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**Working Paper**

## Pensions and the Nordic Welfare Model

CESifo Working Paper, No. 10321

**Provided in Cooperation with:**

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

*Suggested Citation:* Andersen, Torben M. (2023) : Pensions and the Nordic Welfare Model, CESifo Working Paper, No. 10321, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/271965>

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# Pensions and the Nordic Welfare Model

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## **Impressum:**

CESifo Working Papers

ISSN 2364-1428 (electronic version)

Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH

The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute

Poschingerstr. 5, 81679 Munich, Germany

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Editor: Clemens Fuest

<https://www.cesifo.org/en/wp>

An electronic version of the paper may be downloaded

- from the SSRN website: [www.SSRN.com](http://www.SSRN.com)
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# Pensions and the Nordic Welfare Model

## Abstract

Within the frame of the Nordic welfare model, pension system design has taken very different routes. While the overall aims in terms of distribution and replacement rates are similar, the division of labour between defined benefit and contribution as well as pay-as-you-go versus funded schemes differs significantly. The main characteristics of the pension systems in the Nordic countries are presented, and outcomes relating to pension adequacy in terms of poverty and replacement rates are discussed. Specific design issues related to achieving distributional goals and financial robustness via automatic adjustment mechanisms are highlighted. Finally, the overall financial sustainability of pension systems and the macroeconomic implications are discussed.

JEL-Codes: G510, H350, H600, J260.

Keywords: pension systems, pension adequacy, fiscal sustainability, distribution, insurance, incentives.

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March 2023

This paper draws on material presented at various workshops and conferences. Financial support from the Rockwool Foundation Research Unit project “Ageing and Pensions” is gratefully acknowledged.

## 1. Introduction

Pensions are a cornerstone in all welfare models, and the birth of the welfare state is often attributed to the establishment of public pension systems<sup>1</sup>. The Nordic welfare model is attracting attention for its ability to reconcile a well-functioning economy with attainment of social goals, including poverty alleviation and a low level of income inequality.

In this perspective, it is interesting that the pension systems differ significantly across the four large Nordic countries. While the Nordic countries share overall aims in terms of poverty avoidance, replacement rates and insurance, the designs of pension systems are very different.<sup>2</sup> The spectrum of pension systems spans from the Danish system, relying heavily on funded occupational defined contribution pension arrangements, to the Swedish notionally defined contribution (NDC) scheme, which is largely a self-contained PAYG-based system. The pension systems in Norway and Finland fall in between these two systems. The Danish system is in the Mercer CFA Institute Global Pension Index consistently ranked in the top<sup>3</sup>, and the Swedish NDC system is often referred to as an innovative restructuring of a PAYG scheme. In this perspective, it is also interesting that Denmark and Sweden are among the few countries not facing a fiscal sustainability problem in the wake of an ageing population.

These differences in designs are of interest not only from the perspective of characterizing the Nordic welfare model, but also in the wider discussion of pension system design since they show that different designs may appear despite rather similar policy objectives and deliver fairly similar outcomes. It is also a reminder that clustering of countries based on some general characteristics may overlook important institutional, historical, and structural aspects.

The key policy dilemma in pension policy design is how to attain distributional goals while supporting incentives to work (retire later) and save. All Nordic countries have tax-financed universal pensions to prevent poverty among elderly and universal access to health and old age care. A wave of reforms in the 1980s and 1990s aimed at reconciling this with acceptable replacement rates (consumption smoothing), and this led to reforms leading to the current designs. More recently, in the wake of demographic changes, automatic adjustment mechanisms have been included, notably adjustments of benefits and/or statutory retirement ages to longevity. The Nordic countries have taken different routes in addressing the challenges mentioned above, and it is interesting to compare them as an outset for a discussion of some key design issues for pension systems.

This paper first discusses some principal aspects in the design of pension systems (Section 2), and then gives a short presentation of the pension systems in the Nordic countries (Section 3). Subsequently the outcomes of the pension systems are discussed with a particular focus on poverty and replacement rates (Section 4). This is followed by a discussion of the targeting of public pensions and the automatic

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<sup>1</sup> For accounts of the historical origins and developments in the Nordic countries, see e.g. Kuhnle and Sander (2010), Pedersen and Kuhnle (2017), and Lindert (2004).

<sup>2</sup> It is beyond the scope of this paper to provide a detailed account of pension system reforms in the Nordic countries, and the discussion takes outset in the current designs.

<sup>3</sup> The Mercer CFA Institute Global Pension Index for 2022 ranks 43 countries, and Denmark ranks 3<sup>rd</sup>, Norway 5<sup>th</sup>, Finland 7<sup>th</sup>, and Sweden 8<sup>th</sup>, see <https://www.mercer.com/our-thinking/global-pension-index.html>.

adjustment mechanisms, and finally the issue of the financial viability of pension systems is considered (Section 5). The paper concludes by summarizing a few lessons from the Nordic experience (Section 6).

## 2. Principal aspects in pension system design

While the overarching aims of pension systems are fundamental and in that sense basic, the actual design includes many dimensions and therefore inevitably becomes rather complicated. To set the scene for the subsequent characterization of pension systems in the Nordic countries, it is useful first to discuss some key principal aspects.

Multiple objectives pertain to the pension system, and at a general level they can be grouped in three categories:

- **Distribution:** Ensuring that all elderly have a decent living standard (minimum standards, poverty alleviation).
- **Consumption smoothing:** Ensuring that living standards post retirement stand in a reasonable relation to living standards while working (replacement rates).
- **Insurance:** Coverage of hazards associated with morbidity (future needs/health) and mortality (survival), including coverage of surviving spouse and children.

The distributional objective is obviously important in the context of the Nordic welfare model. Avoiding old age poverty and ensuring a decent pension for all is a key policy objective and has historically laid the foundation for pension systems. The need to ensure acceptable replacement rates upon retirement from the labour market has been crucial for more recent developments of pension systems (see below).

Pension policies are thus an integral part of the welfare state, and public responsibility in the pension area has broad political support in all the Nordic countries. There is a substantial mandatory element in pension policies, either via tax-financed schemes or pension schemes (funded or unfunded) to which the individual is mandated to contribute either through law or via collective agreements.

A need for policy intervention can arise due to both behavioural and market failures. The former relates to a large class of explanations why voluntary pension savings tend to be too low. The primary explanation for “undersaving” is so-called present-biased<sup>4</sup> preferences causing agents to attach too little weight to their future well-being, see e.g. Feldstein (1985) and Andersen and Bhattacharya (2011, 2021). This gives an

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<sup>4</sup> Agents may discount the future too heavily (myopia) or have hyperbolic preferences. The latter makes a distinction between the present and the future, attaching the former more weight than the latter. At date  $t$  the difference between whether receiving a given payment at say period  $t+k$  or  $t+k+1$  is not so important (sometime in the future), but standing in period  $t+k$  there is a large difference between receiving a payment today at  $t+k$  or in the future at  $t+k+1$ . The passage of time makes the agent change views on receiving a given payment at a given point in time, and this is the cause of time-inconsistent behaviour (changes of plans over time even if all other aspects have not changed), see Laibson (1996). Present-bias may also arise due to so-called self-control problems, i.e. the ability of agents to resist temptation for immediate gratification but having long-run costs, like saving today rather than spending the money, see e.g. St-Amant and Garon (2014) for an application in a pension context..

argument for mandatory savings arrangements (pension systems), and although such schemes tend to crowd-out voluntary savings<sup>5</sup>, they aim at improving material living conditions post retirement.

In an extended welfare state, there is also the potential free-rider problem that individuals, knowing that poverty among elderly is not politically acceptable, may reduce individual saving expecting the support provided by the welfare state. If so, more individuals come to rely on the public support, and the financial burden falling on the tax-financed scheme increases. This problem may provide a rationale for mandatory savings requirements, see e.g. Pestieau and Posen(2008) and Fenge and von Weizsäcker (2001).

These behavioural arguments support not only mandatory savings, but also have implications for the benefit structure and retirement ages. To counter the quest to front-load consumption, the (larger part of) pension benefits should be in the form of life-annuities<sup>6</sup>. Otherwise, there is a risk that individuals deplete their funds prematurely, leading either to poverty or a financial burden on the welfare state. Likewise, there is an argument for a statutory retirement age or earliest age at which pensions can be claimed. Otherwise, agents may choose too early retirement to front-load the fruits from their savings, not perceiving the implications for material living conditions for the remaining lifetime.

Related, mandated schemes may overcome problems of both financial literacy and fixed costs of information. Individual acquisition of relevant information not only to decide on savings but also investment policies is costly. In particular, it involves fixed costs making such acquisition unattractive, especially for individuals with low income/wealth, see e.g. Lusardi and Mitchell (2014). A mandated defined contribution funded scheme may achieve more diversified investments and thus a better return-risk outcome than especially for low- and middle-income families can realize on their own.

The scope for pension savings may also be affected by market failures. Markets for pension products may suffer from ineffective competition, and especially markets for life-annuities are known to be imperfect or even non-existing, see OECD (2016). By mandating pension savings in the form of life-annuities, effectively a market is created, making it possible to provide life-annuities on an actuarial basis<sup>7</sup>.

A fundamental design choice is between a PAYG and a funded pension system. The former is in principle running under a balanced budget constraint, implying that pensions to the retired are financed by contributions/taxes levied on those currently working. A funded scheme relies on savings and accumulation of funds from which future pension benefits are financed. The specific design of these systems features many details, but there are some principal aspects.

The return in a funded scheme is explicit and equals the market rate of return, while the return in a PAYG pension scheme is implicit. This is most easily seen for a stylized PAYG pension system where a proportional

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<sup>5</sup> Evidence for Denmark points to relatively low crowding out (15-30%) of voluntary savings, see e.g. Chetty et al. (2014).

<sup>6</sup> Annuities can take many forms, see below, and the indexation of the benefit is crucial. Comparing e.g. price indexation to wage indexation in an actuarial scheme, the initial benefit is higher in the former case since price increases are smaller than wage increases. If the real value of benefits erodes, the public may have to step in to ensure the real value of pensions. Hence, there is an argument for mandatory life-annuities with price/wage indexed benefits.

<sup>7</sup> Effectively a pooling equilibrium may be enforced that overcomes adverse selection problems, see e.g. Eckstein et al. (1985). See also Scharfstein (2018).

tax on wage income finances a flat rate pension for all pensioners. The total revenue is the contribution rate times the total wage income (the wage sum), and dividing by the number of pensioners gives the annual pension that can be paid out to pensioners. In this scheme, pensions grow by the growth rate of wage income, and this defines the implicit rate of return. This can also be expressed in the way that individuals while working contribute based on the current wages but get a pension determined by future wages, and the ratio between the two determines the implicit return. In a dynamically efficient economy, the empirically relevant case,<sup>8</sup> the market return exceeds the implicit return in the PAYG scheme, and this gives a return argument for a funded scheme, see Aaron (1966).

There are other important differences. The flat rate PAYG pension is a collective system, and a DC funded system is an individualized system. This has implications for incentives and insurance. The contribution – even if mandated – to an individualized funded scheme is not a tax since the future pension entitlement is conditional on the contribution.<sup>9</sup> A flat-rate PAYG pension, on the contrary, has the common-pool property that the pension to which the individual is entitled does not depend on the contributions made, and hence contributions are part of the tax burden levied on labour. In a PAYG pension scheme where future pension benefits are related to contributions (earnings), the individual contribution is only a “partial” tax since there is some relation between contributions and entitlements. Distortions of economic incentives are thus lower under an individualized than a collective system. These are two key arguments usually put forward in favour of funded pensions relative to PAYG pensions: they have a higher return, and the contribution rates are less distortionary than the corresponding tax rates.

