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Pension Reform in Norway

Microsimulating effects on government expenditures, labour supply incentives and benefit distribution

Abstract:
A much higher old-age dependency ratio, together with more generous pension benefits, will lead to a substantial increase in the future public pension expenditures burden in Norway. A pension reform implemented from 2010 will imply a shift to a quasi-actuarial system, seeking to neutralise the expenditure effect of further growth in life expectancy and strengthen ties between former earnings and pension benefits. Labour supply will be stimulated by lowering implicit tax rates and by aligning the social and private costs of early retirement. Using a large dynamic microsimulation model we find that the reform will stimulate labour supply and reduce the future tax burden, but also increase inequality in the benefits received by old age pensioners.

Keywords: Pension reform, social security, retirement, pension expenditures

JEL classification: H53, H55, J26

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1. Introduction

Like most OECD countries, Norway will face an ageing population in the coming decades. A significant increase in the old-age dependency ratio, together with more generous pension benefits as the present Norwegian social security system matures, will lead to a substantial increase in the future pension burden. Awareness of these problems and a discussion of how they should be met have led to pension reforms in several OECD countries during the last couple of decades. Comprehensive studies of the situation may be found in reports from the OECD (1998), the EU Commission (2001), Kotlikoff and Leibfritz (1999) and Disney (2000). In a survey, Lindbeck and Persson (2003) shed light on some main principles of pension reforms, discussing the effects on efficiency, distribution and financial stability. They conclude that the reforms in the various countries in the recent years show a strong tendency in the direction of more actuarial pension systems that combine pay-as-you-go financing with funded elements and greater individualization.

In countries like Greece, Hungary, Italy, Korea, Portugal, and Switzerland financial consolidation of the pension system has been secured by parametric pension reforms cutting benefits. Sweden, Japan, and Germany have in recent reforms reduced the real value of pension benefits by shifting from wage indexation to price indexation (or a combination). In countries like US, Germany, Italy, Japan and New Zealand the capital values of the pension benefits have been reduced by rising the retirement age, and in some countries, like UK and Belgium, formal retirement age for women is increased to become more equal the retirement age for men. Higher retirement age is a powerful way to improve financial stability because a reform in this direction simultaneously increases the number of workers and decreases the number of pensioners. According to the suggestions by Feldstein (1998), the social security systems in the US and Canada have been changed in the direction of funded systems, although the actuarial elements are rather week. Similar shifts are carried out in France, Ireland and the Netherlands. Several countries like Italy, Latvia, Poland, Finland and Sweden[1] have moved from quite non-actuarial pay-as-you-go systems to quasi-actuarial systems with notional accounts. Argentina, Chile and Mexico have made full shifts to actuarially fair funded systems.

In Norway, a Pension Commission was appointed in 2001 to prepare a reform to control growth in the future old age pension expenditures of the Norwegian National Insurance Scheme (NIS). Inspired by reforms in Sweden and Finland, the Commission's report (NOU 2004:1) proposed to move from the

[1] A description of how a notional defined contribution scheme works related to the pension system in Sweden, is given by Palmer (2003).

present pay-as-you-go system, with a rather weak connection between former labour incomes and pension entitlements, to a quasi-actuarial system neutralizing the effects from further growth in life expectancy. In addition to reducing growth in future pension benefits, the proposal aims to stimulate labour supply through postponed retirement and increased labour supply among those in the labour force. The suggestions have been followed by two White Papers from the Government (St.meld. no. 12, 2004-2005, and St.meld. no. 5, 2006-2007). Norwegian Parliament approved the main principles for the reform in 2005, and further details in April 2007.

The purpose of the paper is to give an overview of the reform by outlining and discussing its effect on labour supply, public expenditures and income distribution. Actual pension systems are complex and include non-linearities. Different parts of the population may face different rules, and there may be substantial problems of aggregation in calculating the total effect on government budgets of changes in tax or pension systems. To meet these problems use of microsimulation models, as advocated among others by Orcutt et al. (1986), has been more and more common in the last few decades to support governments with analyses regarding the effects of different social and financial policies. The basic idea in microsimulation modelling is to represent a socio-economic system by a sample of decision units (e.g. persons), and then model the behaviour of these primary units. Contrary to what is possible in a macroeconomic approach (CGE and OLG models), the detailed and complicated tax and benefit rules may be exactly reproduced. Aggregated numbers are obtained by multiplying the variable of interest for each unit with its sample weight and then summing across the sample.

A detailed dynamic microsimulation model is especially designed to analyse the *mechanical effects* on individual pension entitlements, benefits, and government pension expenditures of changes in the Norwegian public pension system. By *mechanical effects* we mean effects ignoring behavioural responses and general equilibrium effects, in line with the terminology employed by Gruber and Wise (2004). These direct effects will always be of interest. They constitute the most important elements that may be used as a point of departure for more comprehensive analyses, and the effects may easily be controlled. By using a microsimulation model, it is also possible to include distributional effects connected to shifts in the pension system in a consistent way. In addition to the mechanical effects, we incorporate plausible labour supply assumptions exogenously in the model. Such assumptions are particularly important to understanding the retirement behaviour effects of pension reform.

A brief outline of the present system for old age pensions in NIS is presented in section 2, while the main elements in the proposed system and their effects on retirement age are outlined in section 3. A

short description of the methodology, including the dynamic microsimulation model, is presented in section 4. The effects on retirement age and labour supply are further discussed in section 5, while the effects on the contribution rate and income distribution are analysed in section 6 and 7, respectively. Section 8 concludes.

2. The present old age pension system in Norway

Old age pension benefits in NIS are based on entitlements each person achieves through his or her working career. NIS has it own measuring unit called the *Basic Pension Unit* (BPU) that at present amounts to about 17 per cent of the average wage level per man-year.[2] The BPU is used to calculate pension entitlements and index pension benefits to average wage growth[3]. Annual pension benefits (B) are composed of a universal basic pension (U) and the maximum of a means-tested special supplement ($\overline{B}$) and an earnings-based supplementary pension ($\hat{B}$). B is calculated according to the formula:

$$B = U + \max(\overline{B}, \hat{B}) \tag{1}$$

A pensioner married to another pensioner receives a basic pension (U) of 85 per cent of BPU, while single pensioners receive 1 BPU. The special supplement for single pensioners is 79 per cent of BPU in 2006. The sum U + $\overline{B}$ constitutes the minimum income guarantee extended to all pensioners.

