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The Norwegian Pension Reform: An External Perspective

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1. Introduction

Like many other developed countries, Norway is facing a rapid ageing of its population that is attributed to both falling mortality and fertility rates in the past and projected life-expectancy increases over the next several decades. According to United Nations (2015), it is projected for Norway that by 2060, the share of the population 65+ will increase to over 25% (from 16% in 2015) and the potential support ratio will drop to 2 people in the labour force for each person aged 65 years and over.

Such fundamental demographic change will have wide-ranging implications for the Norwegian economy and, in particular, for its National Insurance Scheme (NIS) that provides citizens with old-age and disability pensions. It is estimated that if the old pre-reform National Insurance Scheme had remained unchanged, the government expenditure on the old-age pension would have more than doubled from about 6% of GDP in 2013 to 13% of GDP by 2060, with additional spending of around 4% of GDP on disability pension (Fredriksen et al., 2015).[3]

As a response to this pronounced population ageing and its severe fiscal implications, Norway has recently reformed its pension system. A decade-long, well-thought out reform process (which started in 2001 when a Pension Commission was appointed by the government) has resulted in structural pension reform that has strong support from the public.

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[3] And there are additional costs to the government associated with pensions for civil servants and other public sector workers.

The main features of the new National Insurance Scheme – the adjustment of pensions for changes in life expectancy, flexible retirement from age 62 based on actuarial principles and new rules for the indexation of pensions – were implemented in 2011. The reform also radically changed the rules for accumulation of pension entitlements. These rules are being introduced gradually for cohorts born after 1953, with people born in 1963 or after being fully subjected to a new notional defined contribution (NDC) model for accumulating their pension rights.[4] The major goal of this structural reform is to improve the long run fiscal sustainability of the system, particularly through stronger labour supply incentives, while maintaining key redistributive measures that were built into the pre-reform system.

In this report, we describe the main aspects of Norway's pension reform and provide an assessment of the reform against the main objectives, including sustainability and affordability of the reformed system to taxpayers, efficiency implications particularly for labour supply incentives, and distributional effects. Our assessment is based, in part, on the findings of the related literature examining the Norwegian pension reform and, in part, on comparison of the Norwegian pension reform with pension reforms in other developed countries.

The major findings of this report are as follows.

- Norway's structural reform to the public old-age pension combined with the policy changes to second-pillar pension schemes in the private sector is expected to have a significantly positive impact on long-run fiscal sustainability – driven to a large extent by strong labour supply effects along both the intensive margin (higher working hours) and the extensive margin (postponed retirement).

- The new pension system will continue to deliver adequate and equitable pensions as a result of *(i)* maintaining (and in some cases strengthening) the redistributive measures of the public old-age pension and *(ii)* growing significance of occupational pensions for young and future generations.

- Key areas for further improvement of Norway's pension system include: *(i)* reducing complexity by reforming particularly second-pillar pensions in the public sector; *(ii)* applying an automatic adjustment mechanism to account for future macroeconomic and demographic risks; *(iii)* increasing coverage of the longevity risk by recalculating annuity factors at the age of 67 for those claiming a public old-age pension before that age; *(iv)* considering progressive taxation or means testing of public pension benefits to mitigate negative distributional effects of life-expectancy differentials by socioeconomic characteristics.

The rest of this report is organised as follows. The next section introduces Norway's multi-pillar pension system and in detail describes the key elements of the Norwegian pension reform. The focus is placed on the National Insurance Scheme (NIS) old-age pension – since the main reform has been to this publicly provided pension. However, we also discuss Norway's occupational pensions and collectively agreed early retirement schemes (AFP). In Section 3, we assess the Norwegian pension reform against economy-wide criteria such as sustainability, equity and efficiency. The final section offers some conclusions and policy recommendations.

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[4] Note that concurrently with the changes to the public old-age pension, the second pillar's private occupational pensions and collectively agreed early retirement schemes (AFP) for the private sector workers have also been radically reformed.

2. The Norwegian Pension System and the Reform

In this section, we introduce the components of retirement income provision in Norway, briefly outline the former system and provide a detailed description of the timeline and key elements of the Norwegian pension reform. Our discussion includes the policy settings of and the changes made to the NIS old age pension, the AFP schemes and funded occupational pensions.

2.1 Components of Retirement Provision

Figure 1 depicts a three-pillar framework for the provision of old age income security – very similar to the ones used by OECD (2013a, p.123) and in Bateman et al. (2001, p.8). As shown, the pillars are clearly separated based on their functions. The function of the first compulsory pillar is to provide a safety net aimed at reducing poverty in old age. The second and third pillars operate as mandatory and voluntary income replacements aimed at helping with consumption smoothing between working life and retirement.