However, PAYG pensions have other advantages. Current retired can get a pension financed by contributions levied on the current workers. Such a system can be jump-started providing pension to inaugural cohorts who have not contributed to the scheme. In contrast, a funded pension scheme has a very long phasing-in period. Historically, this difference has been an important reason for the introduction of PAYG pensions. A PAYG pension scheme is also sometimes denoted an implicit social contract since those currently working contribute to the financing of pensions to the current old in the expectation (trust) that future workers will do the same, see e.g. de Walque (2005).

If benefits in some way depend on contributions, income during work-life has a role for pension benefits. This is intentional as it ensures pensions in proportion to income while working; the replacement rate important for consumption smoothing. It is, however, also an implication that the distribution of pensions comes to reflect the distribution of individual (earned) incomes. This is especially a problem for those with no or only low lifetime income. The basic distributional objective is thus not well served if total pensions

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<sup>8</sup> If this is not the case, there is over-saving, and the accumulated stock of capital is too large, and welfare can be increased by lowering savings and reducing the capital stock, see e.g. Blanchard and Fischer (1989). For empirical evidence in support of this return assumption, see e.g. Jordá et al. (2019). Although rates of returns are currently low, especially on government bonds, this does not imply that the return condition associated with dynamic efficiency does not hold. The relevant return is the marginal product to capital (which can be measured by e.g. the returns to equities), and this is still higher than the growth of the wage sum, see e.g. Blanchard (2019) for a discussion.

<sup>9</sup> This is more complicated if agents are present-biased (justifying the mandated pension scheme) and capital markets are incomplete. Such agents would like to undo the mandated savings by reducing voluntary savings and eventually borrowing using future pensions as collateral. If the capital market does not allow such borrowing, the mandated savings requirement is efficient in increasing savings, but it may at the same time distort labour supply, see e.g. Kaplow (2015).



are too tightly related to wage income<sup>10</sup>. It is easier to build distributional elements into PAYG pensions. This is most easily seen in the case of a flat rate pension where all get the same pension, while contributions depend on individual income. This scheme is clearly progressive in a lifetime perspective.

Pension system design also involves insurance aspects. In a defined contribution funded scheme, pensions depend both on the return and its risk as well as on the work career of the individual and any interruptions of the work career due to sickness and unemployment, and also wage variations become reflected in the pension. The labour market history also matters in defined benefit schemes with benefits depending on earned income. Generally, public pensions are less sensitive to such events due to their common pool nature, as is most clearly the case for a flat rate pension. Risk sharing across generations is also more difficult in a funded than a PAYG scheme. Therefore, the design of the pension system has implications for risk sharing, which should be taken into account when comparing designs of pension schemes, see e.g. Matsen and Thøgersen (2004). The different pension systems do not have the same implications for risk exposure and diversification, which gives arguments for having hybrid pension systems comprising different pension types.

Multiple objectives are addressed in pension systems, which therefore have many dimensions, including membership groups, contributions, modes of financing, and benefit structures for the retired, to mention only some general features. Accordingly, pension systems are rich on details, and modes of design differ, as is also seen from the cross-country variations, see e.g. OECD (2021a) and European Commission (2018).

Different weighting of the different objectives naturally leads to different designs of the pension system. It is not possible to define a unique optimal pension system<sup>11</sup>. This does not imply, however, that the design of the pension system does not matter. Quite the contrary, the design of the pension system is crucial, and it is important to be explicit on the pros and cons of the different design elements and how they relate to the various objectives to be met by the system. This is discussed in the following with outset in the Nordic countries, which have similar overall welfare state objectives and yet very different pension system designs.

### 3. Nordic pension systems – an overview

Pension systems can be classified along many different dimensions, see e.g. OECD (2021a) and European Commission (2019). To focus on replacement rates and distribution/poverty, it is useful to distinguish between those elements of the pension system that are (I) purely tax-financed having no (or a weak)

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<sup>10</sup> Redistribution is feasible within a funded scheme, as an example, many countries have so-called unisex rules precluding that benefits depend on gender-specific mortality rates.

<sup>11</sup> The two basic pension types thus have various pros and cons, and this is the reason why the World Bank (1994) recommended a multi-pillar pension system consisting of I) public tax-financed pensions, II) a mandatory funded pension system, and III) voluntary private savings. The division of labour between the three columns is that the public pensions are addressing the distributional objective, the mandatory and savings-based pensions cater to consumption smoothing, while the third column allows for individual desires and needs. Across the columns there are various built-in insurance elements covering various events which may arise at the individual or society level.

relation between entitlements and contributions (tax payments) and (II) contribution dependent systems<sup>12</sup> where benefit entitlements somehow depend on contributions (earned income).

Type I arrangements are defined benefit (DB) programs offering flat rate pensions or targeted benefits means-tested against income/wealth<sup>13</sup>. Since such pensions are part of the general public budget, a strict balanced budget requirement does not apply on a period-by-period basis. The financial robustness depends on the fiscal sustainability of the overall public budget, see discussion of adjustment mechanisms in Section 5.

Type II arrangements can be of different forms. A prototype is a funded, defined contribution (DC) scheme with individual accounts. Contributions accumulate over the work-career and earn the market rate of return. At retirement, the pension capital is buying a life-annuity (or other benefit forms including insurances)<sup>14</sup> on actuarial terms given rates of returns and mortality rates. This system is by definition financially viable, and all consequences or needs for adjustments fall on the benefits received by the individual<sup>15</sup>.

Many DB-pension schemes have entitlement rules depending on work-history (point system) or wage income (accrual rates) during the work-life. Pension benefits may thus depend on explicit contributions or imputed contributions, and they may be accumulated with an explicit or implicit (via indexation) rate of return. At retirement, the accumulated pension wealth is typically transferred to a life-annuity on actuarial terms depending on the actual retirement age and longevity. The financing may be part of the public budget or in a separate system.

The so-called notional defined contribution scheme (NDC) is a hybrid system where pension entitlements depend on contributions, but the financing is basically on a PAYG basis, see below. DC and NDC schemes thus share the property that benefit entitlements explicitly depend on contributions, and benefits are determined on actuarial terms given the accumulated contributions. Though, the rates of returns differ, and they have different incentive and insurance implications.

Pension benefits are typically indexed to prices, wages, or some combination. If benefits are determined on actuarial terms, the indexation scheme governs the profile of pension benefits. If benefits are price-indexed, they will, other things being equal, start at a higher level than if indexed to wages. Price indexation ensures that the purchasing power of the benefit is maintained (real income is constant throughout the retirement period, but the relative income position declines when wage growth exceeds price growth),

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<sup>12</sup> Vidlund et al. (2016) provide a comparison of contribution rates in Austria, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden and Switzerland. It is concluded that the total pension contribution as a share of the total wage sum or GDP does not differ much across the compared countries, and Finland is very close to the average across the eight included countries.

<sup>13</sup> For the tax-financed pension, all the Nordic countries have a residence requirement, and the full pension requires a certain number of years of residence. Shorter periods of residence (possibly over some minimum) qualify for a pro-rated benefit.

<sup>14</sup> Some risk sharing may be possible in such systems, e.g. via return smoothing. There may also be some redistribution, e.g. if life-annuities are computed based on average mortality rates rather than gender-specific rates.

<sup>15</sup> Regulated by the so-called Solvency II requirements approved by the European Commission, which, among other things, stipulate a solvency requirement to ensure a 99.5 % probability that the company will remain solvent within a 1-year horizon given its portfolio of assets and liabilities, see <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02009L0138-20140523&from=EN>

while wage indexation ensures an unchanged relation between pension benefits and wages of current workers (the relative position in the income distribution can be maintained throughout the retirement period).

The statutory retirement age is an essential part of all pension systems, and it is determined by law. There may be an earliest retirement age at which the tax-financed (base/guarantee) pension is available (the age from which the distributional guarantee applies) and one at which it is possible to claim the contribution-based pension. These two age limits need not be the same. Moreover, these statutory retirement ages may implicitly or explicitly be linked to longevity, see below.

The membership group of mandated schemes may differ. Some schemes are by law comprising the entire population, while negotiated schemes typically cover a subset of the work force only. Particular issues arise with interrupted employment spells (unemployment, sickness, maternity/paternity leave etc.), reducing pension benefits in a funded DC-system, but such periods may be counted in earnings-related systems. If these interruptions are voluntary, it may be argued that it is no problem that pension benefits decline; if they are considered involuntary, there is an insurance/distributional argument to mute the effects for pension benefits. Challenges pertain in particular to self-employed, where the need for capital to run the business, which in turn constitutes wealth which in due time can finance pensions, is commonly given as an argument for why this groups should not face mandatory pension savings requirements. However, this is a pension wealth which is not well diversified, with little protection against a low living standard as old.

Finally, in a Nordic context there are two important points. First, there is universal (tax-financed) access to welfare services, including health care.<sup>16</sup> Hence, the need for precautionary savings to cope with possible future health-related costs is lower than in more lean welfare states. Second, although the contributions and entitlements are earnings-dependent, the schemes in the Nordic countries are generally not firm-specific; that is, pension coverage is portable in case of job-shift. This system has mandated elements to cater for social objectives, and yet it is designed in accordance with requirements for labour market adjustment and flexibility.

Table 1 summarizes the main characteristics of pensions in the Nordic countries, based on the more detailed account given in the following subsections. The table covers mandatory – by law or bargaining – pension schemes only. The table does not include other benefits/supplements like housing, needs-based (old-age care, medicine) supplements, and survivor's pensions. In all countries, there are specific tax treatments of voluntary pension savings (and other forms of savings), but tax systems are not covered here<sup>17</sup>.

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<sup>16</sup> There are moderate user payments for some parts of health care, means-tested payment of old-age care etc.

<sup>17</sup> For a discussion of taxation issues, see e.g. Andersen (2018).

**Table 1: Key characteristics of pension systems in the Nordic countries**

	Tax-financed		Contribution-based			
	Benefit structure	Means-testing		Financing	Contribution rate	Benefits
DNK	Base pension for all + supplements	Supplements are means-tested against income (pensions) and wealth	ATP: Law – comprising all except self-employed	DB, funded	Fixed nominal amount depending on working hours	Guaranteed life-annuity – aiming at maintaining the real value of the pension benefit
			Bargained/firm agreement – comprises workers under the agreement	DC, funded	Typically 12-18%	Life-annuities – actuarial determination + some part as rate pension/lump-sum Additional insurance elements
FIN	Guarantee /national pension	Against pension income	Law	Income pension:  Private: Partly PAYG, partly funded  Public: Partly PAYG/tax/ funded	22-23%	Accrual rate during work: Wage and price increases (80-20 split)  Benefits: Life-annuities – actuarial determination  Indexing: Wage and price increases (20-80 split)
NOR	Guarantee pension	Against income pension	Law – all income earners	Income pension: NDC	Implicit accrual rate: 18.1% of all types of earnings (upper income cap - 120% of average wage income)	Rate of return: Wage growth  Benefits: Life annuities – actuarial determination  Indexation: Wage growth less 0.75 p.p.
			Law – all workers	DC	Min. 2%	Life-annuity – actuarial determination
SWE	Guarantee pension	Against income and wealth	Law – comprising all	Income pension: NDC	16% - all types of earnings (upper income cap – about 110% of average income <sup>i</sup> )	Accrual rate: Income growth  Benefit: Life-annuity – actuarial determination  Balancing factor – benefit adjustment
				Premium pension DC	2.5% - all types of earnings	Life annuity – actuarial determination
				Bargained	DC	4.5% - 30%

Note: i) Determined as 8.07 times the “inkomstbasbelopp”, which in 2022 is approx. SEK 47,800 per month.