The supplementary pension ($\hat{B}$) is based on previous labour market earnings. Each year when the person is in the interval 17 to 69 years old, the labour market earnings are translated into *Pension Points* (a_t) by using the BPU of the year income (Y_t) was earned:

$$a_t = \begin{cases} 0 & If: Y_t < BPU \\ (Y_t - BPU)/BPU & If: BPU \le Y_t < 6\ BPU \\ 5 + (Y_t - 6\ BPU)/3\ BPU & If: 6\ BPU \le Y_t < 12\ BPU \\ 7 & If: Y_t \ge 12\ BPU \end{cases} \tag{2}$$

[2] In 2006, 1 BPU equals NOK 62 161, or approximately 7500 euros, as a yearly average.
[3] Wage indexation is the political intention, and this assumption underlies all Norwegian projections of government pension expenditures. Effectively, however, the historical indexation of public old-age pension benefits has been somewhat less generous.

The main rule for calculating Pension Points is that labour market earnings exceeding 1 BPU are divided by 1 BPU. Labour market earnings exceeding 6 BPU are divided by 3xBPU, and thereby given a weight of one third; earnings exceeding 12 BPU are neglected. The final pension point value ($\overline{a}$) is calculated as the average of the 20 largest Pension Points, while the number of entitlement years (n) is given by adding together the number of years with labour market earnings above 1 BPU. The Supplementary Pension is calculated by using the BPU at the time pension benefit is received:

$$\hat{B} = \gamma \cdot \frac{\min(40, n)}{40} \cdot \overline{a} \cdot BPU \tag{3}$$

Here, γ represents a marginal benefit-wage ratio and its present value is 42 per cent. The second term, n / 40, represents the earning time percentage. The last two terms, $\overline{a} \cdot BPU$, represent an income base. For incomes above 1 BPU and below 6 BPU, it is equal to the former income as employee indexed by the growth in BPU.

The connection between earnings and accumulation of pension entitlements is weakened by the Special Supplement, a weight of 1/3 for earnings between 6 and 12 BPU, and the lack of entitlements for earnings above 12 BPU. Furthermore, the number of entitlement accumulation years is capped to 40, and the earnings-based pension is calculated using only the 20 best income years. In sum, these effects make the marginal effect on pension entitlements from an extra unit of labour income unclear.

In the present system, the official retirement age is 67 years. However, an early retirement scheme (AFP) at present encompassing more than 60 per cent of the workforce allows for early retirement from the age of 62. The early retirement is established in cooperation between labour unions, employers and government. It subsidises early retirement by benefits, tax credits, and the accumulation of imputed entitlements until official retirement age. As such, individuals are not faced with the social costs of retirement as these to a large extent are borne by government and employers.

3. Main elements in proposed system

When the pension reform was discussed in the Norwegian Parliament in the spring of 2005, the majority approved the following main principles for old age pensions in NIS:

- The minimum pension benefit is kept at the present level, but entirely transformed into a means-tested guarantee.

- To limit expenditures if life expectancy increases, an actuarial mechanism is introduced to reduce annual benefits as the expected length of retirement spells increases. It is possible for each individual to counteract the lower benefits by postponing retirement.
- The statutory retirement age of 67 is replaced by a flexible retirement scheme starting at age 62. Annual benefits will actuarially reflect retirement age.
- Entitlements are indexed by wage growth, as in the present system. However, benefits in payment are to be indexed by the average of wage and price growth. A special indexation rule linked to life expectancy implies that the income guarantee over time will lose value relative to the earnings-based benefit.
- There is to be a tighter link between earnings and pension benefits to improve work incentives. Lifelong accumulation of entitlements replaces the present cap on accrual years and the principle of calculating benefits on the basis on the best 20 years.

In line with the outlined principles, the benefit accumulation formula can be specified as follows:

(4) $$b_A = \beta \cdot \sum_{t=0}^{A-1} Y_t \cdot (1+w)^{A-t}$$ up to a maximum Y_t of 7.1 BPU.

Here

Y_t = Income in year t relevant for pension entitlements,
b_A = Calculated annual pension at retirement age A,
β = Accrual coefficient reflecting the accumulation of annual pension entitlements, given a value of 1.35 percent in the approved reform, and
w = Annual growth in average wages.

The accrual scheme in the new system thus means that annual labour incomes below a threshold of 7.1 BPU is accumulated as fictitious capital up to retirement age A. All annual earnings up to the threshold are eligible for entitlements, there is no upper limit on accrual years, and no calculation of the average best years. Entitlements are to be indexed by average wage growth and converted into an annuity at retirement. The calibration of β to 1.35 percent is chosen to give about equal average benefits as with the present system (before adjusting for growth in life expectancy and the reduced indexation of benefits in payment outlined below). With an assumption of 40 years of normal average earnings in the labour market, the accrual coefficient corresponds to a benefit-wage ratio of 54 per cent.

Based on accumulated entitlements, the annual pension benefit will be exposed to adjustments for increasing life expectancy and to the indexing of benefits in payment by the average of wage and price

growth. The nominal annual earnings-dependent pension benefit ($\hat{B}$) at age x for a person from cohort K retiring at age A is defined by:

$$\hat{B}_{K,A,x} = \frac{b_A(1+w-u)^{x-A}}{\delta_{K,A}} \quad . \tag{5}$$

Here

w = Rate of nominal wage growth.
u = Deviation from wage indexation in percentage points.

$\delta_{K,A}$ is a divisor for a person from cohort K who retires at age A and is defined by:

$$\delta_{K,A} = \frac{\Phi_{K,N,A}}{\Phi_{1943,67}} \ , \tag{6}$$

where $\Phi_{,K,N,A}$ is the expected present value of an annual benefits of unity for a person in cohort K who retires at age A. In the case where the nominal rate of interest is equal to wage growth, it is formally defined by:

$$\Phi_{K,N,x} = \sum_{x=A}^{\infty} p_{K,N,x}\left[\frac{1+w-u}{1+w}\right]^{x-A} \quad . \tag{7}$$

Here
N = Lower limit for retirement in an otherwise flexible retirement scheme,
K = Birth year of the actual cohort,
$p_{K,N,x}$ = The probability that an individual of cohort K will survive to the end of year x, conditional on being alive at age N.