Figure 1: Three pillars of retirement income provision and the Norwegian structure (red)
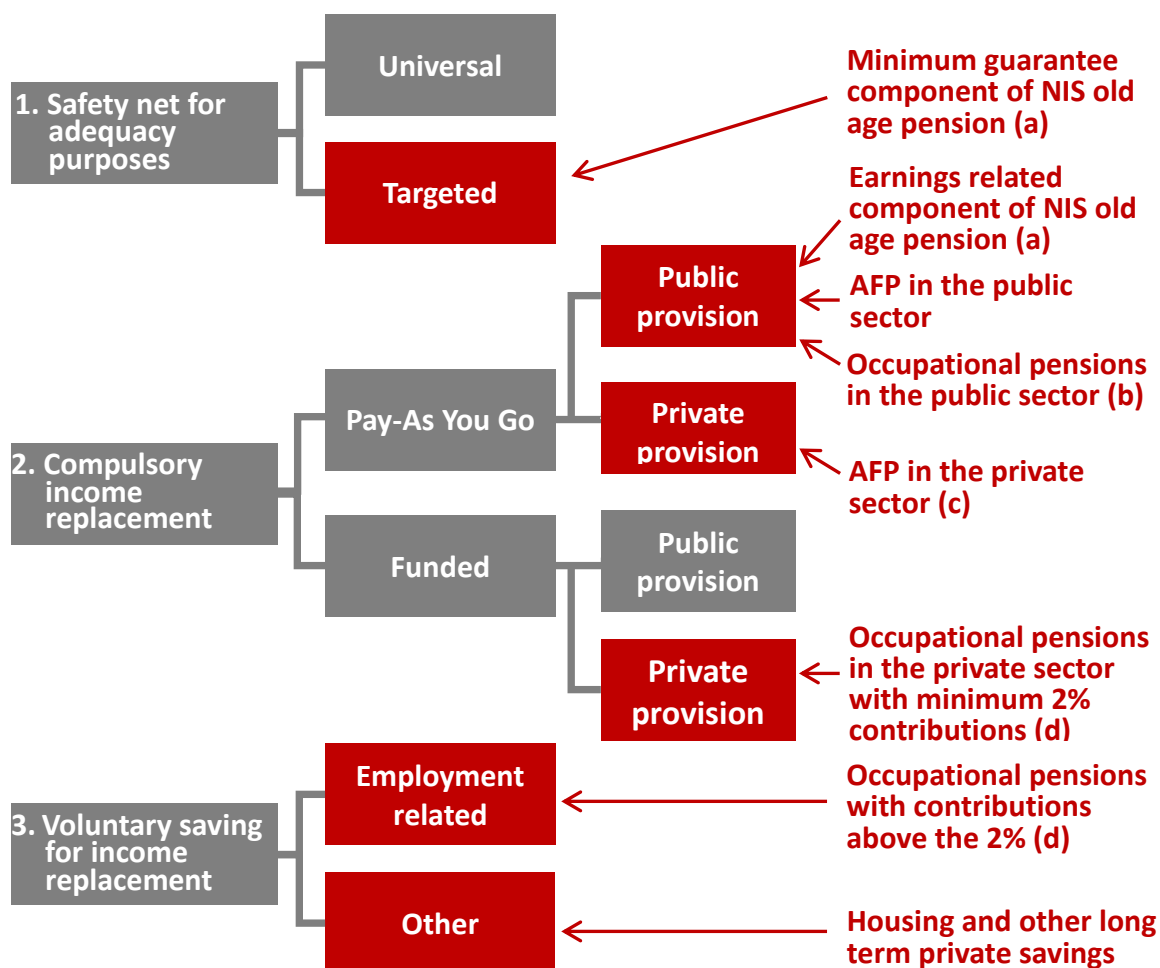
Note: (a) The National Insurance Scheme (NIS) public old-age pension includes minimum guarantee and earnings-related components; (b) Occupational pensions in the public sector are unfunded and based on defined benefits (DB); (c) Collectively agreed early retirement schemes (AFP) in the private sector cover around 50% of workers and are partly financed by the government; (d) Occupational pensions in the private sector are based predominantly on defined contributions (DC).

More specifically, the first pillar is a non-contributory transfer program that pays benefits irrespective of work history. Benefits can be either universal (paid at a flat rate to everybody satisfying age and residency requirements (e.g., New Zealand)) or targeted (to individuals with limited private resources (e.g., Australia).[5]

The second pillar is a compulsory earnings or employment-related participation pillar that provides payments related to pre-retirement earnings. It is often a publicly provided, defined benefit system financed on a pay-as-you-go basis (e.g., in much of North America and continental Europe). Alternatively, it may be a mandatory system of saving, privately or publically managed and funded through contributions made by employers, employees or both (e.g., Australia, Chile and Singapore).

The third pillar comprises additional employment-related saving (through contributions above the required minimum) and other voluntary saving, including housing, personal savings and other assets held outside the pension system. Note that voluntary (and mandatory) retirement savings held in a private pension scheme usually benefit from tax breaks that are contingent on these savings being preserved until to a specific access age.

The components of Norway's three pillar pension system are highlighted in red in Figure 1. It shows that the publicly-provided NIS old age pension includes two components – a minimum guarantee pension (representing the "safety net" pillar) and an earnings-related pension (part of the "compulsory income replacement" pillar). The minimum guarantee pension provides a safety net and is targeted or means tested against the earnings-related pension. This earnings-related pension is part of the second pillar and it has been radically reformed (further details being provided below). The expenditure on the NIS old age pension is "pay-as-you-go" financed through a combination of social security contributions and general tax revenues.