### 3.1. Denmark<sup>18</sup>

The Danish pension system is a combination of public (PAYG, defined benefits) and occupational (funded, defined contributions) pensions. The major changes<sup>19</sup> in the Danish pension system occurred during the late 1980s, when it was generally perceived that many groups would face low replacement rates and that the Danish economy had a savings problem manifested in systematic current account deficits. At the same time, there were discussions about the establishment of wage-earner funds for employees to obtain ownership in firms, an idea to which the employers were strongly opposed. The outcome of this process was an agreement to expand occupational pensions to cover most groups in the labour market. This allowed workers to build up funds, and the employers to avoid direct co-ownership of firms. The occupational pension scheme is thus a result of a tripartite process.

The public pension includes a basic amount (flat-rate pension) and means-tested supplements (also depending on marital status) available from the statutory retirement age. Means-testing of the supplements depends on income on a household basis. In addition, there are a number of age-dependent supplements (housing, special needs). Public pensions are indexed to wages<sup>20</sup>. There is an actuarial-based adjustment of public pensions if claiming the flat rate pension is postponed after the statutory retirement age.

By law, all wage earners and recipients of transfer income contribute to the supplementary labour market pension (ATP). It is a funded DB scheme to which wage earners and recipients of transfers<sup>21</sup> contribute a monthly amount (depending on working hours). The scheme provides a guaranteed life-annuity. The scheme is thus a funded part of the pillar one part of the Danish pension system, and it is therefore especially important for low-income groups with no or low pension savings<sup>22</sup>.

Labour market pensions are agreed upon as part of collective agreements between the social partners and in that sense voluntary, but involuntary/mandatory for workers employed in areas covered by the arrangements. Labour market pensions are organized in a number of pension funds, where membership depends on the type and area of work. The development of labour market pensions took off in 1989-91, and the arrangements have subsequently been extended to a large part of the labour market (coverage: about 85% of the employed, 100% in the public sector and 75% in the private sector). Contribution rates have largely remained unchanged since 2000. At present, contribution rates (usually split 1/3 vs. 2/3 between workers and employers)<sup>23</sup> vary between 12% and 18%, with rates tending to be higher for high-income groups (shorter contribution period, and longer retirement period). Some groups not covered by collective agreements have firm-specific pension arrangements.

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<sup>18</sup> This section draws on Money and Pension Panel Expert Group (2012), Pensionskommissionen (2015), Andersen et al. (2022) and [www.borger.dk](http://www.borger.dk).

<sup>19</sup> For a detailed account of the process leading to the current system, see Due and Madsen (2003).

<sup>20</sup> Since 2020, public pensions have been regulated by wage increases (minimum 2%). Most other income replacing transfers are indexed by wage increases less than 0.3%, where the latter part is a mandated contribution to a pension scheme (obligatorisk pensionsopsparing), see text.

<sup>21</sup> For recipients of transfer income, the contribution is the double of the contribution for workers.

<sup>22</sup> About 40% of current pensioners only have the public pensions and the ATP pension.

<sup>23</sup> The split is unlikely to have any long-run effects. Whether the contribution is levied on workers or employers would eventually be reflected in the wage rate. Workers are interested in their total pay (current wage plus pension entitlements), and firms in the total wage costs (pay plus pension contributions).

Occupational labour market pensions differ in relation to investments, payments and insurance cover, see e.g. Money and Pension Panel Expert Group (2012) for a detailed account. Pension assets may be used to cover actual pensions or insurance products linked to the pension scheme. The pension is paid either as an annuity, instalments (rate pension) or a lump sum (known as a capital pension), with the life-annuity being the dominant part. Insurance elements are often attached to labour market pensions, e.g. disability pensions, spouse/children pensions as well as health-related activities. About 20-25% of contributions fund insurance coverage. Labour market funds are still maturing in the sense that no members have contributed to a pension at the current contribution rates and received a pension based hereon. As a more recent add-on, many collective agreements include a so-called free choice account, where contributions around some threshold can be used either for pension savings, higher wage payment or paid days off.

The fact that the labour market pensions are negotiated and thus only comprising workers in a given bargaining area creates a so-called residual group of individuals not having any significant pension savings. This group is heterogeneous, comprising workers (not covered by an occupational pension scheme), individuals with marginal attachment to the labour market, and self-employed. Moreover, interrupted employment spells have an effect since no pension contributions are paid (though the ATP contributions are still being paid for when receiving income replacing transfers). While the bargained labour market pensions have the advantage that they have the social partners' support, it is a drawback that not all are included. Proposals to make more significant pension savings mandatory for all have been made from time to time but have so far not led to any initiatives. A mandatory (by law) pension scheme (obligatorisk pensionsopsparring) for recipients of income transfers was launched in 2020. The contribution rate, paid by the state, is 0.3%, increasing to 3.3% in 2030. The contributions are part of the ATP-pension.

Denmark mainly follows an ETT tax scheme, where private pension contributions are generally tax deductible. The return on pension savings in pension funds is taxed (so-called PAL tax), and pension income is taxable income. There are, however, some exceptions to these rules with schemes not being tax deductible, but then the pension income is not taxable income when paid out (aldersopsparring), and there are also some age-specific tax advantages to pension savings.

### 3.2 Finland<sup>24</sup>

The Finnish pension system is based on a mandatory earned income pension system as well as means-tested public pensions (national/guarantee pension). The earnings-related pension system is a defined benefit scheme which is partly PAYG and partly funded. Contributions are paid by all employed persons, also self-employed. The current structure of the pension system is the result of a major pension reform in 2005, and a further reform was implemented in 2017.

The tax-financed part of the pension scheme includes a guarantee pension and a national pension, and since they serve distributional purposes, both elements are means-tested. The national pension is means-tested (taper rate 100%) against the earnings-related pension<sup>25</sup>, while the guaranteed pension (taper rate 50%) is means-tested against all forms of income. The earnings-related benefits are individualized, but the

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<sup>24</sup> This section draws on OECD (2021a), European Commission (2015), Barr (2011), Andersen (2021) and [www.kela.fi](http://www.kela.fi).

<sup>25</sup> The part of pensions accrued from the period of child home-care and studies is not included in the income tests for the national pension.

base pension has family conditionalities (singles versus couples). The national and guarantee pensions are fully tax-financed via the public budget.

The earnings-related pension system is organized in several pension funds, where membership depends on the area of work. The pension funds operate under similar rules, but their modes of financing differ, cf. below. The overall structure of the system is determined in negotiations between the social partners.

Contribution rates are at the level of 22-23% for the larger part of the labour market (split in 17 percentage points for employers and 5 percentage points for employees). The mixed PAYG and funded financing both serve to smooth contribution rates over time and to address expected expenditure increases due to demographic changes. The private pension funds are not receiving state transfers, but for public sector pension funds there is partial tax-financing.

Pension entitlements depend on lifetime earnings and life-expectancy. Individuals accrue an annual earnings-related benefit entitlement depending on their annual gross income with an accrual rate of 1.5% (since 2017, during a transition period until 2025 the accrual rate for the age group 53 to 62 years is 1.7%). In the private sector, there is a minimum earnings limit for pension insurance (2020: 60.57 euros per month), but neither earnings nor contributions have any ceiling, except for the self-employed. Pension rights are also accrued while studying for vocational training or a university degree, on parental leave and when unemployed (financed by the state). Accrued pension benefits are indexed by the so-called wage index given as a weighted average of wage increases (80%) and price increase (20%). The benefit entitlement at retirement thus consists of the sum of accrued pension rights (including accumulated increases via the wage-index) during work-life.

After retirement, pensions are indexed based on the pension index (20% wages, 80% prices). Earnings related pensions can be claimed from the statutory retirement age (currently 65 years), and the pension benefit is adjusted based on actuarial terms if retiring later. A life-expectancy coefficient based on cohort-specific mortalities translates the pension right into the actual pension received from retirement (computed at the age of 62). The statutory retirement age is indexed to cohort-specific longevity, see below.

All pension income is taxable income but taxed more leniently than wage income due to specific tax deductions applying to pension income for both municipal and central-government income taxation. However, if pension income after deduction of the abovementioned allowances exceeds a threshold, there is an additional central-government tax. Voluntary pension savings is possible; contributions are deductible in the income tax, and taxable income when paid out.

### 3.3. Norway<sup>26</sup>

The current pension system, still being phased in, is a result of a large reform in 2011 changing the system established in 1967.

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<sup>26</sup> This section draws on OECD (2021a), European Commission (2018), Fredriksen and Stølen (2011), NAV (2018), NOU (2022), and [www.nav.no](http://www.nav.no)

The pension scheme has a guarantee and an income pension. The guarantee or lowest pension level (minste pensjonsnivå) is the floor of the system, and it is means-tested against the income pension (taper rate 80%) and depends on marital status.

The income pension is a notional defined contribution scheme. The system is tax-financed and thus part of the public budget, and there is thus not an explicit contribution rate, but the pensionable income is determined as 18.1% of income (the implicit contribution rate), see Fredriksen and Stølen (2011). There is an upper ceiling (7.1. basic amounts<sup>27</sup>, about 120% of the average wage) above which no pension rights are attained, which is a progressive element in the scheme. Childcare/caregivers are credited by about  $\frac{3}{4}$  of average full time wage income, unemployed by income prior to unemployment (up to a cap, approx. 120% of average wage income).

Contributions are accumulated at an implicit return (accrual rate) equal to nominal wage growth, and at retirement the accumulated notional pension wealth is transferred to a life-annuity depending on the cohort-specific mortality rate (at age 61) and the actual retirement age. The benefit is indexed by wage growth less 0.75 percentage points, which approximately corresponds to a 50-50 indexation to wage and price increases<sup>28</sup>.

There is no balance requirement for the notional defined contribution scheme, in contrast to the Swedish system, since the financing runs via the public budget. However, the State Pension Fund (established in 1990 as the Oil Fund and later renamed) partly finances pension expenditures. The assets (market value was above NOK 12,000 billion by the end of 2021, more than 300% of mainland GDP) are managed such that the expected real return (currently 3%, before 2017: 4%) is transferred annually to the public budget. Hence, this rule (handlingsreglen) aims to keep the real capital value of the fund intact. This generates a revenue flow that partly covers the increasing public expenditures due to an ageing population.

The retirement age is flexible, and the pension is adjusted on actuarial basis to the actual retirement age. For everyone who has accumulated enough entitlements to achieve a greater pension than the minimum/guarantee pension, it is possible to retire from the age of 62. Later retirement results in a higher pension, see above. There is no premium to postponing claiming the pension when reaching age 71. It is possible to work and receive pension benefits flexibly (fully or partly) without an earnings test.

In 2006, a mandatory occupational pension (tjenestepensjon) was introduced in the private sector as a supplement to the public pension. There is a similar arrangement for the public sector. The contribution rate is 2% (for income about some minimal threshold, and below some upper limit), paid into a defined contribution scheme (or equivalent amounts if offered some form of defined benefit scheme).

Pension income is taxed more leniently than wage income. There is no income tax for all pension income (including the guarantee pension) below some income threshold. There is a tax incentive to postpone retirement (since 2011), and social security contributions on pensions are lower than on wage income.

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<sup>27</sup> Equal to NOK 106,399 in 2021.

<sup>28</sup> The two are equivalent when real wage growth is 1.5%.



The reform in 2006 also introduced an early retirement scheme (AFP) covering all public employees and roughly half of the private employees. The scheme allows retirement from the age of 62. There are a number of qualifying conditions, and there is an earnings test for recipients combining work and pensions.

The primary aim of the pension reform in 2011 was to strengthen work incentives, and empirical work shows that there is a significant effect, primarily by combining take-up of pensions and working after the age of 62, especially for the low-educated group, see Hernæs et al. (2016), Hernæs et al. (2019) and Andersen et al. (2020). Despite the reforms and the revenues from State Pension Fund, fiscal policy is not sustainable, see below.