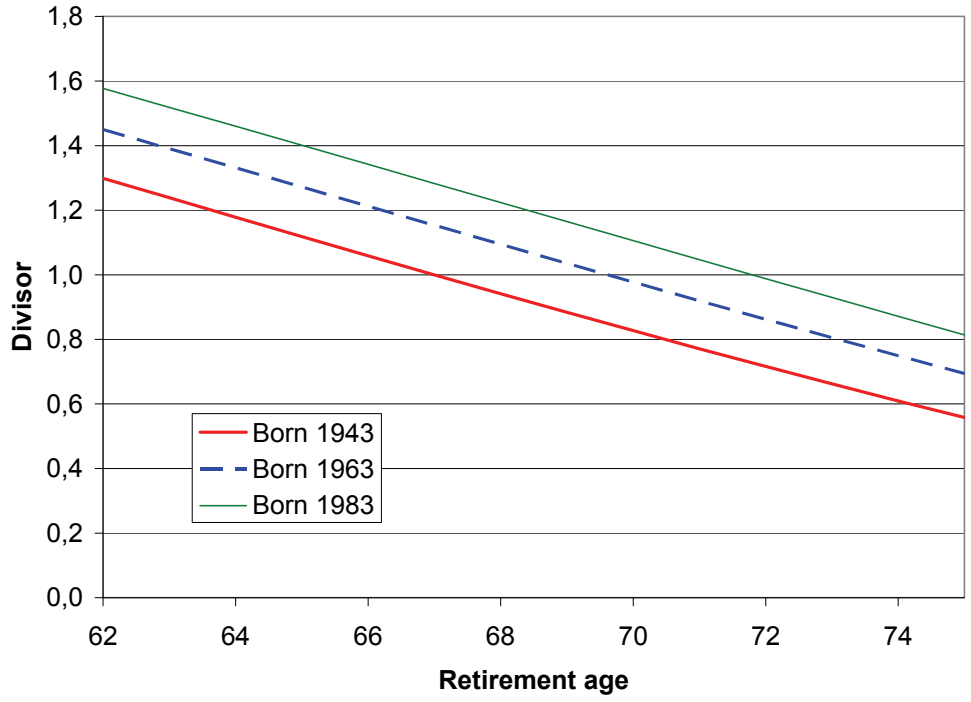
In the special case where benefits after retirement are indexed by wage growth (u = 0), Φ expresses the sum of survival probabilities above the considered retirement age A calculated form the lower retirement age N.

From (6) it follows that $\delta_{1943,67} \equiv 1$, implying that yearly pension benefits are chosen to be standardized according to life expectancy for persons born in 1943 who retire at age 67 in 2010 when the new system is planned to be implemented. In the case where life expectancy for a later cohort increases compared to life expectancy for the 1943-cohort, $\Phi_{K,N,A} > \Phi_{1943,67}$ and annual benefits will be reduced.

Each individual may however counteract higher life expectancy by postponing retirement. If, on the contrary, a person chooses to retire early, yearly benefits will be reduced.

Following the assumptions about survival probabilities from the population projections produced at Statistics Norway, the divisors at different retirement ages for individuals belonging to the cohorts from 1943, 1963 and 1983 may be illustrated as in figure 1.

Figure 1: Divisors for selected cohorts



As shown in the figure, the divisor is inversely proportional to retirement age since pension benefits are paid over fewer years. For a given retirement age, increasing life expectancy is reflected by an increasing divisor. The 1983-cohort coefficient is estimated to be equal to one for a retirement age of 72. As postponed retirement also will give a larger accumulation of entitlements, retirement age has only to increase by 8 months per increased life expectancy year if annual benefits are to be maintained.

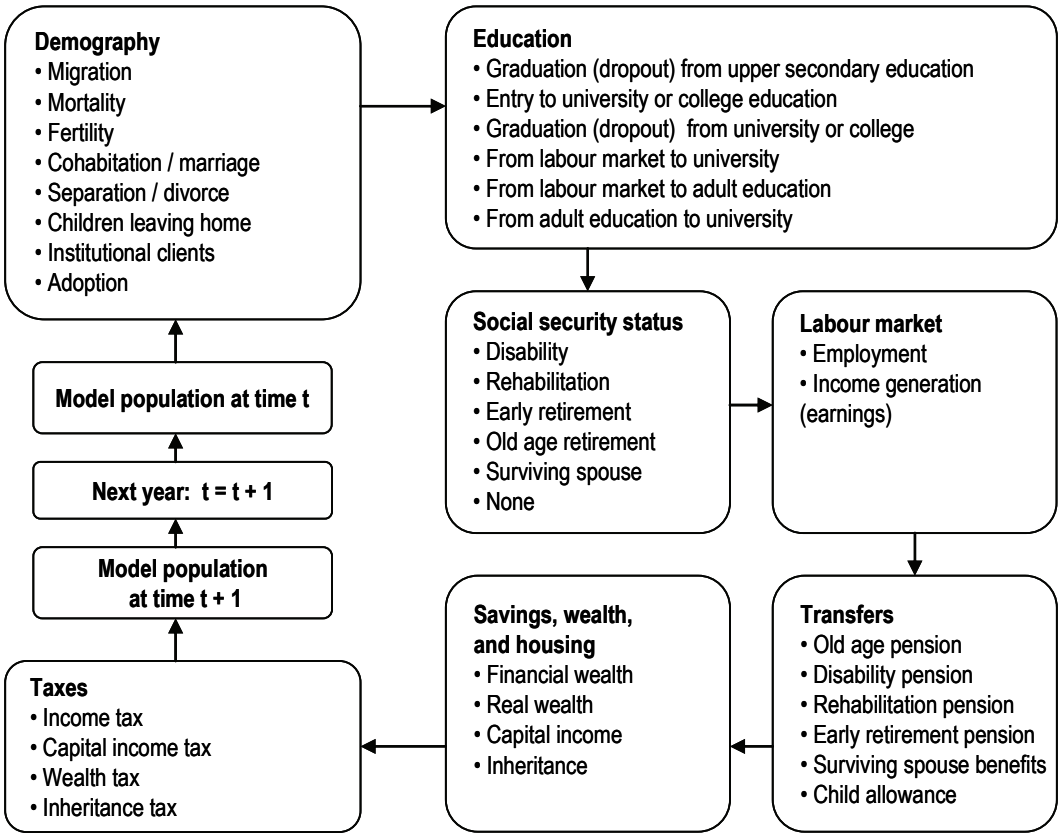
4. Methodology

The analyses in this paper employ Statistics Norway's dynamic micro simulation model MOSART documented in Fredriksen (1998). In this model, projections for demographic development and labour supply are combined with the different rules for accumulation of pension entitlements from section 2