The second "compulsory income replacement" pillar also includes the collectively agreed early retirement schemes (AFP) and mandatory occupational pensions. These two schemes differ significantly – depending on whether the worker is employed in the public sector or the private sector. Whereas 100% of public sector workers are covered by AFP, only around 50% of private sector workers are covered by AFP. In the private sector, AFP is privately managed through labour market agreements, but it is partly financed by the government.

Occupational pensions for public sector workers are pay-as-you-go financed and based on defined benefits (DB). In contrast, occupational pensions in the private sector are fully funded through employer contributions, with minimum required contributions of at least 2% of wages in a defined contribution (DC) scheme. For DB schemes in the private sector (coverage of which has declined to less than 10%), the benefits must be of at least equivalent level. Similarly to private pensions in other advanced economies, Norway's occupation pensions receive a preferential taxation treatment, which is conditional on the minimum access age (currently 62 years) being reached and a duration of at least 10 years of pension payments.

Contributions to DC occupational pensions in excess of the required 2% are common, with typical contributions in the range of 2% to 7% of annual wage into these schemes.[6] Under the

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[5] See Chomik et al. (2015) for details on the settings of, the related literature on and the analysis of non-contributory (means-tested) pension programs.

[6] Typical contributions to DC occupational pensions are expected to increase due to recently increased ceilings that we discuss further below in Subsection 2.4.

description given in Figure 1, these voluntary "excess" contributions to occupational pensions would be part of the third pillar of Norway's retirement income provision. This third pillar also includes other financial assets held outside the pension system and home ownership, which is particularly high among older Norwegians (over 80%) and can play an important role in financially supporting retirees.

2.2 The Former System

NIS Old-Age Pension. The NIS old-age pension was established in 1967 as a mandatory, pay-as-you-go, DB pension scheme. The statutory pension age was initially set at 70 years, but soon after the commencement, the earliest access age for this publicly provided pension was reduced to 67 years. As already mentioned, the NIS old-age pension includes two components – a minimum guarantee pension and an earnings-related pension.

The minimum guarantee pension differs according to marital status. In 2010, the minimum guarantee pension was 2G for single pensioner and 1.85G per person for married pensioners. Note that 1G or a basic pension unit equals about 1/6 of average annual full time labour income. So the minimum guarantee pension equates to about 33% of the average full time wage for single pensioners, and about 31% per person for married pensioners. Since it is not taxed, the minimum pension is higher relative to after tax wages. The pension is income tested against the earnings-related pension component and the taper rate prior to the reform implemented in 2011 was 100%. In addition, a minimum 3 year period of residence is required to receive at least some guarantee pension. For the full minimum pension, a 40 year period of residence is required, with this minimum guarantee payment being reduced proportionally for each year missing.

Before the reform, the earnings-related pension was based on entitlements accrued through labour earnings after 1967. Individuals were accumulating pension points if their annual labour income exceeded 1G. They could get a maximum of 7 points for an annual labour income of 12G.[7] A 40 year period with positive pension points was required to receive a full benefit. The calculation of the earnings-related pension component uses the average number of pension points (AVP) over the 20 years with highest labour earnings (the so-called "best-years rule"). For a person with 40 years of positive pension points, the earnings-related pension component was calculated by 0.42*G*AVP (Hagist et al., 2014).[8]

Both the accumulation of entitlements for the earnings-related pension component and the total NIS old-age pension were in principle indexed to wage growth, but as pointed out by Fredriksen et al. (2015), practice in the past has tended to fall somewhat short of this intention. In fact, the G was systematically increased by less than wage growth in the 1980s and 1990s, which has led to a sluggish growth in earnings-related pensions. On the other hand, the minimum guarantee pension was increased repeatedly with broad political support.

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[7] This description and figures are based on Brinch et al. (2017) who provide the figures for 2007 in US dollars. They point out that 1G equals roughly $US10,000. The pension point calculation is such that one point per $US10,000 of earnings is assigned to an individual with a labour income in the bracket $US10,000-$US60,000 and one point per $US30,000 of earnings is assigned in the bracket $US60,000-$US120,000. No points are awarded for earnings below $US10,000 and above $US120,000. This means that for example, a person with an annual labour income of $US50,000 is assigned 4 points for that year and that the maximum number of points is 7 for a person earning $US120,000 (or 12G) and above.

[8] This translated to the earnings-related pension being set at 42% of earnings between 1G and 6G, and 14% of earnings between 6G and 12G (Hernæs and Jia, 2013). Also note that earnings from before July 1992 give a higher percentage of 45% between 1G and 8G and of 15% between 8G and 12G.

A negative consequence of such increases was that increasing numbers of women in particular – who have longer periods out of work, more part-time work and lower wages on average than men – ended up with the minimum pension, despite their work and social security contributions. This is because of the income test applied to the minimum pension at the rate of 100% against the earnings-related pension component. Thus, the higher minimum pension required higher labour earnings over the working life for the total NIS old-age pension to exceed the minimum guarantee pension. In addition, the minimum and maximum thresholds for earning positive pension points, a maximum 40 year accumulation period for pension entitlements and a reduction of the earnings-related accrual have weakened the link between income earned over the working life and this public pension received in retirement.

As for the adequacy of the total NIS old-age pension (including the guaranteed pension), the aim of the scheme – that was to provide a gross replacement rate of over 60% for an individual on average wage earned for 40 years – has not been met, with the average gross replacement rate being closer to 50% (Christensen et al., 2012).