### 3.4. Sweden<sup>29</sup>

The Swedish Pension system was radically reformed in the 1990s with effect from 1999. The public system has three elements: the guaranteed pension, the income pension, and the premium pension. The guaranteed pension is tax-financed, and the other two are financed by contributions, cf. below.

For the income and premium pensions, the contribution rate is 18.5% of earnings, which is split between 16% for the income pension and 2.5 % for the premium pension. The contribution rate has an employer and employee component. The premium pension is an individualized defined contribution system.

The income pension scheme is a PAYG scheme termed a notional defined contribution scheme, see e.g. Palmer (2000). The income base on which pension contributions are levied is earned income (also for self-employed based on tax declared income), social transfers, unemployment benefits etc. There is even an imputed income in case of child-care (for children below the age of four) and education (post high school) with contributions financed by the state. Pension contributions are made for incomes above a certain threshold (and some upper income limit about 110% of average wage income). For incomes about that level, employers still pay contributions, but they are not credited to the individual accounts, but to the state; i.e. it is effectively a progressive tax.

Contributions are accumulated on an individual account with a rate of return determined by nominal income growth (the income base on which contributions are levied). At retirement (at earliest at the age of 61), the pension wealth is transformed into a pension. Pension entitlements are thus dependent on lifetime income, and the pension at a given retirement age is determined on an actuarial basis such that the benefit level in expected present value terms equals the pension wealth at retirement at age 65. Notice that the benefit profile is front-loaded compared to a profile where benefits are regulated by developments in incomes. The guaranteed pension cannot be claimed before age 65.

However, to ensure that the pension system is financially viable, adjustments of pension wealth and thus pensions may be needed. This is captured in the so-called balance ratio, which is computed as the ratio of the system's assets to liabilities. The assets are current and expected future contributions to the system plus buffer funds, and the liabilities are the pension payments to current pensioners and current contributors. If the balance ratio is below one, benefits are adjusted downwards (the growth factor is reduced below income growth). If the ratio is above one, buffer funds are accumulated. Note that there is a common pool property since the growth rate is determined by growth of average income. If e.g. there is a

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<sup>29</sup> This section draws on OECD (2021a), Palmer (2000), Pensionsmyndigheten (2011, 2014) and [www.pensionsmyndigheten.se](http://www.pensionsmyndigheten.se)

general change in working hours or retirement age, it affects the growth rate of income and thus the pension of all.

The income and premium pensions can be claimed in parts (25, 50, 75 or 100%) while still working. Notice that there is no means-testing of these pensions against earned income.

The guaranteed pension is the floor of the system available from age 65. The pension is means-tested against the income and premium pension. The ultimate floor in the system is a special transfer (äldreförsörjningsstöd) for people aged at least 65 with insufficient means. The transfer is means-tested and ensures that a minimum living standard can be maintained (the transfer is below the guaranteed pension). There is also a supplement (indkomstpensionstillägg) to individuals with low pension entitlements and a long attachment to the labour market (40 years to claim the maximum benefit, about 8% of the guaranteed pension).

In addition to the public schemes, occupational pensions are common (about 80% of workers). There are four pension funds. As an example, for the SAF-LO area the contribution rate is 4.5% for incomes below some threshold (7.5 prisbasbelopp, approx. SEK 335,000 in 2015) and 30% for incomes above this level.

The Swedish taxation regime is, as the Danish, an ETT scheme, but it is much simpler. The return tax (15%) has as the tax base an imputed rate of return given as the average rate of return on government borrowing in the previous year times net assets (assets less financial debt). Since the government borrowing rate is typically lower than the rate of return on pension funds, the effective tax rate is below 15%. Other types of capital income are taxed at the rate of 30%, though 27% on insurance arrangements (kapitalförsäkringar).

Recent political agreements imply that the age limits in the system are increased in steps (in 2026 the eligibility age for claiming income pension will be 63 years, and the guaranteed pension 67 years), and then linked to development in longevity, see e.g. Finanspolitiska Rådet (2022).

#### **4. Outcomes – replacement rates and distribution**

The technical details on the designs of pension systems should be seen in the perspective of the outcomes. Two prime performance indicators are risk of poverty and replacement rates. However, comparing such outcomes across countries is not straightforward due to country-specific differences, and for comparability the following uses OECD data, although this may leave differences to standard national ways of measuring these issues.

Below the Nordic countries are compared and related to the OECD average. In comparing with other countries, differences in welfare arrangements should be noted, and in the present context the public provision (tax-financed) of health and old-age care in the Nordic countries<sup>30</sup>. Since these provisions are free to all old, a given living standard can thus be maintained with a lower replacement rate than in countries with more self-financing of health and old-age care. Moreover, it should be noted that considering the entire group of retired at a given point in time gives a snapshot of the situation across members of different

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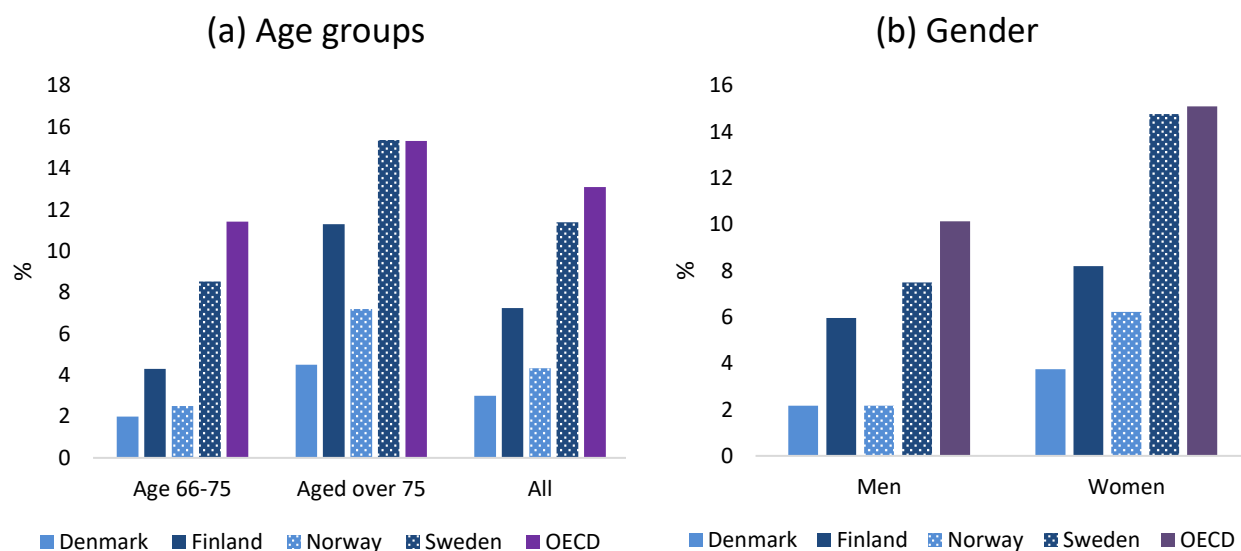
<sup>30</sup> Per capita health expenditures are in all Nordic countries higher than the OECD average, and the larger part is tax-financed, see OECD (2021b). There are user payments for parts of health and old-age care.

cohorts, but past reforms and changes imply that they have not all been contributing or are not receiving benefits according to the same rules.

#### 4.1. Poverty

A key objective of the pension system is to avoid poverty among elderly citizens. Poverty rates are shown for the age groups 55-75 and 76+ as well as for the entire population in Figure 1. Generally, poverty rates are lower in the Nordic countries than the OECD average. This also holds when considering the age group 66-75, although Sweden is close to the OECD average. For elderly above 75 years, Sweden and Finland come out above, Norway close to, and Denmark below the OECD average. Considering gender differences, poverty rates are higher among women than men; for men the Nordic countries are below the OECD average (with Sweden close to the average), and for women Sweden is above, Norway and Finland close to, and Denmark below the OECD average, see Figure 1.

**Figure 1: Poverty rates, age and gender (elderly people above age 65), 2018**



Note: Percentage of population group with incomes less than 50% of median household disposable income, 2018 or latest available year. The poverty rates across gender apply to the age group above 65. Data source: OECD, Pensions at a Glance 2021.

In relation to poverty alleviation, residence requirements for public pensions should be mentioned since they play an increasing role due to an growing number of immigrants. In all Nordic countries (and most other countries), public pensions have a residence requirement, and full pensions require a minimum of years in residence (e.g. 40 years), otherwise there is a pro-rata reduction of benefits. Migrants arriving at more mature ages thus do not qualify for the full pension, and this is particularly important for immigrants from low-income countries, who do not typically bring any pension entitlements with them from their former country of residence. They are thus in a high-risk group of ending up in poverty<sup>31</sup>. However, they may qualify for other transfers, e.g. social assistance and housing subsidies.

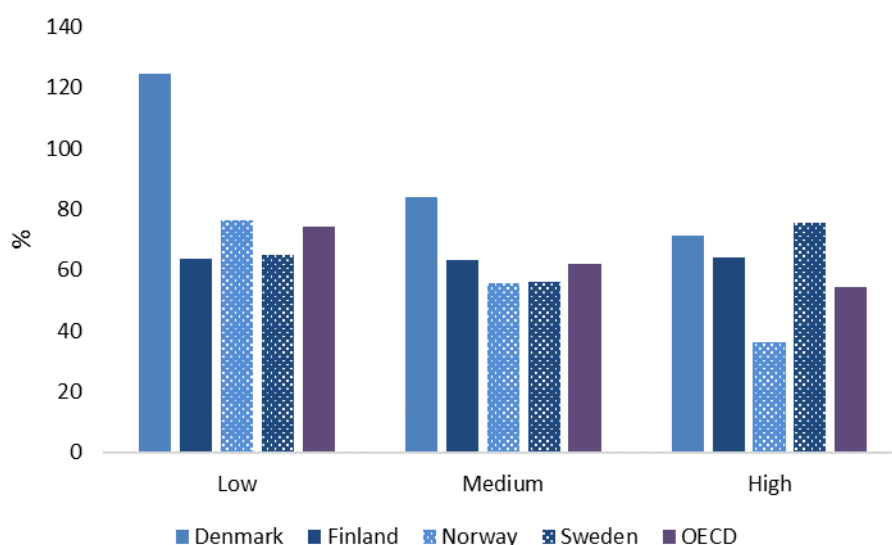
<sup>31</sup> As an example, most pensioners falling below the poverty line in Denmark are immigrants, see Benjaminsen et al. (2016).

## 4.2. Replacement rates

Replacement rates in the Nordic countries are in general on par with or higher than the average level across OECD countries for both men and women. This is seen in Figure 2, showing the replacement rates for low-, medium-, and high-income groups. In addition, comes the free access to health and old-age care, see above. It should be noted that the replacement rates are measured relative to wages, and since wage dispersion differs across OECD countries, a given fraction of the mean wage selects groups of different sizes in the respective countries.

There are, however, some notable differences across the Nordic countries. For Denmark the replacement rate is decreasing in the income level, see also Pensionskommissionen (2015). The replacement rate for low-income groups is close to 100% because the level of social benefits to non-employed individuals in the working-age population is at the same level as public pensions (the flat rate pension plus supplements) offered to individuals without any (significant) private pension, see above. For Finland and Norway, the replacement rates are largely invariant to the income level. For Sweden there is a U-shaped pattern with the highest replacement rate for low- and high-income groups, and the lowest for medium-income groups. The first part reflects the distributional concern, and the second part that supplementary labour market pensions are most prevalent/extended for high-income groups.