and 3 and the adjustment for increasing life expectancy with the new pension system outlined in section 3. When analysing the Norway public pension system, information about heterogeneity in the population is important because the building up of pension entitlements depends on former labour incomes in a non-linear way. The future pension expenditures are also highly dependent on the development of the population by age and the size of the labour force. Although the presentations of the present and the new pension system in sections 2 and 3 are based on simplifications, it is obvious that tax and benefit rules are often detailed and complicated.

In addition to the mechanical effects on individual pension entitlements, benefits and government pension expenditures of changes in the Norwegian public pension system, we incorporate plausible labour supply assumptions exogenously in the model. These assumptions are particularly important to understanding retirement behaviour effects. It should be clear that there is no modelling of labour supply and general equilibrium effects in the MOSART model. We feel that the possible lack of consistency compared to a recursive modelling framework, containing only a small set of representative agents, is more than outweighed by the decisive detail and heterogeneity inherent in a dynamic microsimulation approach. The richness in these model aspects has been particularly useful in both estimating and implementing the possible effects on retirement decisions and labour supply from persons in working age.

Figure 2: Structure of the dynamic microsimulation model MOSART



The main structure of the MOSART model is presented in figure 2. From a representative sample of the population in a base year, the MOSART model simulates the further life course for each person in this initial population. The life course is simulated by possible transitions from one state to another, given by transition probabilities depending on each person's characteristics. The transition probabilities are estimated from observed transitions in a recent period. Events included in the simulation are migration, deaths, births, marriages, divorces, educational activities, retirements and labour force participation. Public pension benefits are calculated from labour market earnings and other characteristics included in the simulation. Old age pensions, disability pensions, survival pensions and early retirement pensions are included in the model.

The analysis in this paper is based on a representative sample from 1993 that is mainly calibrated to the situation in 2001 (c.f. Table 5.1). The demographic assumptions are based on Statistics Norway's demographic projections from December 2005. A total fertility rate of 1.8 and a net immigration of 16000 persons each year imply that the size of the different cohorts stabilizes towards 2050. The aggregate population may however increase as a result of a further increase in life expectancy at birth

of about 6-7 years in the same period, and then a further increase towards 2100. The assumptions about probabilities for entering disability are based on the observations from 2001 that represent an average of the fluctuating probabilities during the 1990s.

There has been a growing probability to enter early retirement schemes for those entitled to enter these schemes during the 1990s, and the projections are based on the observed level from 2001. This is also the case for assumptions about participation in the labour force and working hours. The necessary information about distribution of incomes between individuals over the life cycle is based on observations from a longer period. When pension entitlements are indexed by wage growth in the projections, the choice of base year for wages and prices is of minor importance. For convenience the level from 2006 is chosen for the presentation in this paper.

Table 1: Main underlying assumptions in MOSART

Net immigration	16 000 persons per year
Life expectancy at age 62	Increases about 4 years towards 2050
Total fertility rate	1.8
Propensities to study	As in 2001
Propensities for entering into disability	Observed level from 2001
Propensities for entering early retirement schemes	Observed level from 2001
Formal retirement age, present system	67 years
Labour market participation rates	Observed level from 2001
Distribution of labour incomes during life course	Observed from the period 1967 to 1993
Wages, prices, basic unit	As in 2006

5. Labour supply assumptions

The labour supply response to a pension reform should be evaluated along two dimensions. Firstly, closer correspondence between former labour incomes and pension benefits means a lowering of implicit tax rates on the intensive margin. As pointed out by among others Lindbeck and Persson (2003) and Lindbeck (2006), distortions in the labour market can thus be reduced and Pareto improvements realised. The reform takes a clear step in this direction by removing the present cap on accumulation years and permitting lifelong incomes below the annual ceiling to be accumulated as entitlements. Secondly, the labour supply responses to reform on the extensive margin may be evaluated by how well it aligns the social costs of early retirement with private incentives. As also stressed by Lindbeck (2006) an appropriate way to reduce growth in future welfare expenditures would be to impose an "automatic rule mimicking the functioning of actuarially fair private income

insurance systems". In the Norwegian pension reform this aspect is addressed by an actuarial mechanism that aims to keep the expected present value of future pension benefits constant, irrespective of changes in life expectancy and retirement age (cf. equation 6).

The Norwegian pension reform is therefore expected to stimulate labour supply on the extensive margin by postponing retirement and on the intensive margin by increasing incentives to work for those in working age. The question is by how much. A central finding in the empirical labour market literature is that adjustments tend to be much stronger on the extensive margin than on the intensive; see for instance the surveys by Heckman (1993) and Blundell and MaCurdy (1999). As presented in several analyses (cf. Gruber and Wise, 1999 and 2004 for international comparisons) the lowest possible retirement age without any loss in payments may be quite decisive. In Norway, Hernæs et al. (2000) and Røed and Haugen (2002) find that the present Norwegian early retirement scheme (AFP) favours early retirement, because there are not any negative consequences for future pension benefits. A tightening of these provisions is then expected to have a positive effect on participation rates for elderly workers.

As there has been no comparable change in the Norwegian pension system the last decades, it has only been possible to make a simple estimate of how retirement age might be affected by a shift towards a more actuarial pension system. The estimation of this effect is documented in Fredriksen et al. (2005). Fredriksen's point of departure has been the average rates of two observations: first, the observed participation rates among men in the age group 60-66 years from the beginning of the 1980s; and second, the low participation rates observed in 1999 among those in the corresponding group that may enter an early retirement scheme without loss of pension rights. After further corrections, because only 60 percent of the labour force is included in the early retirement schemes and because not all qualified individuals presently make use of the system, the average retirement age is estimated to increase by 0.6 years in 2015.