Collectively Agreed Early Retirement Scheme (AFP). The AFP system was introduced in 1988 as a result of a tripartite agreement between the employers' and employees' organisations and the government. It covered all relevant employees with collective agreements – all public sector employees and about 50% of workers employed in the private sector.[9] The minimum access age for AFP pensions was initially set at 66 years, which, in the succeeding decade, was gradually lowered to the age of 62 by 1998. Therefore, the AFP system made it possible for about 70%-80% of all employees to retire on a full pension from the age of 62.

This early retirement scheme paid a pension that was independent of the retirement age and typically equivalent to the NIS old-age pension. AFP pensions were paid up to the age of 67 – the former minimum access age for the NIS old-age pension. As there was no deferral option for delayed take-up, the AFP system embodied a strong disincentive to work after the age of 62 years – particularly for low income earners (see Hernæs et al., 2016).

The private sector AFP was (and still is) co-financed by the government on a pay-as-you-go basis, which pays for one third of the yearly cost of this pension scheme for private sector workers.

Occupational Pensions. Occupational pensions traditionally covered public sector workers, but the majority of private sector workers were not covered by occupational pensions before 2000. As stated by Hernæs and Jia (2013), the public sector occupational pensions that are of the DB type are fully integrated with the NIS old-age pension such that the combined gross replacement rate is 66% of the final salary at full accrual (after 30 years of contributions at age 67).[10] Similarly, DB occupational pensions in the private sector are designed to supplement the NIS old-age pension, targeting a total gross replacement of 66% of the final salary. The access age was set at 67 years – the same access age as for the NIS old-age pension.

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[9] As shown by Hippe and Voien (2014), there are also large differences in the private sector AFP coverage across industries, with a very high coverage in oil, mining and manufacturing (74%-80%) but a very low coverage in real estate, private education and health (only around 30%).

[10] Note that the combined gross replacement rate is actually higher, as one quarter of G is added to 66% of the final wage.

Note that up to 2001, occupational pensions of only the DB type were allowed but after that they could be offered in a DC format. In 2001, new tax legislation on DC occupational pensions was introduced. That legislation gave the DC schemes the same preferential tax treatment as previously applied only to the traditional DB schemes. As a result, the coverage of private sector workers by DC occupational pensions started to increase. The shift from DB to DC pension plans accelerated after 2006 when the government mandated a minimum employer contribution of 2% of yearly wage for employees with earnings between 1G and 12G. Details on the key changes to DC occupational pensions and the current policy settings, including their preferential tax treatment are further discussed below in Section 2.4.

2.3 Timeline of the Pension Reform

The timeline of the Norwegian pension reform is presented in Table 1. Notice that we also include the changes to occupational pensions in 2006 and to the AFP scheme for the private sector workers negotiated in 2008 – since these changes were made in connection with the changes to the public NIS old-age pension.

Table 1: Timeline of the Norwegian pension reform

2001	Government appointed Pension Commission with members from all parliamentary parties and independent experts
2004	Pension Commission delivered final report with a modernised pension system that strengthens the link between contributions and benefits
2005	First parliamentary pension settlement with decision on the main principles of a new pension system
2006	Petroleum Fund and National Insurance Fund merged into State Pension Fund
2006	Occupational (funded) pensions made mandatory by law with required employer contributions of at least 2% of yearly wage
2007	Second parliamentary pension settlement with a broad support for the pension reform with some adjustments addressing redistributive measures
2008	Renegotiation of the collectively agreed early retirement scheme (AFP) in the private sector
2008-10	Stepwise removal of the earnings test applied to the NIS old-age pension against labour earnings of those aged 67-69 years
2009	Parliament approved the reform with a broad majority
2011	Key features of the reform implemented, including the life expectancy adjustment of pensions, flexible retirement and new rules for pension indexation. A new NDC model for calculating the earnings related component of the NIS old-age pension introduced gradually.

Source: Christensen et al. (2012) and Ervik and Linden (2014).

Table 1 shows that the reform process started well before (precisely a decade before) 2011 when the key features of the reform came into force. The reform process began in 2001, when the Stoltenberg government appointed a Pension Commission that included representatives from all political parties and independent experts. In 2004, the Pension Commission delivered

its conclusions on a modernised National Insurance system with pension benefits more closely linked to pre-retirement wages and several measures that aimed to limit future growth in public pension expenditures. Then, there were two pension settlements in the Norwegian parliament, which indicated a broad political support for a pension reform along the lines suggested by the Pension Commission, with some adjustments made to address distributional implications. In 2009, a White Paper with details on the new National Insurance Scheme and transitional rules was released. The new system was approved by the Norwegian parliament in the spring of 2009. Except for a new model for accumulating pension entitlement, which is being introduced gradually, the main changes were implemented in 2011 including: the adjustment of pensions for changes in life expectancy, flexible retirement from age 62, and new rules for the indexation of pensions.[11]

In addition to reforming the public NIS old-age pension, important changes have been made to DC occupation pensions for private sector workers. In 2001, these schemes were given the same tax treatment as previously applied to DB occupational pensions and in 2006, occupational pensions were made mandatory with minimum required contributions. The second pillar's AFP system was also reformed but only for the workers employed in the private sector. As a result of a new tripartite agreement from 2008, the reformed AFP scheme for the covered private sector workers pays a lifetime pension that is calculated on a similar NDC principle and with longevity adjustments as the reformed NIS old-age pension (additional details below).