**Figure 2: Net replacement rates and income, Nordic countries, and the OECD, 2018**



Note: The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking account of personal income taxes and social security contributions paid by workers and pensioners. The values of all pension system parameters reflect the situation in 2020 and onwards. The calculations show the pension benefits of a worker who enters the system that year at age 22 – that worker is thus born in 1998 – and retires after a full career. The baseline results are shown for single individuals. Individual earnings: low: 50%, medium: 100%, and high: 150% of wage income. For the Nordic countries there is no difference across men and women, for the OECD average the net replacement rate is about one percentage point higher for men than women, and the figure shows the average.

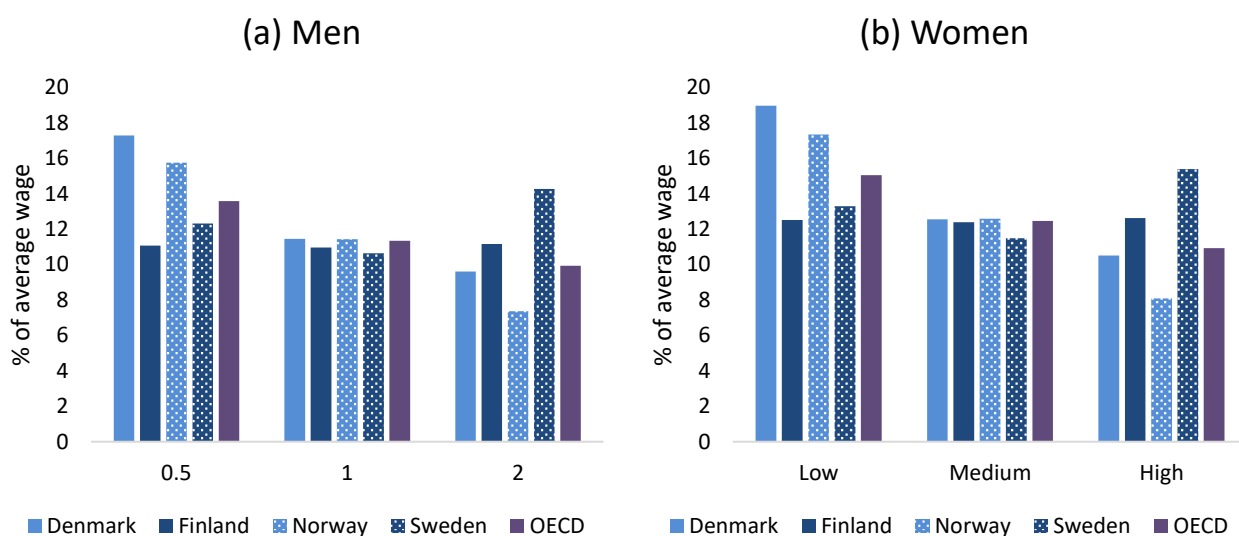
Data source: OECD, Pensions at a Glance 2021.

Gender differences in replacement rates are smaller in the Nordic countries than across OECD countries. This partly reflects the universal coverage of pension arrangements as well as higher employment rates for women. Most mandatory schemes apply unisex principles in the sense that mortality rates are not gender-specific when computing the benefit offered as life-annuities. In this context, differences between levels and ratios should be kept in mind, and gender differences in wage levels are not seen when comparing replacement rates.

### 4.3. Pension wealth

Private savings depends on the type of pension arrangement. In general, mandatory savings crowds out voluntary savings, whether tax- or contribution-financed, see Andersen and Bhattacharya (2011, 2021). However, there is a notable difference between the two schemes. In a PAYG scheme, total private savings tends to fall, while total private savings (voluntary and mandatory) increases in a funded DC scheme. This difference is reflected in gross pension wealth across the Nordic countries, which is higher in Denmark than the other countries, as should be expected given the large importance of the DC funded scheme, see Figure 3. For Sweden, the wealth level is higher for high-income groups in accordance with their high contribution rates.

**Figure 3: Gross pension wealth by income level and gender**



Note: Net pension wealth is the present value of the flow of pension benefits, taking account of the taxes and social security contributions that retirees have to pay on their pensions. It is measured and expressed as a multiple of net annual individual earnings in the respective country.

Data source: OECD, Pensions at a Glance 2021.

The role of pension wealth and the related return difference between PAYG and funded schemes is interesting. It is well established that the market return exceeds the implicit return in a PAYG scheme. Or expressed differently, the market rate of return is higher than the growth rate of the economy. Piketty (2014) stresses this point and argues that this is the source of an increasingly skew functional distribution of income between labour and capital as well as a more concentrated ownership of capital (since savings rates are increasing in income). Surprisingly, this discussion has not included the issue of pension systems for the distribution of income. The Danish case is an example of a system where the savings rate of wage earners has increased significantly due to the mandatory pension savings, and by implication ordinary wage earners

have become (indirect) capital owners entitled to a share of the return to capital. The presence of a mandated funded pension scheme makes it more difficult to make a sharp distinction between capital owners and wage earners. Andersen et al. (2022) show how the mandatory funded pension system in Denmark has contributed significantly to a reduction in wealth inequality, which in contrast to many other countries has been declining.

## 5. Pension system design

The following discusses some of the key design issues bringing up questions of distribution and incentives in combination with possible adjustment mechanisms to ensure a financially viable pension system.

### 5.1. Means-testing

Preventing poverty among the retired is an important policy objective in the Nordic welfare state. As discussed above, all Nordic countries have tax-financed elements in their pension system targeting the least well-off pensioners.

The World Bank (1994) report suggested that the distribution and replacement issues could be separated: “By separating the redistributive function from the savings function, the public pillar – and the size of the payroll tax needed to support it – can be kept relatively small, thus avoiding many of the growth-inhibiting problems associated with a dominant public pillar” (World Bank (1994), p. xiv). In practice it is, however, not that simple to separate these two tasks. A flat-rate pension for all pensioners would be a simple way of ensuring a minimum income level for all pensioners, but this solution increases the burden on public finances and thus distortionary taxes. Targeting the support to the least well-off pensioners by means-tested<sup>32</sup> pensions has lower fiscal costs, but introduces implicit taxes via the tapering rate determining how the public pension depends on private income/wealth. Reaching distributional goals thus involves a difficult trade-off between incentives and distribution/insurance in contrast to the separation hypothesis advanced in the World Bank report.

A high tapering rate (starting at relatively low pensions) implies that the guaranteed pension is targeted the “bottom” segment of the distribution, and the financial costs of such a programme are small. The high tapering rate creates a high effective tax rate, but only over a short interval. A moderate tapering rate implies that public pensions are received by a larger group, and hence it is more costly. The effective tax rate is not as high, but affects a larger group. This is obviously most clear in the case of a flat-rate pension, which is part of the Danish system.

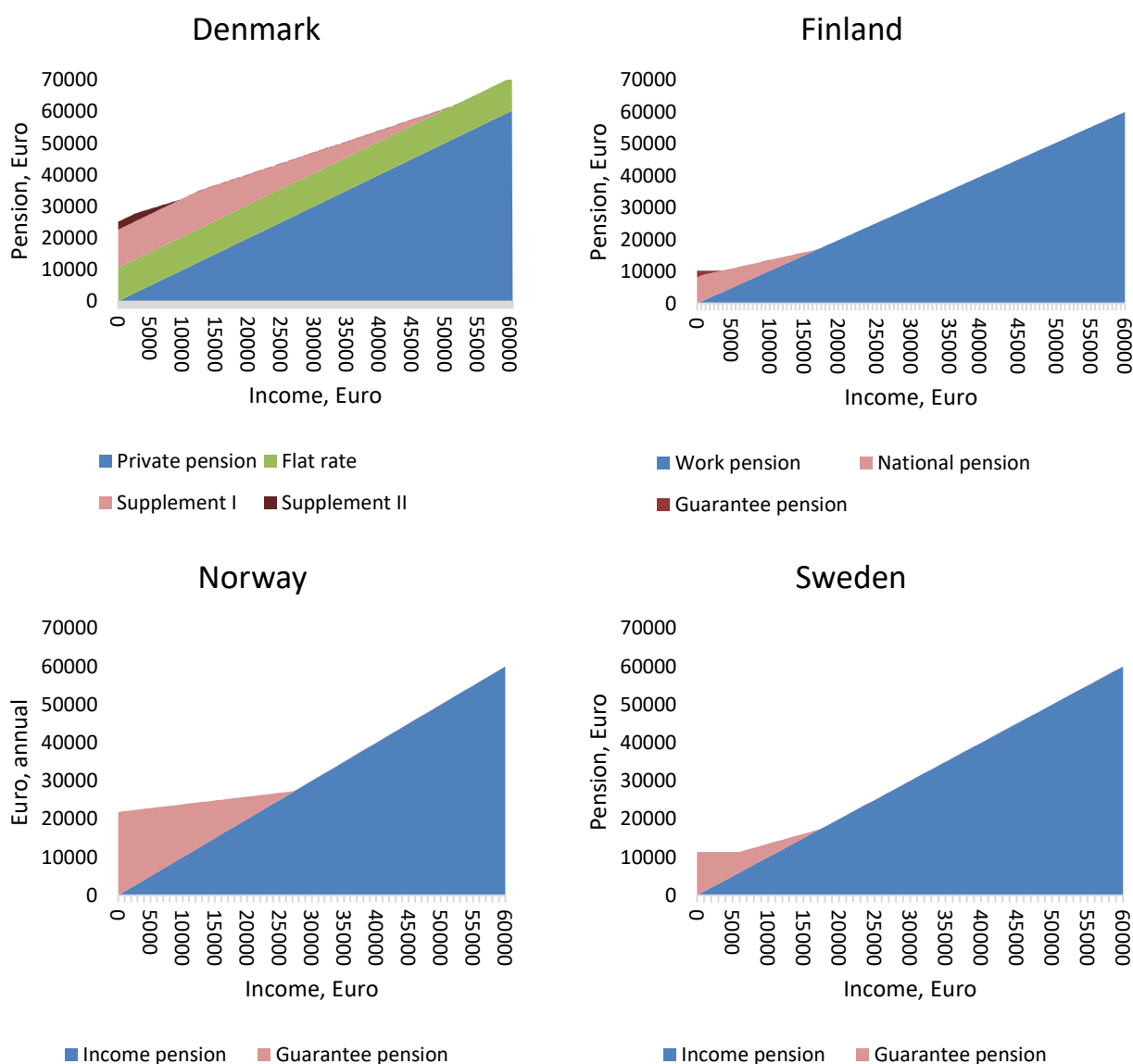
The overall structure of the base pensions and means-testing in the Nordic countries is illustrated in Figure 4. The figure simplifies by disregarding taxation, other needs-tested supplements (e.g. housing, medicine), and shows the case for singles (avoiding the difficulties arising since pension entitlement also depends on the economic situation of the spouse). Generalizing, there are two key differences across the Nordic countries. Denmark and Norway have higher minimum or base levels, and lower tapering rates than Finland

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<sup>32</sup> Means-testing can be against i) earned income, ii) pensions income (all types of pensions or only some, e.g. mandatory pensions), and iii) wealth (all types of wealth including housing, or only subsets). The taper rate decides how the public support is reduced when private means increase. Typically, tapering is over some interval, e.g. income above a certain minimum level up to some highest income level at which public pension benefits are zero.

and Sweden. The importance of means-testing can also be seen from the fact that the share of pensioners receiving some means-tested pension (being in the interval where means-testing is effective) is 80% in Denmark, 37% in Finland (2019), and 30% in Sweden. These differences contribute to explaining why poverty rates among pensioners is low in Denmark and Norway, close to the OECD average in Finland, and above the OECD average in Sweden, see Figure 1.