With an actuarial system, individuals are expected to postpone retirement when life expectancy increases. At age 62, around 40 percent of the population is disability pensioners. They will be transferred to the old age pension scheme at a time set by government. Furthermore, we expect that about 40 per cent of the population (the main part not on disability pension) at the age of 62 at average postpone their retirement by 2/3 year when life expectancy increases by one year. Because of increased entitlements by postponed retirement this is sufficient to maintain the level of yearly pensions. The remaining 20 per cent of the population are assumed to postpone their retirement in

equal length as the increase in life expectancy. In total average retirement age thus is estimated to increase by 1.6 years in 2030, and 2.6 years in 2050. Because of its actuarial retirement scheme, the reform is expected to reduce the number of old age pensioners (including early retirees) by almost 200 000 persons in 2050, as shown in table 2.

Table 2. Projections of the number of old age pensioners (early retirements included) by the present and the actuarial pension system. 1000 persons

	Present	Actuarial
2000	643	
2010	677	666
2020	862	772
2030	1059	933
2040	1246	1071
2050	1311	1120

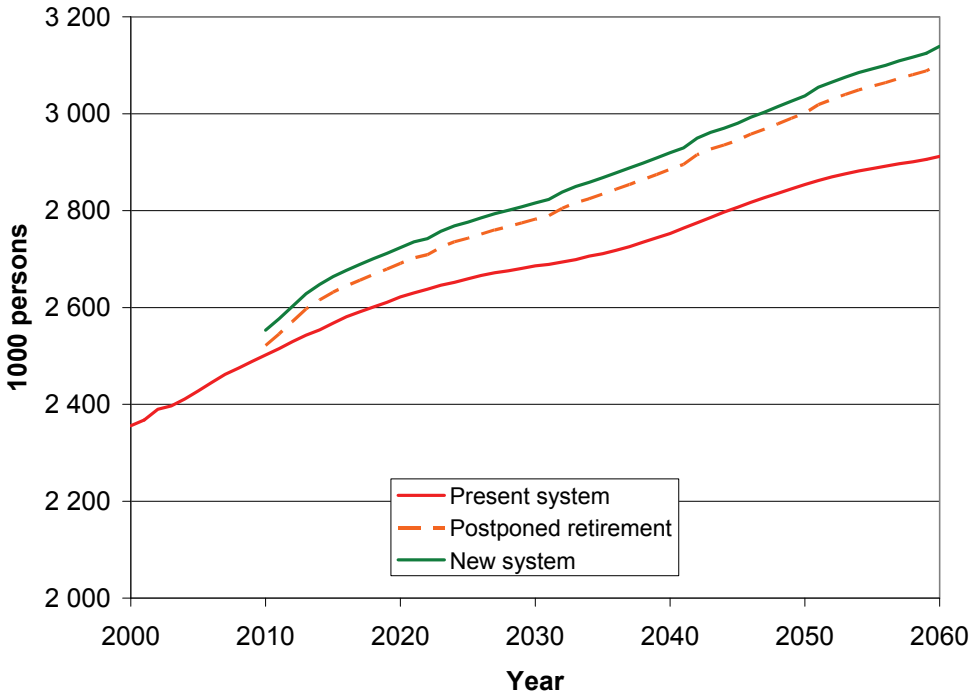
On the intensive margin, a shift towards greater correspondence between earnings and the accumulation of pension entitlements implies a smaller effective tax rate on labour income. If average benefits and tax rates remain unchanged, this means a partial positive substitution effect on labour supply without any counteracting income effect. The method we have applied in quantifying the effects, as documented by Stensnes (2007), has been to use the MOSART model to compute the change in the present value of future pension benefits by exposing a cross-section of the model population to a small and transitory income shock in one specific period. Once implemented, the model is run to let the individual life courses unfold, keeping all individual characteristics constant as if the income shock had not taken place. The simulations in Stensnes (2007) indicate that the actuarial dimensions of the reform will reduce marginal tax rates in the labour market by 5.1 percentage points, on average.

Because the connection between pension contributions and benefits is not evident for an average employed under the present system, and probably not will be clearly evident in the new system, it is difficult to obtain a precise estimate of how much this effect will increase the labour supply of individuals who have not reached retirement age. On balance, using a marginal compensated substitution elasticity of about 0.5, a partial rough estimate of the supply of man-hours as a result of the reform is about 2.5 per cent. We assume that the effect on man-hours may be equally divided between an increase in the number of employed persons and average working hours of about 1.25 percent each, also reflecting that the implicit tax reduction of the reform is likely to increase

participation rates. In combination with the postponed retirement effect, the labour force is estimated to increase by almost 6.5 percent in 2050 as a result of the reform while the number of man-hours is estimated to increase by more than 7.5 percent. The estimated effects thus conforms well to the empirical results from the literature indicating that a welfare reform may have stronger effects on participation rates than on average working hours. Immervoll et al. (2007) base their analysis of the effects of introducing in-work benefits in 15 countries of the European Union on similar assumptions.

The estimated total effects on the labour force from increased labour supply on the intensive margin and from postponed retirement are presented in figure 3. Labour force is increased by 1.25 per cent as a result of the intensive margin effect. However, its strength is less than the extensive margin effect that naturally will play a more leading role as life expectancy increases. The estimated labour supply effects are by no doubts uncertain. How sensitive fiscal sustainability is to a set of different underlying labour supply assumptions is a major test of the reform. The intention of the actuarial pension scheme is to stabilise expenditures from changes in life expectancy and retirement age. Empirical projections we have carried out with the MOSART model indicate that different assumptions about retirement behaviour will only have marginal effects on expenditures since they are almost completely neutralized by the divisor. In section 6 we discuss how the fiscal stance is affected by the uncertainty of the labour supply effects on the intensive margin.

Figure 3: Projections of the labour force with the present and the new pension system. 1000 persons



6. Effects on the contribution rate

In a pay-as-you-go system where public pension expenditures are financed by current tax revenues, the ratio of workers to old-age pensioners has a significant impact on the fiscal balance sheet. One measure of the fiscal burden of the public pension scheme is the so-called contribution rate defined by Disney (2004) as "the average rate (on earnings) that would be required to finance current spending on public pensions without budgetary transfers or the accumulation or decumulation of public pension funds". With the standard pay-as-you-go formula, the contribution rate (CR) may be calculated as the ratio of public pension payments (PP) to labour incomes (W). Correcting for the more lenient taxation of gross pensions than wage incomes in Norway, the contribution rate may be formally defined as:

$$CR = \frac{PP}{(W + \alpha * PP)} \tag{8}$$

The right hand side numerator represents nominal public pension expenditures, whereas the denominator is the relevant tax base. The parameter α represents the more lenient taxation of pension incomes compared to wage incomes, and is assumed to be 50 percent under the current tax regime.