2.4 Key Elements of the Pension Reform

<u>New NIS Pension</u>. The new NIS old-age pension will continue to include minimum guarantee and earnings-related components. The minimum guarantee pension is set at the same level for single and married pensioners as under the old system and the same residence requirements apply – a period of at least 3 years to be eligible for some guarantee pension and a 40 year period to be eligible for the full guarantee pension. Old-age pension expenditures will also continue to be financed on a pay-as-you-go basis through a combination of general tax revenues and social security contributions (which finance all other social security payments).

The reform, however, made significant changes to the calculation of, the access to, and the indexation of the NIS old-age pension – which were all implemented in 2011. In addition, a new model for accumulating pension entitlements is being phased in, gradually transforming the old defined benefit (DB) scheme to a new system with notional defined contribution (NDC) features. In more detail, the Norwegian reform to the NIS old-age pension includes the following elements:

1. <u>New notional defined contribution (NDC) model for accumulating pension entitlements</u>. Under the new system, pension entitlements accrue through income from work or through entitlements for special periods and circumstances, between ages 13 and 75.[12] Each year, a pension accrual of 18.1% of pensionable income (i.e.,

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[11] For the public sector workers, the individual guarantee was introduced so that people born before 1959 are guaranteed a combined gross replacement rate of 66% of the final salary after life-expectancy adjustment.

[12] Those with special circumstances are registered unemployed, military conscripts, those with children under the age of 6 years or those who care for the elderly. Special periods include times spent away from work due to sickness or injury, maternity or parental leave, or periods enrolled in labour market assessment programs. For details on the calculation of these other types of entitlements see Christensen et al. (2012).

labour earnings, temporary benefits, or calculated labour earnings for the self-employed) up to a ceiling of 7.1G (approximately 115% of the average full-time wage) is registered on individual notional accounts. Hence, the reform abolished the maximum 40 year period of registered earnings for receipt of a full pension, the "best 20 year" count rule and the minimum income threshold of 1G for accumulating pension entitlements in order to strengthen labour supply incentives. Notice that the ceiling on annual income (7.1G) has been kept and actually reduced, as a desirable distributional feature of the reform. The transitional rules have been put in place such that the new NDC model will be introduced partially for cohorts born in and after 1954 and fully for cohorts born after 1962.[13]

2. <u>Introduction of flexible retirement between ages 62 and 75 based on actuarial principles</u>. As mentioned, the former earliest access age for the NIS old-age pension was 67 years. The reform replaced it with a flexible access age from 62 years, with the old-age pension being available to everyone who accumulated enough entitlements to achieve a higher earnings-related pension than the minimum pension guaranteed at the age of 67. The NIS old-age pension can be drawn fully or partially from the age of 62, with a possibility of withdrawing 20%, 40%, 50%, 60% or 80% of a full pension, combining both the minimum and earnings-related components. Furthermore, there is no earning test against labour earnings of the working recipients of pensions and in fact, continued work after having started to pension draw-down yields additional pension entitlements.[14]

3. <u>New adjustment of pensions for changes in life expectancy</u>. The calculation of earnings-related pensions has been radically reformed. Specifically, the implicit pension wealth of accumulated entitlements (adjusted yearly according to wage growth) recorded on NDC accounts is converted into an annuity over the expected remaining lifetime. This is done by determining (uniform) annuity conversion factors from the age of 62 to 75 for each cohort when it reaches the age of 61 years.[15] Note, however, that these annuity factors determined at the age of 61 will not be adjusted in later years. Actuarial neutrality then implies that an increase in the expected number of retirement years reduces annual pension benefit such that the present value of total pension benefits (i.e., pension wealth) is nearly invariant to changes in current remaining life expectancy and retirement age.

4. <u>New rules for indexation of pensions</u>. As mentioned, pension entitlements in accumulation phase are indexed to wage growth (essentially providing an implicit annual rate of return on NDC accounts). At retirement, the income (or earnings-related) pension is indexed to annual wage growth less 0.75 percentage points. This

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[13]Specifically, the old rules of calculating the earnings-related pension component will continue to apply to for the cohorts born in 1953 and earlier (see Section 2.1). For the cohort born in 1954, 90% of the earnings-related benefit will be calculated according to the old rules and 10% of the earnings-related benefit will be calculated according to the new rules. These percentages calculated under the new (old) rules will increase (decrease) by 10 percentage points for each succeeding younger cohort, with the cohorts born in 1963 or after having their earnings-related component calculated entirely under the new NDC rules.

[14] There was an earnings test applied to the NIS old age pension for 67 to 69 year olds where labour earnings above 2G resulted in a reduced NIS pension based on a 40% taper rate. That earnings test was abolished gradually between 2008 and 2010. The labour supply effects of that reform are studied by Brinch et al. (2017).