**Figure 4: Tax-financed pensions and means-testing in the Nordic countries**



Note: Own calculations based on information from [www.borger.dk](http://www.borger.dk), [www.nav.no](http://www.nav.no), [www.kela.fi](http://www.kela.fi), and [www.pensionsmyndigheten.se](http://www.pensionsmyndigheten.se). Data applies to 2022.

## 5.2. Retirement age – longevity and flexibility

The statutory retirement age and the scope for individual entry earlier or later are important design issues. The retirement age is important for both individuals and society. The trend increase in longevity makes the

retirement age of particular importance – how is the gain in longevity to be shared between work and retirement? It is well established empirically that the statutory retirement age is important for actual retirement ages (so-called bunching), see Blundell et al. (2016), Gruber and Wise (2004), and Börsch-Supan and Coile (2018).

The pension systems in Finland, Norway and Sweden have a built-in incentive for individuals to retire later when cohort-specific longevity increases. The scheme implies that cohorts with longer longevity would have to retire at higher ages to attain the same annual benefit flow as cohorts with shorter longevity. The same applies to the occupational pensions in Denmark, while it does not apply to the tax-financed base pension. However, experience from Sweden shows that the response to such incentives is weak, see e.g. discussion in Pensionsåldarutredningen (2013), Finanspolitiska Rådet (2022), and also above on bunching. This could be due to strong norms on retirement and that the private costs of retirement at a given age are generally lower than the social costs, and this is at the root of the problem. Individual adjustments to changes in longevity are not necessarily matching the socially desirable adjustments.

As a consequence, a number of countries index the statutory retirement age to longevity. There are two key arguments in support of such indexation. First, increases in longevity are strongly associated with so-called healthy ageing, making it possible to prolong working life alongside increases in longevity. Second, increasing the statutory retirement age alongside increases in longevity ties the adjustment to the cohorts benefitting from the increase in longevity and thus supports an intergenerational fairness argument. At a system level, indexation of statutory retirement ages is important for the financial viability of pension systems. The longevity adjustment can be designed in different ways. In the Danish case,<sup>33</sup> it is absolute in the sense of targeting a given average retirement period, while it is relative in Finland<sup>34</sup> and Sweden,<sup>35</sup> targeting a relative share of life in retirement. The absolute indexation applied in Denmark implies that the relative retirement period is declining in longevity, and this aspect has been criticized.

Longevity indexation of statutory retirement ages is challenged by the fact that healthy ageing is not applying to all, which in turn raises distributional issues since the gains in longevity have a social gradient with the largest increases for educated and high-income groups. The ability to continue working is not the same for all old; morbidity and depreciation of human capital may constrain the individual possibilities. Others may want more flexible retirement options or to retire early for other reasons, while others may want to keep working post the statutory retirement age. In short, retirement can be involuntary or

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<sup>33</sup> The Danish indexation formula ties the early retirement age and the statutory pension age to the development in life expectancy at the age of 60 in order to target an expected pension period to 14.5 years (17.5 including early retirement) in the long run (currently about 18.5/23.5 years).

<sup>34</sup> In Finland the statutory retirement age is linked to life expectancy as of 2030, so that the time spent working in relation to the time spent in retirement will remain at the 2025 level. Specifically, the old-age retirement age is calculated as follows: the difference between the lowest old-age retirement age and 18 years is divided by the life expectancy at the lowest old-age retirement age, and this ratio is to attain its 2025 level. The life expectancy at a given time is calculated with the mortality statistics for the latest 5 years.

<sup>35</sup> Sweden has introduced a reference age (riktålder) replacing the previous 65 age limit. The statutory age is first increased in steps to be 67 years in 2027. The reference, age is given as 65 years plus 2/3 of the expected life-expectancy for a person at the age of 65 less the expected life-expectancy at that age in 1994. The earliest age at which the income pension can be claimed is changed to be three years prior to reaching the reference age.



voluntary, and this complicates the design of the pension system, and there is increasing demand for a more flexible system.

In all countries, there is a corridor or window around the statutory retirement age giving possibilities for both earlier and later retirement than the statutory retirement age. Disability pensions are an important route for early retirement for those with reduced work capabilities. Such schemes exist in all the Nordic countries. Individuals are screened to assess whether their disability is sufficient to warrant the disability pension. There are wide discussions on the disability programs and in particular whether the criteria are set appropriately (physical, psychological diagnosis). In recent years there has been a general tendency towards a tightening of the criteria. The criteria for granting disability pensions may leave a grey zone with individuals for whom the loss of ability to work is not sufficiently severe to be granted a disability pension but still so severe that keep working is an unattractive option or the job options are severely limited. Especially if the role of age and remaining horizon in the labour market is not given sufficient weight. Another critique of the disability pension system is that it is not rule-based like other entitlements in the welfare state.

Denmark is a case example featuring different types of early retirement schemes. Permanent support in the form of disability pensions can, as a rule, only be granted to persons above the age of 40 if work capabilities are reduced to such an extent that self-support cannot be expected (not even in a so-called flex-job). A "senior pension" (seniorpension) is available to individuals with a previous strong labour market attachment (20 to 25 years of full-time work) from an age six years prior to reaching the statutory retirement age for individuals, provided work capability is sufficiently reduced (unable to work at least 15 hours per week), which is determined by an individual assessment (screening). The eligibility criterion is thus more lenient than for the disability pension. A new scheme "early pension" (tidlig pension) is available for persons who at the age of 61 have worked at least 42 years in the labour market, and it is thus based on objective criteria. Finally, there is the early retirement (efterløn) scheme (introduced in 1979 and reformed many times over the years), which is contribution-based (though tax subsidized). Early retirement gives an option of retiring in a window (after reforms reduced from five to three years) prior to the statutory pension age for persons who have contributed to the scheme for at least 30 years. The number of persons eligible for early retirement is decreasing. Finally, individuals are allowed to start drawing on their occupational pension 3(5) years prior to reaching the statutory retirement age. The latter two routes are thus available for voluntary retirement prior to the statutory retirement age. A system allowing individuals to retire early (and as a consequence receiving a lower pension benefit) may thus make individuals self-select (privatization of the risk) into retirement, including both those having difficulties continuing to work (whether due to morbidity or job prospects) and those having a high preference for leisure (or a strong present bias). Screening is potentially more precise in the group having a reduce work capability, but it has a subjective element. A scheme based on years of work is based on a simple rule, but may not be precisely targeted ability to work, and it introduces a link between contributions and entitlements which is different from the general principles underlying universal welfare arrangements.

The scope for retirement later than the statutory retirement to combine work and pensions in the Nordic countries are summarized in the table below. Generally, all countries make such retirement possible, and benefits are adjusted on actuarial terms.

**Table 2: Possibilities for combining work and pensions**

	Combining work and pensions	Scope for postponing public pensions	Postponement premium
Denmark	Possible for labour income up to an upper cap, 30% of the income above this limit is deducted in the pension	Twice, max for 10 years after the statutory retirement age	Determined when receiving the pension based on actuarial principles
	Occupational pensions: no limits	No limits	Actuarial determination
Finland	Work and pension can flexibly be combined – employment should be terminated before applying for the earnings-related pension. Subsequently, it is possible to return to work (also with the same employer). Pension entitlements are accrued by working post the statutory retirement age	No limits	0.4% premium per month postponement of the pension
Norge	Pension is independent of earned income. Pensions can flexibly be combined with work at rates 0, 20, 40, 50, 60, 80 og 100% in the age interval 62 to 75 years  Pension entitlements are accrued by working post the statutory retirement age	No limits – max age 75 years	Determined when receiving the pension based on actuarial principles
Sweden	Pension is independent of earned income. Pensions can flexibly be combined with work at rates 25, 50, 75 or 100%  Pension entitlements are accrued by working post the statutory retirement age	No limits	Determined when receiving the pension based on actuarial principles

Source: See table 1

### 5.3. Automatic adjustment mechanisms

While textbook models often present public pension schemes as Pay-as-You-Go schemes with a period-by-period balanced budget, this is neither feasible nor desirable in practice. On the practical side, total contributions and pension expenditures fluctuate for many reasons in the short-term, and they cannot be determined with full accuracy until ex post. Adjusting contribution rates or pension benefits ex post to balance the budget is not desirable and thwarts one of the key objectives of pension systems: to provide

security and predictability. Period-by-period changes in contribution rates also have efficiency costs via changes in work and savings incentives. Smoothing of contribution rates moreover minimizes potential distortionary effects<sup>36</sup>. Allowing for budget variations also provides risk diversification across employers, employees, and pensioners compared to a situation with changes in either contribution rates or benefit levels to balance the budget.

Therefore, pension systems, even though not fully funded, have pre-determined contribution rates, benefit rules, and statutory retirement ages, and operate via the general public budget (or via buffer funds) to accommodate short-run variations in contributions and benefits<sup>37</sup>. However, this leaves the problem that predetermined contributions, benefits and statutory retirement ages may not ensure a solvent system, that is, a balanced budget on average across the short-run variations in contributions and pension expenditures. If this is not the case, something would have to give in, and this raises questions on how and when to adapt to such changes.

In principle, two approaches are available; either discrete changes from time to time, or built-in automatic adjustment mechanisms coping with changes affecting the financial viability of the pension system. The latter refers to explicit contingencies linking contribution rates or benefits to demographics, macroeconomics, and financial variables. The choice between the two alternative strategies raises political economy issues since discrete changes may suffer from reform delay, implying that adjustment problems grow with implied implications for intergenerational risk and distribution. Rules change the focal point in political discussions from the need for reforms to violating predetermined rules (comply or explain): the political costs of procrastination increase<sup>38</sup>. Rules may therefore strengthen the credibility, continuity, and consistency of the pension system. Clearly, all of this presumes support for the rules in the first place. Rules typically also imply more gradual changes than discrete reforms undertaken from time to time, often in an atmosphere of crisis. Rules do not eliminate risk generally since they are state-of-nature contingent, but political risks are reduced.

Automatic adjustment rules basically make contribution rates and/or benefit levels dependent on the state of nature in some pre-specified way. The challenge here is implementation. While it in principle is possible to design sophisticated rules coping with all eventualities, actual rules have to be simple. Hence, rules can cope with some adjustment problems, but it is not realistic that the pension system can be completely “automated” to cope with all possible future hazards.

The pension systems in the Nordic countries feature two (semi) automatic adjustment mechanisms linking pension benefits<sup>39</sup> (Finland, Norway, and Sweden) and statutory retirement ages (Denmark, Finland, and

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<sup>36</sup> It is a general argument in taxation theory that smoothing of tax rates reduces overall distortionary costs, see Barro (1979).

<sup>37</sup> In Finland the EMU-buffer fund agreed by the social partners in 1997 allows for temporary reductions in pension contribution rates under dire economic circumstances. Subsequently, when the economic situation improves, contribution rates are raised to replenish the buffer fund. The buffer fund constitutes 2.5% of the wage sum. In the wake of the corona crisis, the employer’s contribution rate has been lowered by 2.6 percentage points and will be increased between 2022 and 2025 to rebuild the buffer.

<sup>38</sup> When the balance mechanism in the Swedish system, see below, was to be applied for the first time in 2011, the implied reductions in pension caused political problems, and as a response taxes were reduced.

<sup>39</sup> For Denmark there is no adjustment of tax-financed pensions to longevity. For the DC occupational pension scheme with market-based products, the contribution rate is given, and benefits adjust to all variations in income, returns,

Sweden) to longevity. These mechanisms reduce the financial vulnerability to changes in longevity but are not fine-tuning instrument, since the adjustments mechanisms are not making changes in longevity completely financially neutral. Moreover, other changes – also demographic like fertility – influence the financial viability of the schemes. Hence, these adjustments mechanisms serve a purpose of mitigating the importance of one important trend, namely longevity, but does not eliminate concerns about the future viability of the schemes.