The contribution rate (CR) can as such be interpreted as the minimum tax rate sufficient to finance pension expenditures, assuming that the entire tax burden is placed on labour and pension incomes.

The contribution rate will be sensitive to changes in:

(1) The ratio of average pensions to average hourly wages. This ratio is expected to increase in the coming years as the present pension system reaches maturity.
(2) The indexation of pensions compared to the development of average wages. The pension reform is intended to institutionalise the indexation of benefits with the average of prices and wages. Entitlements are to be wage indexed until retirement.
(3) An increase in the number of hours per worker will reduce the contribution rate in transition to full maturity.
(4) Heavier taxation of pension income (increased α) will decrease the contribution rate, but also net income replacement rates.

We have estimated the contribution rates of the different proposed pension schemes using the MOSART model. Because a reformed system would require several decades from its planned implementation in 2010 to maturity, 2050 has in the Norwegian debate become a reference year indicating the long-term fiscal sustainability of the pension scheme. Table 3 shows the estimated development of the contribution rate for the new pension system compared with the present. The revenue aspect will largely be determined by the estimated effect of the pension scheme on labour supply, both on the intensive and extensive margin according to the discussion in section 5. The table illustrates that the contribution rate with the present scheme is expected to double from 11 percent in 2006 to 22 percent in 2040. But even with the new system, the contribution rate is expected to reach close to 18 percent in 2040, and almost 2/3 of the increase under the present system will remains in spite of pension reform. The main reason is a shift form a demographically fortunate situation with relative small cohorts of pensioners compared to the labour force, towards a situation with a more even (and more normal) composition of the cohorts. The maturing of present system, combined with an even more beneficial entitlement accumulation scheme under the new system, contributes towards the still growing contribution rate.

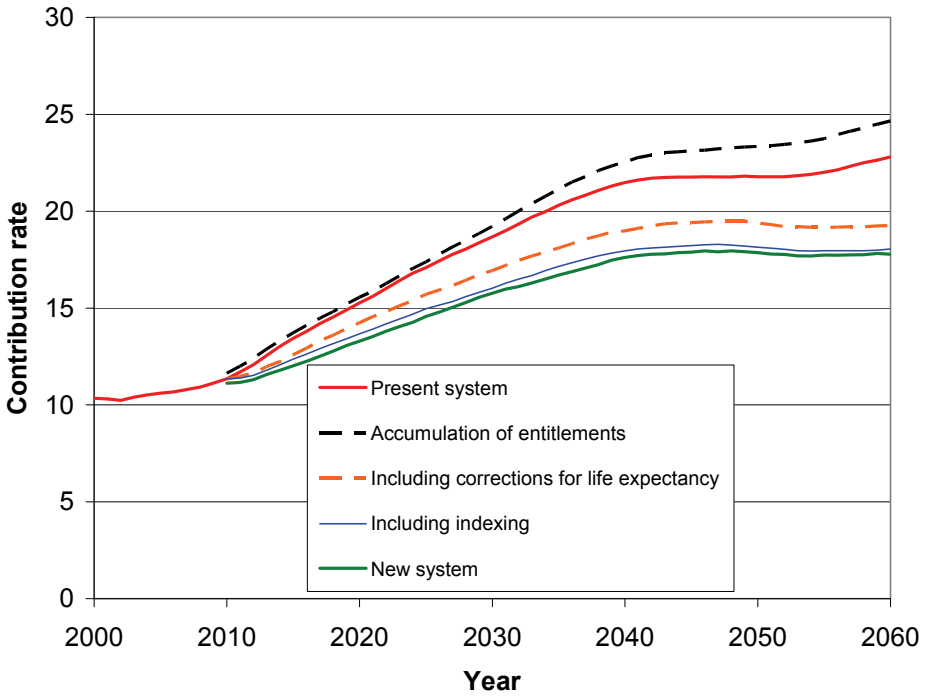
Table 3: Contribution rates for old age pension expenditures in the National Insurance Scheme (NIS). The new pension system compared with the present. Per cent

	2006	2010	2020	2030	2040	2050
Present scheme	10.7	11.4	15.3	18.7	21.5	21.8
New system		11.1	13.3	15.8	17.6	17.9

The divergence between the contribution rates with the present and the new system may be decomposed in the most important elements of the reform. We have here chosen to classify the elements in four main categories:

- The entitlement accumulation scheme
- The flexible retirement scheme starting at age 62, inclusive of corrections for increasing life expectancy and choice of retirement age. This element also encompasses postponed retirement and labour supply effects on the extensive margin.
- Indexing of benefits after retirement by an average of wage and price growth
- Labour supply effects on the intensive margin.

Figure 4. Contribution rate for old age pension expenditures decomposed into the most important elements of the reform



The decomposition is shown in figure 4. The entitlement accumulation scheme will partially increase the contribution rate by more than 1.5 percentage points in 2050 compared to the present system. Removing the present cap on accrual years and the proposed accrual rate are in particular elements that contribute towards a more generous pension entitlement accrual scheme. The curve that includes corrections for life expectancy also encompasses the flexible retirement regime permitting retirement from age 62, whereby annual payments are adjusted to keep the expected present value of retirement benefits constant irrespective of retirement age and increases in life expectancy. This partial shift

lowers the contribution rate by nearly 4 percentage points in 2050 and seems to be the main tightening element of reform from a fiscal perspective. If the growth in life expectancy becomes stronger than predicted, the tightening effect is amplified compared to the present system. The life expectancy adjustment divisor is as such an important and efficient automatic stabiliser of fiscal expenditures. Importantly, our assumptions on how much retirement will respond to pension reform will only have minor consequences for fiscal sustainability since earlier retirement implies lower average benefits.