[15] There has been a transitional rule put in place to ensure that the life expectancy adjustments at age 67 will not exceed 0.5% per year for the first cohorts retiring after the reform year of 2011.

means that the earnings-related pension is effectively indexed to an average growth in wages and consumer prices, as pointed out by Fredriksen et al. (2015). The minimum guaranteed pension is indexed to annual wage growth reduced by a factor of 0.5% per year, reflecting an expected annual increase of 0.5% in (average) life expectancy at the age of 67.

5. Relaxation of income test applied to minimum guaranteed pension against earnings-related pension component. The reform has relaxed the income test applied to the minimum guaranteed pension against the earnings-related pension – reducing the withdrawal (or taper) rate from 100% to 80%. The objective of this policy change is to further strengthen the relationship between labour earnings and the NIS old-age pension, and so to provide work incentives especially to non-standard workers such as women.

Reformed Private Sector AFP. The private sector's AFP scheme was reformed from 2011 onwards into an actuarially fairer system for those beginning to draw an AFP pension, with objectives to increase labour supply and postpone retirement. Specifically, the main changes to the AFP system in the private sector include:

1. New lifelong top-up annuity. Whereas the old AFP system paid a pension only up to the age of 67 and often at the same amount as the NIS old-age pension, the reformed system pays a lifetime top-up (typically just over 20%) of the NIS old-age pension. It can also be accessed from the age of 62, but only in combination with the NIS old-age pension.

2. New model for calculating pension entitlements. Under the new rules, each year of pensionable income from the age of 13 provides a lifelong pension promise of 0.314% of income up to 7.1G.[16] The yearly accrual is indexed according to wage growth (i.e., the increase in G). Hippe and Voien (2014) recalculated this AFP-benefit formula into the actual yearly contributions of around 3.5% to 4% of annual wage that would achieve a typical benefit of just over 20% of the public NIS old-age pension (with yearly contributions of 18.1% of yearly wage).[17]

3. New life expectancy adjustment. The new AFP pensions are adjusted for remaining life expectancy at the age of retirement in the same way as the reformed NIS old-age pension (see Christensen et al., 2012).

4. Earnings test removal. The earnings test that was previously imposed on workers aged between 62 and 66 years was abolished. This change provided strong work incentives for private sector workers covered by the AFP scheme. Hernæs et al. (2016) show that as a result of the earnings test removal, implicit total tax rates declined from 70% to 40% for affected workers on an average wage.

5. New eligibility criteria. These include employment in a company covered by the AFP scheme for at least 7 out of the last 9 years before the age of 62 and for the last three years before retirement (see Hippe and Voien (2014) for details).

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[16] Pensionable income is defined in the same way as in the public system and includes labour earnings, temporary benefits, or calculated labour earnings for the self-employed.

[17] Notice that there were transitional rules in place for those private sector workers in the 1948 cohort (aged 62 years in 2010) and in the four succeeding cohorts who had not taken up the old AFP (for details on these transitional rules see Hernæs et al., 2016).

The public sector's AFP has not been reformed. AFP pensions for public sector workers (around 35% of the population aged 35-61 (Hippe and Voien, 2014)) continue to be paid out from the age of 62 to 66 and cannot be combined with the NIS old-age pension.[18] Therefore, public sector workers can only access the new NIS old-age pension before the age of 67 by giving up their AFP entitlements. The pre-reform earnings test has also been preserved, with an AFP pension being reduced proportionally if a person continues working while receiving this pension. Hence, workers in the public sector after the age of 62 continue to face strong labour supply disincentives (i.e., high implicit marginal tax rates on earnings), as indicated by Christensen et al. (2012) and Hernæs et al. (2016).

Current Occupational Pensions. Similarly to the AFP system, there are significant differences between occupation pensions in the public and private sectors. Occupational pensions in the public sector are entirely based on DB plans, while in the private sector more than 90% of members have a DC occupational pension plan. Here we focus on the occupational pensions in the private sector that have been radically changed, with many policy changes adopted during the reform process of the public old-age pension. As mentioned, the main changes introduced tax-preferred rules and mandatory contributions, with the ceilings on additional contributions to these DC occupational pensions being recently lifted. Below, we outline some of the key features of the private sector's occupational pensions.[19]

1. <u>Minimum contributions and contribution ceilings</u>. Under the current rules, the minimum required contributions into a defined contribution (DC) scheme are set at 2% of annual wage for employees with earnings between 1G and 12G. For defined benefit schemes (with coverage of less than 10% in the private sector), the contributions must be such that they guarantee benefits of at least the same level that can expected under the mandatory DC system. Typically, private sector workers receive contributions in excess of the required 2%. As is the case for private pensions in other countries, there are ceilings on these voluntary additional contributions to DC occupational pensions. From 1 January 2014, the contribution limits on the private sector's occupational pensions are 7% of wage between 0 and 7.1G, plus 18.1% of wage between 7.1G and 12G. Hence, workers earning in excess of 7.1G can receive up to 25.1% of their wage in contributions towards their occupational pensions.[20]

2. <u>Taxation treatment</u>. Similarly to other countries' private pensions, Norway's occupational pensions receive a preferential taxation treatment (compared to the taxation of ordinary income). Specifically, occupational pensions are taxed under the EET regime that is very common among developed countries (see OECD 2015a). These so-called "tax-deferred" or "front-loaded" accounts exempt contributions and pension fund's earnings from any taxation, but the benefits are treated as taxable

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[18] The main eligibility conditions are *(i)* at least 3 years' tenure with the present employer and *(ii)* a minimum 10 year vesting period in the public old-age pension scheme after the age of 50.