Pension systems can have more general adjustment mechanisms<sup>40</sup>, as is the case for the Swedish NDC - scheme which has an explicit solvency-based mechanism, see e.g. Palmer (2000) and Pensionsmyndigheten (2011). Pension accruals and benefits are regulated by the income index (defined as the growth rate of the contribution base). To ensure that the pension system is financially viable, indexation may be reduced below the income index; that is, pension accrual and benefits in payments are adjusted. The trigger is the so-called balance ratio given as the ratio of assets to liabilities. The assets are current and expected future contributions to the system plus buffer funds, and the liabilities are the pension payments to current pensioners and current contributors. If the balance ratio is lower than one, the indexation of accruals and benefits is reduced below the income index. If the ratio is above one, buffer funds are accumulated. The adjustment thus both affects pension accrual (future pensioners) and pension benefits (current pensioners). Although the contribution rate is constant, less pension entitlements are accrued, and pension benefits in payment are reduced.

#### 5.4. Financial sustainability

Ageing is a global phenomenon and thus also important in a Nordic context. Assessed in terms of the old age dependency ratio, the development in the Nordic countries is close to the OECD average, see Figure 5, although in the long run the increase is lower in Denmark, Norway and Sweden. As is well known, this development is driven by a fall in fertility rates and an increase in longevity. The latter increases are stunning. Remaining life expectancy at the age of 65 is projected to rise by about 3.9 years for women and 4.5 years for men between 2015-20 and 2060-65, see OECD (2021a). This trend surely constitutes a significant welfare improvement, but challenges welfare and pension systems.

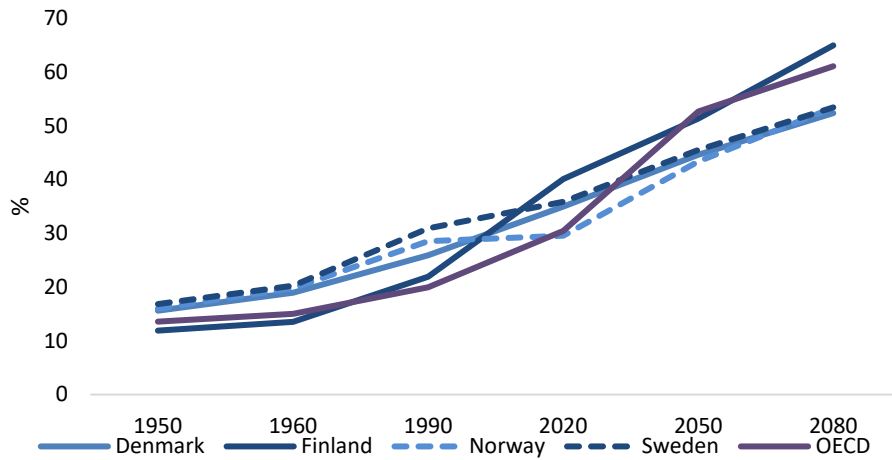
The basic arithmetic of aging in relation to pension systems is simple, and can be summarized in a basic triangle applying to both tax-financed and explicit contribution-based (PAYG/funded) pension systems. The financial viability depends on the balance between taxes/contributions into the system and benefits paid out (level and duration). If longevity increases, there are three modes of adjustment: (a) taxes/contribution rates have to increase. If pension benefits and retirement ages should remain unaffected, (b) benefits will have to be reduced for unchanged taxes/contributions and retirement ages, and (c) retirement ages have to increase (thereby implying a longer period contributing and a shorter period of benefitting from the scheme) for unchanged tax/contribution rates and benefit levels.

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longevity etc. This system has by definition no solvency issues, but this comes at the costs of all adjustment burdens falling on the cohorts/individuals. This scheme does not offer much smoothing and therefore risk diversification across cohorts.

<sup>40</sup>The Germany pension system links both contributions and benefit entitlements to the developments in the dependency ratio. If the dependency ratio declines, the contribution rate increases and benefit levels decrease, see e.g. Börsch-Supan and Wilke (2006) and Vidal-Meliá et al. (2009).

**Figure 5: Old-age dependency ratio, Nordic countries, 1950-2080.**

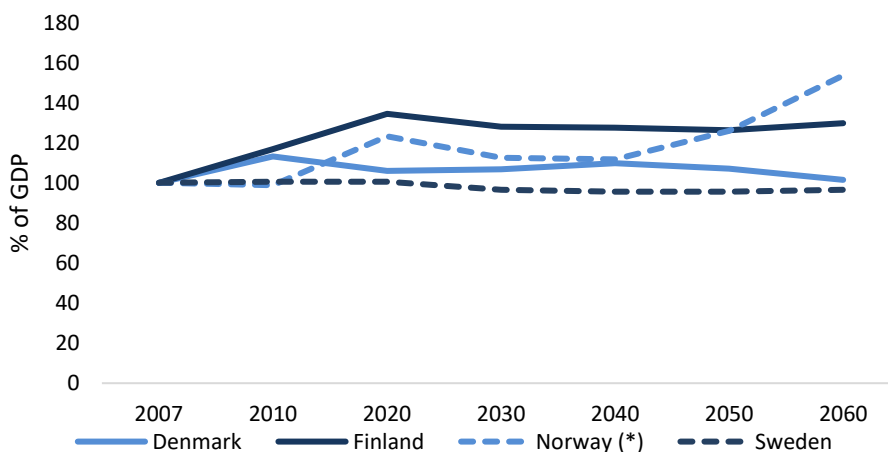


Note: The demographic old-age to working-age ratio is defined as the number of individuals aged 65 and over per 100 people aged between 20 and 64.

Source: OECD, Pensions at a Glance 2021.

The economic implications are shown in Figure 6, giving the projected development in public age-related expenditures. For Norway and Finland there is an increase of 40-50%, which is quite significant and the mirror image of the sustainability problems discussed below. Denmark and Sweden are not projected to have an increase in age-related expenditures as a share of GDP. This is quite remarkable, given the increase in the dependency ratio, see Figure 5. In the case of Denmark, this reflects the increasing role of private pensions and reforms increasing the statutory retirement age, while for Sweden the pensions are largely (except guaranty-pension) independent of public finances (although health and care expenditures may increase), cf. discussion above.

**Figure 6: Projected age-related public expenditures, Nordic countries, 2007-2060.**



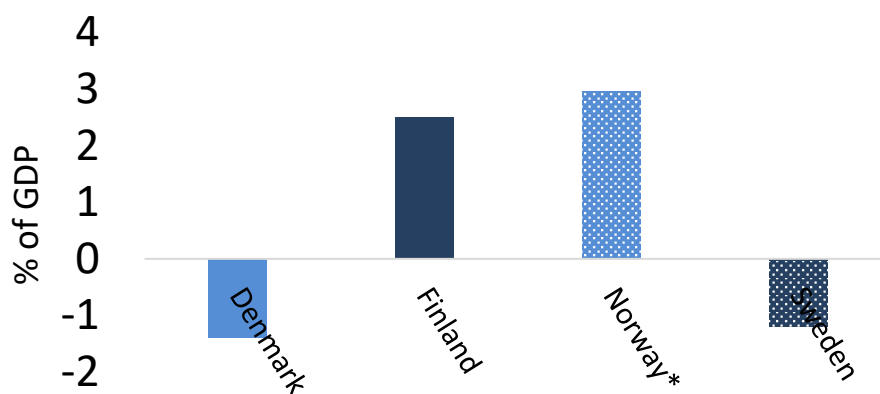
Note: Expenditures as a share of GDP. Index 2007=100. For Norway, total public expenditures.

Source: Denmark: Convergence Programme 2021; Finland: General government fiscal plan 2023-2026, Norway: Perspektivmelding 2021; Sweden: Convergence programme 2022.

While ageing influences pension systems in general, it is of particular interest to analyse the burden falling on public finances and thus the welfare state at large. This is done in fiscal sustainability analyses analysing the viability of current arrangements given the demographic changes (and possibly other trend changes). The idea is to project future expenditure and revenue paths given the existing welfare (pension) and taxation system and compute the necessary permanent improvement in the budget, which ensures that the intertemporal budget constraint is fulfilled. This assesses whether current policies are financially viable and is thus an input to policy discussions on how to reform the system to cope with demographic changes if there is a sustainability problem.

Most EU countries face a sustainability problem; that is, ageing causes a systematic imbalance between revenues and expenditures under current policies (see e.g. European Commission, 2021). Clearly, this is not viable. The longer the adjustment is postponed, the larger is the burden shifted onto future generations, or the higher is the risk that entitlements will be reduced.

**Figure 7: Sustainability indicator – permanent budget changes % of GDP, Nordic countries.**



Note: For all countries the S2 indicator, except for Norway where it is the average required budget improvements over the period 2030-2060.

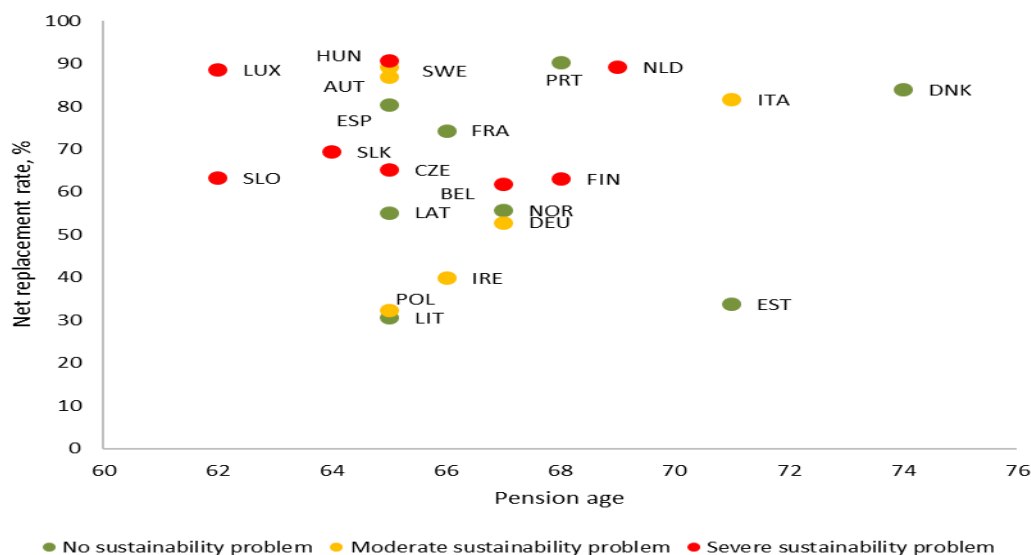
Source: See Figure 6.

Figure 7 gives assessments of fiscal sustainability in the Nordic countries based on official analyses. The situation is different across the Nordic countries. Denmark and Sweden do not have any sustainability problem. This shows the importance of early reforms of pension systems and thus preparation for an ageing population. Although there have also been reforms in Finland and Norway, they have not been sufficient to ensure fiscal sustainability. For Norway the analyses take into account the return flow from the pension fund (the State Pension Fund, earlier known as the Oil Fund). Note that these analyses focus on the technical side of sustainability; equally important are political sustainability, to ensure stable rules, and predictability, which is particularly important in relation to pensions due to the long time lags and the irreversibility associated with retirement and pension saving.

In comparing how different countries adjust to the challenges facing pension systems, it is important to note the fundamental financing triangle between contributions, retirement period and benefit level discussed above. Increasing longevity requires either higher contributions or lower pension benefits, and similarly for other conceivable changes. In which dimension to adjust to changes in fundamentals including fertility, longevity, productivity growth or other structural changes is a policy choice, but an adjustment is inevitable. Hence, comparisons of cross-country developments of specific elements, e.g. the statutory retirement age, should be made with care since such adjustments should be seen not only in relation to changes in fundamentals but also other modes of adjustment. One country may thus choose to increase retirement ages to ensure the financial viability, while another may change retirement ages less strongly and accept lower benefits.