Indexation of benefits after retirement by the average of wage and price growth causes a reduction in the contribution rate of 1.2 percent in 2050. The effect is calculated assuming that real wages grow by 1.5 per cent per year. The 2.5 per cent labour supply response on the intensive margin reduces the contribution rate with about 0.3 percent. The importance of this element for the contribution rate is thus rather small, and is even reduced as time goes by because increased employment means higher accumulation of entitlements and thereby higher benefits.

In the analysis of fiscal consequences so far, an important underlying assumption has been that the present systems for early retirement, occupational pensions in the government sector and the present disability scheme are to be adapted to the approved system for old age pension benefits. No final political decisions have so far been taken on these issues, and the predicted negative effects on future expenditures and contribution rates may therefore be overvalued. Specifically:

- The present early retirement scheme does not punish early retirement, and because more than 60 per cent of the workforce is entitled to this scheme, upholding the system will almost completely undermine the pension reform.
- The occupational pension schemes in the public sector commonly guarantee gross replacement rate of 66 per cent (for a sufficient number of years with earning of entitlements). Unless these pensions are incorporated in the life expectancy adjustment, they will undermine the intension of the pension reform for employees in this sector.
- The projections are based on an assumption that disabled persons are transformed to old age pensioners at the age of 67. On one hand this means a cut in the old age pension benefits for disabled persons as life expectancy grows. On the other hand, higher life expectancy makes it more beneficial to enter disability rather than early retirement under the old age pension scheme. If the previously disabled are not exposed to the consequences of old age pension reform, the incentives for entering into disability will increase even further.

7. Distributional consequences

By using the MOSART model to consider the distribution of annual pension benefits between individuals, we move beyond the limitations of stylised calculations for individual and household types. Our microsimulation approach thus permits a more accurate description of the distributional consequences of pension reform.

Our analysis is based on three important qualifications. Firstly, we consider only pension benefits, and not how the pension premiums paid by the employed are distributed between individuals. In Norway, old age pensions are fully integrated into the general tax revenues and expenditures in the state budget. Pension reform will permit tax cuts/other expenditure increases in 2050 that are likely to have distributional consequences, depending on how they are carried out. These consequences are excluded from our analysis since the alternative would mean making speculative assumptions about future political decisions. Secondly, we analyse only the direct effects of pension reform for a given labour supply, both at the intensive and extensive margins. Indirect effects through behavioural changes are excluded from the analysis with a rationale given by the envelope theorem: When focusing on changes in utility level, the utility of income increases through more hours are counteracted by the utility loss of reduced leisure, as long as the individual is free to choose hours worked. Thirdly, we report the distributional effects without accounting for indexation and the actuarial adjustment through the flexible pension scheme. The reformed system will replace a fixed retirement age with an individual retirement choice above 62 years. If we included the mentioned factors, annual pensions would be a poor approximation for pension wealth because they would indicate both (relevant) changes in pension wealth and (for our purpose irrelevant) changes in retirement spells.