[19] Other features not covered in this report would include governance and asset allocation of pension funds. In brief, note that defined contribution accounts are administered directly by large employers setting up pension funds or by insurance companies (with about 75% of private pensions funded though insurance companies). The funds run by large employers cannot hold shares of that employer and must have separate accounts.

[20] Notice that the maximum annual contribution of 25.1% of yearly wage into occupational pensions for workers with earnings above 7.1G is equal to 18.1% of wage towards the NIS old-age pension and the maximum contribution of 7% of wage towards private pensions for workers on earnings below 7.1G.

income of the recipient (and so they are subject to the progressive income taxation). Although the employer contributions are fully tax-deductible (from the employer's taxable income), employers still have to pay social security contributions on these occupational pension contributions (OECD, 2015a). Benefits from these tax-preferred private pension plans are also subject to social security contributions but at a lower rate than other types of income.

3. <u>Access age and other rules</u>. As part of the 2011 pension reform (that reduced the earliest access age of the NIS public old-age pension to the age of 62), the access age of occupational pensions was also reduced from the age of 67 to the age of 62. The rules related to payout options prohibit lump-sum withdrawals and only allow lifetime annuities.[21]

3. Assessment of the Norwegian Pension Reform

Over the last decade, many countries have implemented pension reform to address the large future fiscal burden associated with their unfunded social security and ageing population. However, there are objectives other than fiscal sustainability that should be considered in order for a reformed pension system to also be socially sustainable. According to OECD (2013a), the six key objectives of recent pension reforms in OECD countries include: *(i)* coverage in both mandatory and voluntary schemes; *(ii)* adequacy of combined retirement income from public and private pension schemes; *(iii)* financial sustainability and affordability of publicly-provided pensions to tax payers and contributors; *(iv)* incentives that encourage people to work and save more whilst employed; *(v)* administrative efficiency to minimise the running costs of the pension system; and *(vi)* security through diversification of retirement income sources across providers, pillars and financing options.

Similarly, the main goals of the Norwegian pension reform are to *(i)* improve long-run <u>financial sustainability</u> of the system (through longevity adjustments of pensions and the changes to pension indexation), *(ii)* provide <u>labour supply incentives</u> for people to work more and for a longer period of their lifetimes (by strengthening the relationship between pensions and former labour income and though flexible retirement based on actuarial rules) and also *(iii)* to improve the <u>adequacy and equity</u> of retirement income for lower income earners (through changes to the public old-age pension) and for higher income earners (through changes to private occupational pensions).[22]

In this section, we evaluate the Norwegian pension reform against the OECD key objectives for the pension reform – with particular focus on the corresponding Norwegian goals outlined above. We conclude by providing a comparison with pension reforms undertaken recently in some other developed countries.

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[21] Specifically, the benefits must be withdrawn as a lifetime annuity or an annuity with a duration of at least 10 years and lasting until the age of 77 (OECD, 2013a).

[22] An additional objective was to provide public with <u>good information</u> on the main principles of the new system through a well thought-out reform process to ensure that the reform will be socially acceptable and long-lasting. The reform process has been introduced in the previous section, with the timeline and the key reform changes provided in Table 1.

3.1 Financial Sustainability and Affordability

Public Pension Expenditure and Fiscal Gap. Fredriksen et al. (2015) from Statistic Norway project the fiscal effect of the Norwegian pension reform, using an integrated micro-macro modelling framework.[23] Their results for the government expenditure on the NIS old-age pension measured as a percentage of mainland GDP are reported in Table 2. As shown, the pension reform is projected to reduce the old-age pension expenditure from 12.8% of GDP to 9.4% of GDP in 2060, or by approximately 26% when compared the old pre-reform old-age pension system. This reduction in old-age pension expenditures is driven partly by lower pension amounts (mainly due to lower indexation of public pension benefits) and partly by fewer pensioners (postponing retirement as a result of work incentives through the adjustment of pensions for changes in life expectancy). Therefore, different assumptions about future life expectancy in particular alter the magnitude of the relative difference in old-age pension expenditures under the new and old rules. Specifically, an assumed high life expectancy leads to a reduction in the old-age pension expenditure (measured in Norwegian Krone) of 26.2% relative to the pre-reform system, compared to a 20.5% reduction from an assumed medium life expectancy (see Fredriksen et al., 2015).

Table 2: Expenditure on NIS old-age pension (as % of mainland GDP)

	2013	2020	2060
Pre-reform expenditure	6.3	7.6	12.8
Post-reform expenditure	6.3	7.4	9.4
Relative difference (in %)	-	-2.6	-26.6

Source: Fredriksen et al. (2015).

The simulation by Fredriksen et al. (2015) also shows that reform has a significantly positive effect on the overall taxation revenue due to increased employment and tax base expansions. The combined effect of reduced old-age pension expenditures and increased taxation revenues yields a reduction in the fiscal gap of almost 6 percentage points of mainland GDP in 2060, relative to the fiscal gap projected in that year under the old pension system.[24] The reform effects on the fiscal gap are shown to be quite sensitive to the assumptions about future life expectancy and retirement behaviour. Both delayed retirement and high life expectancy result in a larger reduction in the fiscal gap in the reformed system when compared to retaining the old pre-reform rules for the NIS old-age pension.

