The central idea is to first raise the pensionable age and later link it to life expectancy through a so-called recommended retirement age.

According to the suggestion, the lower limit of the earnings-based retirement age would first be raised to 62 years by 2015, and linked to the recommended retirement age in 2019. The earliest eligibility age for retirement in the current population forecast will rise to 63 years immediately in 2019. The report states that additional clarifications are needed of whether there is a need for downward flexibility from this limit, if the career has been long. The upper limit of earnings-based retirement age will be raised in 2016 from 67 to 69 years, and linked to the recommended re-

tirement age. The guarantee pension is linked to the recommended retirement age, and is expected to rise to 66 years by 2019.

The starting point for this reform proposal is that the retirement age of the previous reform was calibrated according to the population forecast of 1997, and the recommended retirement age needs to be raised in relation to the changes taking place since. The recommended retirement age is calculated as follows: at the age of 65, 2/3 of the expected increase in life expectancy of a 65-year-old is added. This increase is calculated by deducting the 1997 life expectancy for 65-year-olds from the life expectancy for 65-year-olds of the year in question. The increase is rounded off to the nearest year. The calculation will begin in 2015 and will be applied for the first time in 2019, i.e. with a four-year delay.

Population forecasts can be used to try to predict the development of the recommended retirement age. In Swedish population forecasts, the speed at which the probability of death for men decreases is being lowered to be the same as for women. As a result, the forecast for the standard retirement age will rise quickly at first and then slow down. According to the latest forecast, increases will be implemented in 2019 (66 years), 2022 (67 years) and 2038 (68 years). If this proposal is implemented and the population forecast comes true, the eligibility ages for flexible retirement in Sweden in 2022 will thus be 64–71 years. The pension committee evaluated that the increase in pensionable age would boost employment among 63–67-year-olds by 27,800 persons by 2020.

In vocational pension systems the pensionable age is 65, but early retirement is common. It is suggested that the taxation legislation is reformed so that pension contributions will be tax-deductible only in contracts where the retirement age is at least 62.

The pensionable age in the **Icelandic** national pension system is 67 years. The normal retirement age in the mandatory earnings-based pension system is also 67 years, but the retirement age can be flexibly changed between the ages of 65–70, with the size of the pension following suit (Jónasdóttir, 2007).

Summary and comparisons

Extending life spans is not considered a great problem in Norway and Iceland, where retirement already takes place later than average. At least not yet. The new Swedish reform proposal came about due to disappointment with the impact that the previous reform had on retirement and concern over pension sufficiency as life spans extend. In Denmark, there is a drive to postpone the retirement age, but also to control the costs of the comparatively generous national pension.

In Finland, Norway, Sweden and Iceland, the retirement age has been made flexible and, practically speaking, this is also the case in Denmark, on account of the *efterlön* system. In Denmark, the reaction to extending life spans has been to link retirement age to life expectancy so that the expected time spent in retirement is stabilized. This increases the length of careers in relation to time spent in retirement, for as long as life spans are extended. In the Swedish proposal, 2/3 of the extended life span would be used for work and 1/3 for retirement. Both countries have considered it necessary to raise the earliest eligibility age for retirement before implementing the link to life expectancy.

In Norway, there is still faith that removing the incentives for early retirement and adapting pensions to the life expectancy will raise the retirement age to a sufficient degree. The pension capital accrued in Norway and Sweden will be divided by an annuity divisor, which adjusts pensions taking into account the starting age for pension withdrawal and the life expectancy.

From the Finnish point of view, the most important thing in the Nordic reforms is that the ages entitling to pension are rising elsewhere, providing a competitive advantage due to lower earnings-related pension contributions. It is to be noted, however, that raising the retirement ages may also have a negative impact on profitability, if wages do not adjust to the potential individual productivity decline. Finland has the lowest employment rates among the elderly workers, the longest time spent in retirement and the largest fiscal sustainability gap, and therefore the highest pressure to extend working lives.

The details of the Nordic reforms are also interesting, as there are many common denominators. Taking from others could in Finland mean, for example, raising the lower limit of the flexible eligibility age this decade and linking both the limits to life expectancy in the 2020s, at a ratio of time spent in working life and retirement that is considered suitable. Changing the raised accrual rates to an actuarial increase for deferred retirement is also on the to-do list. In the spring of 2013, the European Commission suggested that Finland links the earliest eligibility age for flexible retirement to life expectancy.

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The Finnish Centre for Pensions is a statutory co-operation body, expert and producer of joint services for the development and implementation of earnings-related pension provision. The aim of our research is to produce high-quality, widely applicable information for the evaluation and development of pension provision.

Eläketurvakeskus on työeläketurvan kehittämisen ja toimeenpanon lakisääteinen yhteistyöelin, asiantuntija ja yhteisten palveluiden tuottaja. Tutkimustoiminnan tavoitteena on tuottaa korkeatasoista ja laajasti hyödynnettävää tietoa eläketurvan arvioimiseen ja kehittämiseen.

Pensionsskyddscentralen är ett lagstadgat samorgan och sakkunnig inom verkställigheten och utvecklingen av arbetspensionsskyddet. Vi producerar gemensamma tjänster för arbetspensionssystemet. Vår forskning har som mål att ta fram högklassig information som nyttiggörs på bred front vid bedömningen och utvecklingen av pensionsskyddet.

Finnish Centre for Pensions
ELÄKETURVAKESKUS