Figure 5: Distributional indicators for pension benefits in 2050

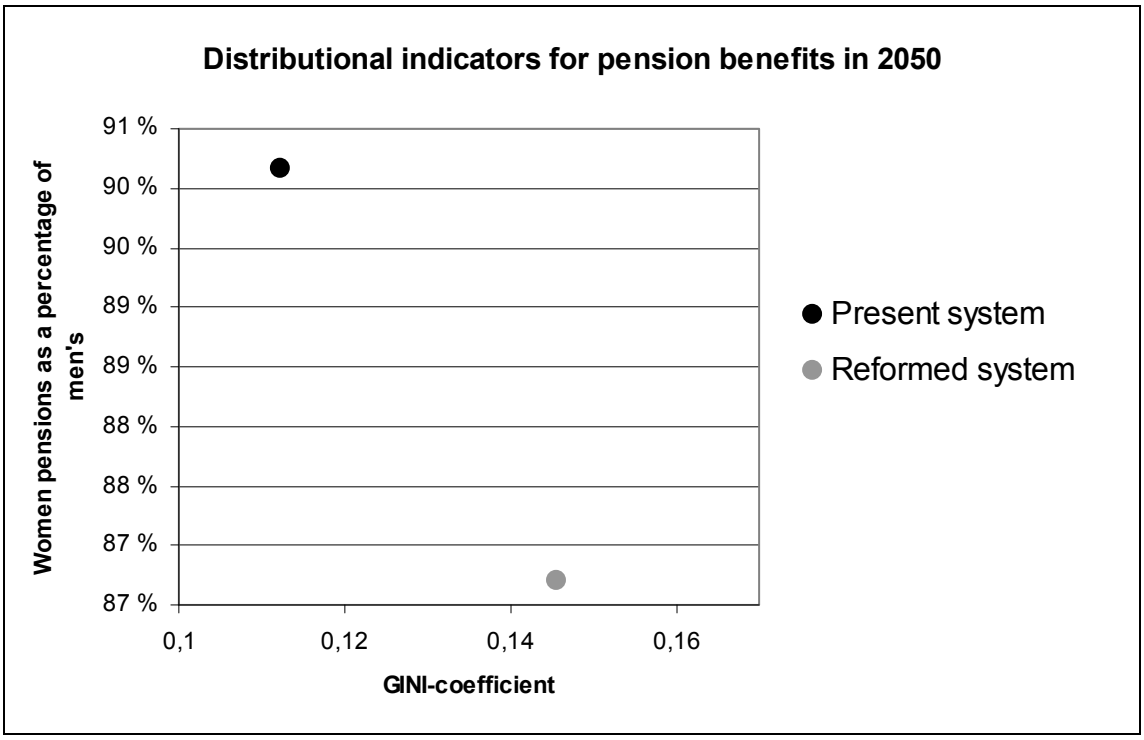


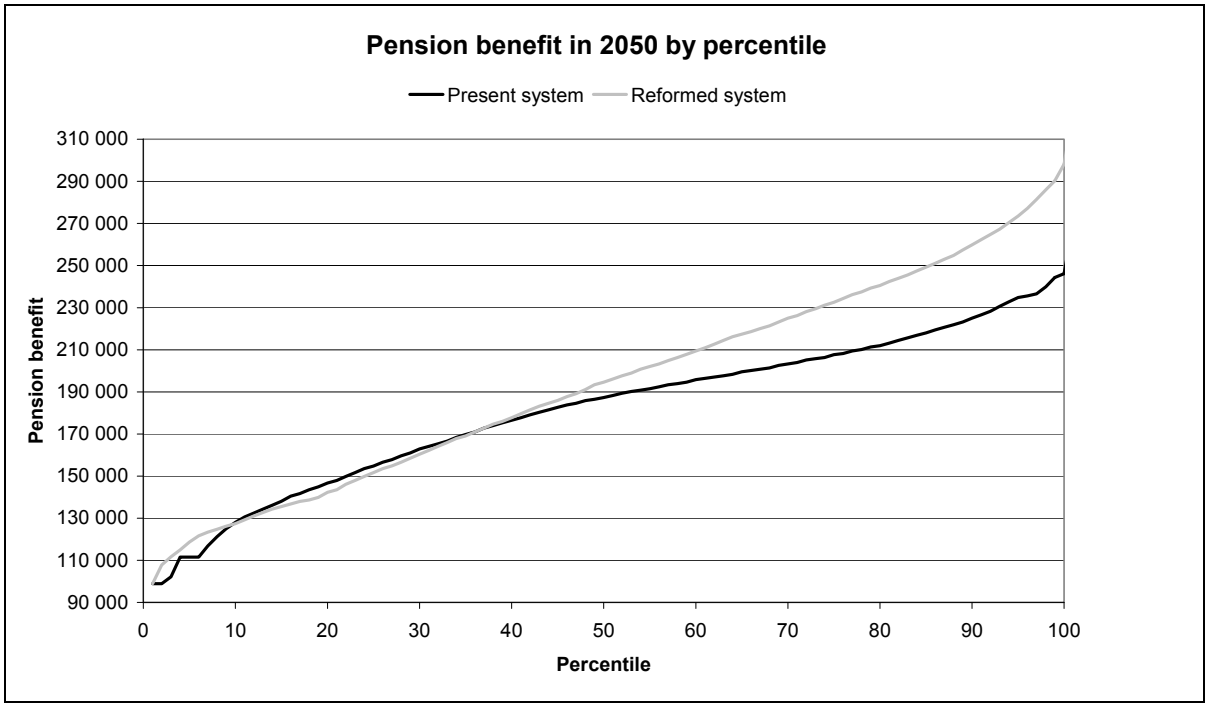
Figure 5 gives a first impression of how different accrual schemes distribute income between individuals at system maturity in 2050. The horizontal axis measures the GINI-coefficient of inequality, and the vertical axis shows women's pensions as a share of men's, on average. Along the two dimensions, the upper left quadrant would therefore indicate more equality and lower right more inequality. How labour incomes and pension benefits are linked in the different accrual schemes is a key to understanding outcomes. As a starting point, it is worth noting that there is greater inequality in labour incomes than pension benefits in the schemes we consider. The public old age pension scheme is redistributive, due to components such as a minimum benefit and the annual income ceiling on accumulating pension entitlements. Income replacement ratios are therefore higher at the lower end of the income scale. A closer link between earnings and pensions in the accrual scheme will therefore tend to increase inequality in benefits, while this very link is also at the heart of improving work incentives by reducing the implicit tax rate on social security contributions. In deciding on a pension accrual scheme, government is faced with the classical trade-off between equality and efficiency. It should therefore come as no surprise that the present reform, aiming to stimulate labour supply, also will increase inequality in pension outcomes.

We will now look more in detail at the distributional consequences of the present and reformed old age pension systems. Figure 6 breaks annual pension benefits in 2050 down by pension income

percentile. The results are most readily commented successively by income groups. For the bottom four deciles, pension levels will remain largely unchanged with pension reform. This is mainly caused by a guarantee pension at the same level as the minimum pension in the present system before taking adjustments for increasing life expectancy into account. The distributional impact of the other elements affecting the lowest deciles is not large, and the different elements partly counteract each other.

The top six pension income deciles will experience an increase in the pension level, reflecting both the increased accrual coefficient for pension entitlement and the sharpened actuarial properties of the system in general. The gains are largest for the highest income groups. For both schemes the curves are convex for the uppermost deciles, because they exhibit an increasing gap compared with the average incomes. As corrections for life expectancy and indexation are excluded from the distributional analysis, this is the main reason why a majority of income groups seem to gain from the reform. The decomposition of reform effects (figure 4) reveals that corrections for life expectancy and indexation are the cost cutters of reform, whereas the system for accumulation of entitlements partially increases expenditures. Figure 6 is therefore a good indication of distributional consequences, but misleading seen from a fiscal perspective.

Figure 6: Pension benefits* in 2050 by percentile



* Benefits are shown before indexation and exposure to the life expectancy adjustment divisor for a constant level of the BPU, which is given a nominal anchor equal to its 2006 mean value (NOK 62 161).

8. Conclusions

Like the past reforms in Sweden, Latvia and Finland, a pension reform moving towards a more quasi-actuarial system will have positive effects on labour supply and create incentives for postponing retirement. It will improve efficiency by lowering implicit tax rates in the labour market and by aligning the social and private costs of early retirement. In 2050 the number of man-hours is estimated to increase by more than 7.5 per cent as a result of the pure mechanical reform effects. Postponed retirement and reduced growth in future benefits as a result of the actuarial elements is the main factor behind the estimated reduction in the future tax burden for financing future pension expenditures. Lower indexation of benefits and larger labour supply on the intensive margin are factors that work in the same direction. Closer correspondence between former labour incomes and pension entitlements in the new system, by removing progressive elements in the present system such as the slanting roof and the maximum number of 40 years for accumulation of entitlements, will inevitably lead persons with higher incomes to benefit from reform. It should therefore come as no surprise that our analyses show the presence of a classical trade off between efficiency and equality.

The projected reduction in the pension burden is based on the assumption that the present early retirement schemes and the occupational pensions for employees in the government sectors are subjected to the adjustments for increasing life expectancy inherent in the spirit of the reform. Without a reform the contribution rate for old age pension expenditures in Norway may double from 11 percent in 2006 to 22 percent in 2040. An estimated rate of 18 percent in 2040 with the approved system shows that the reform is far from sufficient to prevent a substantial increase in the future tax burden. This increase is caused by far larger birth cohorts among old age pensioners compared to the size of the cohorts in working age. In addition, maturing of the present system and a somewhat more beneficial model for earning of entitlements in the new system, cause expenditures to increase.

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