The many dimensions involved make it extremely difficult to compare countries. The figure below makes a very stylized comparison to frame the discussion. It shows projections of future replacement rates and retirement ages. In policy debates particular focus has been on retirement ages. It is here important to note that countries are very differently phased in terms of reforms (and automatic adjustment mechanisms), and many countries do not have fiscally sustainable systems. Comparing replacement rates and statutory retirement ages in countries having a financially sustainable system with countries where this is not the case is obviously problematic. In Figure 8 the sustainability problem is indicated by a colour (green: no problem; yellow: moderate problem, and red: severe problem). The Figure shows that most countries have unsustainable systems, and therefore care should be taken in comparison the systems based on e.g. current contribution rates, benefit levels, or retirement ages.

**Figure 8: Replacement rates, pension age and sustainability of public finances, EU countries**



Note: Net replacement rate and pension age are calculated for full-career workers from the age of 22, see OECD (2021a). The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking account of personal income taxes and social security contributions paid by workers and pensioners. Note that the computation does not include all recent reforms, e.g. the Swedish increase in the retirement age. Sustainability is assessed on the basis of the S2 indicator, see European Commission (2021). For a sustainability indicator equal to one or below: no sustainability problem; above one and below three: a moderate sustainability problem; equal to or above three: a severe sustainability problem. Data: OECD (2021a) and European Commission (2021).

## 6. Concluding remarks

In comparative analyses the Nordic countries are commonly grouped together under the heading of the Nordic Welfare Model. While there are many similarities across the Nordic countries, especially in terms of objectives and outcomes, it is interesting that the design of the pension systems differs significantly, not least since pension systems are often interpreted as the bedrock of welfare models. The differences underscore the point that there is no unique relation from objectives to policy instruments. The Nordic experience shows that favourable outcomes in terms of low levels of poverty and high replacement rates can be achieved through different designs. However, a common denominator is a high level of social responsibility in ensuring decent pension coverage for all via initiatives taken politically and by the social partners.

In comparative perspective, the pension systems in the Nordic countries stand out as well-performing, and the countries are also among the front-runners in terms of reforms to deal with an ageing population. In the specific context of pension system designs the Nordic comparison underscores that there is no unique optimal pension system design. Pension systems have many dimensions leaving numerous combinations to achieve given objectives. The multiple objectives – primarily poverty prevention, adequate replacement rates, and insurance – require a hybrid scheme.

The differences across the Nordic countries reflects historical and institutional differences and is therefore also a case in point that there is path dependence in policies. This in turn shows that adjustment to structural changes like demographic changes can be handled despite different pension system design. Though fundamentally the reforms are framed by the basic interdependence between contributions, benefit levels, and retirement ages (periods).



## References

- Aaron, H., 1966, The social insurance paradox, *Canadian Journal of Economics*, 32, 371-4.
- Andersen, S.G., S. Markussen and K. Røed, 2020, Pension reforms and the efficiency-equity trade-off: Impacts of removing an early retirement subsidy, IZA Discussion Paper 12918.
- Andersen, T.M., 2018, How should pensions be taxed? Theoretical considerations and the Scandinavian experience, In: R. Holzmand and J. Piggott (eds.), *Taxation of Pensions*, MIT Press.
- Andersen, T.M., 2021, Pension adequacy and sustainability – An evaluation of the Finnish pension system, Finnish Centre for Pensions.
- Andersen, T.M. and J. Bhattacharya, 2011, On myopia as rationale for social security, *Economic Theory*, 47, 135-158.
- Andersen, T.M. and J. Bhattacharya, 2021, Why mandate young borrowers to contribute to their retirement accounts? *Economic Theory*, 71(1), 115-149.
- Andersen, T.M., J. Bhattacharya, A. Grodecka-Messi and K. Mann (eds), 2022, Pension reform and wealth inequality: evidence from Denmark, CEPR Press Discussion Paper No. 17078.
- Andersen, T.M., J. Rangvid and S. E. Hougaard Jensen, 2022, *The Danish Pension System*, Oxford University Press (to appear).
- Barr, N., 2011, The Pension system in Finland: Adequacy, sustainability and system design, Finnish Centre for Pensions.
- Barro, Robert J. 1979. On the determination of the public debt. *Journal of Political Economy* 87(5): 940-971.
- Benjaminsen, L., M.H. Enemark and J.F. Birkelund, 2016, Fattigdom og afsavn - Om materielle og sociale afsavn blandt økonomisk fattige og ikke-fattige, SFI.
- Blanchard, O.J., 2019, Public debt and low interest rates, *American Economic Review* 109 (4): 1197–1229.
- Blundell, R., E. French and G. Tetlow, 2016, Retirement incentives and labor supply, *Handbook of the Economics of Population Aging*, Vol. 1B, 457-566.
- Börsch-Supan, A.H. and C. Coile, 2018, Social security programs and retirement around the world: Reforms and retirement incentives – Introduction and Summary, NBER Working Paper 25280.
- Börsch-Supan, A.H. and C.B. Wilke, 2006, The German public pension system: How it will become a NDC look-alike, In: R. Holmann and E. Palmer (eds.), *Pension Reform: Issues and Prospects for Notional Defined (NDC) Schemes*, Ch. 22, Washington D.C., World Bank.

- Chetty, R., J.N. Friedland, S. Leth-Petersen, T.H. Nielsen and T. Olsen, 2014, Active vs. passive decisions and crowding-out in retirement savings accounts: Evidence from Denmark, *Quarterly Journal of Economics*, 129 (3), 1141–1219.
- de Walque, G., 2005, Voting on pensions: A survey, *Journal of Economic Surveys*, 19(2), 181-209.
- Due, J. and J.S. Madsen, 2003, *Fra magtkamp til konsensus – Arbejdsmarkedspensionerne og den danske model*, DJØFs Forlag.
- Eckstein, Z., M.S. Eichenbaum and D. Peled, 1985b, Uncertain lifetimes and welfare enhancing properties of annuity markets and social security, *Journal of Public Economics*, 26, 303-326.
- European Commission, 2018, *Ageing Report 2018, Economic and budgetary projections for the 28 EU member states (2016-2070)*, Institutional Paper 079, Brussels.
- European Commission, 2021, *EU debt sustainability monitor 2021*, Bruxelles
- Feldstein, M., 1985, The optimal level of social security benefits, *Quarterly Journal of Economics*, 100(2), 303-320.
- Fenge, R. and J. von Weizsäcker, 2001, Compulsory saving: Efficiency and redistribution - On the interactions of means tested basic income and public pensions, *International Tax and Public Finance*, 8, 637-652.
- Finanspolitiska Rådet, 2022, *Pensionssystemet och pensionärernas inkomster*, Säsilda studier från Finanspolitiska Rådet, Stockholm.
- Fredriksen, D., and N.M. Stølen, 2011, Norwegian pension reform – Defined benefit versus defined contribution, *SSB Discussion Paper No. 669*.
- Gruber, J. and D. Wise (eds.), 2004, *Social Security Programs and Retirement around the World: Micro-Estimation*, University of Chicago Press.
- Hernæs, E., S. Markussen, J. Piggott and K. Røed, 2016, Pension Reform and Labor Supply, *Journal of Public Economics*, 142, 39-55.
- Hernæs, E., S. Strøm and T. Zhang, 2019, The Norwegian pension reform in 2011: The long term impact on take-up of pension and labor supply, *CESifo Working Paper No. 7723*.
- Jordá, Ò., K. Knoll, D. Kuvshinov, M. Schularick, A. M. Taylor, 2019, The Rate of Return on Everything, 1870–2015, *Quarterly Journal of Economics*, 134 (3), 1225–1298.
- Kaplow, L., 2015, Myopia and the effects of social security and capital taxation on labor supply, *National Tax Journal*, 68(1), 7-32.
- Kuhnle, S. and A. Sander, 2010, The emergence of the western welfare state, Ch. 5 in F.G. Castles, S. Leibfried, J. Lewis, H. Obinger and C. Pierson, *The Oxford Handbook of the Welfare State*, Oxford.

Laibson, D., 1996, Hyperbolic discount functions, undersaving, and savings policy, NBER Working Paper, No. 5635, National Bureau of Economic Research, Cambridge, MA.

Lindert, P., 2004, *Growing Public – Social Spending and Economic Growth since the Eighteenth Century*, Cambridge University Press.

Lusardi, A., and O.S. Mitchell, 2014, The economic importance of financial literacy: Theory and evidence, *Journal of Economic Literature*, 52, 5-44.

Matsen, E., and Ø. Thøgersen, 2004, Designing social security - a portfolio choice approach, *European Economic Review*, 48, 883-904.

Mercer, 2015, *The Melbourne Mercer Global Pension Index*.

Ministry of Finance Denmark, 2022, *Convergence Programme Denmark 2022*, Copenhagen.

Ministry of Finance Finland *General government fiscal plan 2023–2026*

Ministry of Finance Norway, 2021, *Perspektivmeldingen*, Oslo.

Ministry of Finance, Sweden, *Convergence programme 2022*

Money and Pension Panel Expert Group, 2012, *Basic pensions - The default option for labour-market pensions*, Report by the Committee of the Money and Pension Panel, Copenhagen.

NAV, 2018, *Hvordan er det norske pensjonssystem byggt opp?* (accessed via [www.nav.no](http://www.nav.no) April 9th 2018).

OECD, 2016, *Life Annuity Products and Their Guarantees*, OECD, Paris.

OECD, 2021a, *Pensions at a Glance*, Paris.

OECD, 2021b, *Health at a Glance*, Paris.

Palmer, E., 2000, *The Swedish pension reform model: Framework and issues*, Social Protection Paper, 12, World Bank, Washington.

Pedersen, A.W. and S. Kuhnle, 2017, *The Nordic welfare state model: 1 Introduction: The concept of a “Nordic model”*, In: O.P. Knutsen (ed.), *The Nordic Models in Political Science: Challenged, but Still Viable?*, 249-272, Bergen, Fagbokforlaget.

Pensionsåldersutredningen, 2013, *Åtgärder för ett längre arbetsliv*, SOU 2013:25, Stockholm.

Pensionskommissionen, 2015, *The Danish pension system – internationally praised but not without problems (Det danske pensionssystem – internationalt anerkendt, men ikke problemfrit)*, Copenhagen.

Pensionsmyndigheten, 2011, *Det svenska pensionssystemet*, Stockholm.

Pensionsmyndigheten, 2014, *Från fattigvård till ekonomisk trygghet vid ålderdom – beskrivning af grundskyddet i det svenska pensionssystemet*, Stockholm.

Pestieau, P. and U. Possen, 2008, Prodigality and myopia - two rationales for social security, Manchester School of Economics, 76(6), 629-652.

Piketty, T., 2014, Capital in the twenty-first century, Belknap Press of Harvard University Press, Cambridge.

Scharfstein, D.S., 2018, Pension policy and the financial system, Journal of Finance, 73(4), 1463-1512.

St-Amant, P.-A.B. and J.-D. Garon, 2014, Optimal Redistributive Pensions and the Costs of Self-Control, International Tax and Public Finance.

Vidal-Meliá, C., M. del Carmen Boada-Penas, and O. Settergen, 2009, Automatic balance mechanisms in Pay-as-you-go pension systems, Geneva Papers, 34, 281-317.

Vidlund, M., M. Kiviniemi, A. Mielonen and N. Väänänen, 2016, What is the cost of total pension provision and who pays the bill? Cross-national comparison of pension contributions, Finnish Centre for Pensions, Reports 09/2016.

World Bank, 1994, Averting the Old Age Crisis, World Bank Publications, Washington D.C.