Notice that overall public pension expenditures (including pension schemes for civil servants and other public sector workers) are expected to increase from 9.3% of GDP to 14.2% of GDP by 2060 (OECD, 2013a). And in addition to the old-age pension, Norway's National Insurance System also includes a disability pension that is paid to disabled until the age of 67 – at which age they are then transferred to an old-age pension. The current cost is around 3% of GDP per year (Christensen et al., 2012). Since the Norwegian pension reform introduced a weaker longevity adjustment for the disabled, it may transfer some early retirees

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[23] Fredriksen et al. (2015) use two models – a dynamic microsimulation model (MOSART) and a small open economy CGE model (CEMEC).

[24] Note that even with the reformed pension system, the fiscal gap – defined as the deviation between the simulated government budget deficit and the deficit consistent with the fiscal rule – is projected to reach almost 3% of mainland GDP in 2060 (Fredriksen et al., 2015).

to this disability scheme. Holmøy and Stensnes (2008) from Statistics Norway project that as a result of the reform changes, the government expenditure on the NIS disability pension will increase 4.7% by 2050. Moreover, the direct fiscal impact of the changes made to AFP for private sector workers (including the complete removal of the earnings test) was to increase the overall cost of this scheme by 42% (see Hernæs et al., 2016). However, Hernæs et al. also find that the reform raised labour supply for private sector employees aged 63 and 64 years considerably and the corresponding tax payments more than compensated for the aforementioned increase of pension costs.

Contribution Rates. The affordability of the public pension system to taxpayers can be measured by calculating the average contribution rate on earnings that would be required to finance current spending on public pensions without budgetary transfers and/or the decumulation of public pension funds (see Disney, 2004). Figure 2 shows the average contribution rates for NIS old-age pension expenditures estimated by Christensen et al. (2012) under the old and new system and with different future longevity assumptions. As shown, the estimated contribution rate will increase even under the new system. However, the new system's average contribution rate of 16.4% in 2050 is significantly smaller than the old system rate, which would more than doubled to 20.8% of the average wage by 2050. The reform's longevity adjustment and lower indexation of pension benefits result in reduced future pension expenditures and a lower growth in the average contribution rate, whereas a more generous NDC model for accumulating pension entitlements works in the opposite direction.

Figure 2: Average contribution rates for NIS old-age pension expenditures
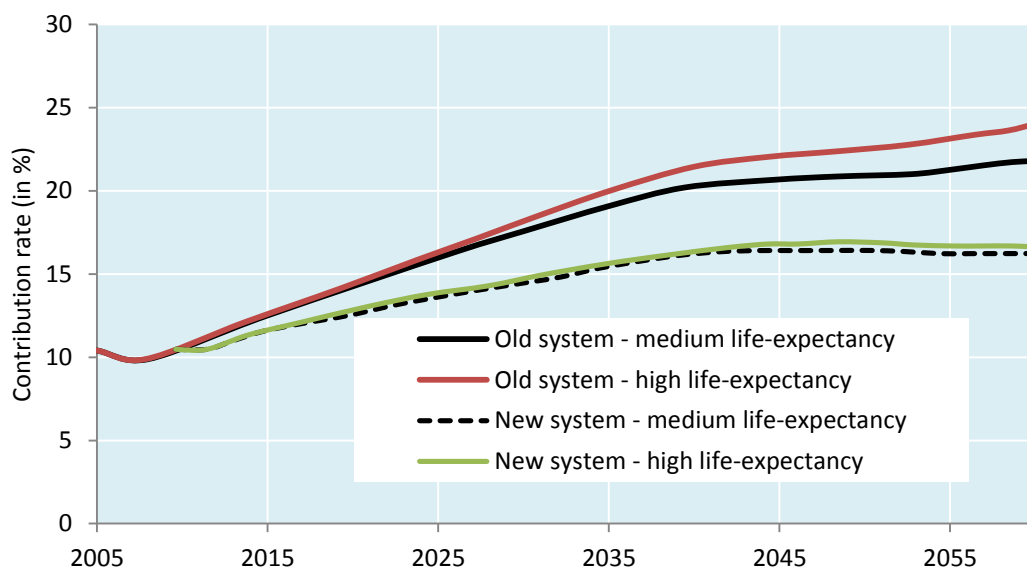
Source: Statistics Norway taken from Christensen et al. (2012).

The impact of the longevity adjustment of pension benefits introduced by the reform is evident in Figure 2 when high life expectancy is assumed. The high life expectancy assumption generates only a modest increase in the contribution rate under the new actuarially fair system, compared with the old rules. Fredriksen and Stølen (2015) calculate the average contribution rate until year 2200 for NIS old-age benefits and also for NIS disability and survivors' benefits. As a result of the pension reform, the average contribution rate is estimated to stabilise after 2100, at around 19% for old-age pension spending alone and at 24% for total NIS spending, including the disability pension. In contrast, under the old pension rules the contribution rate would continue to increase (with growth in life

expectancy), reaching 32% and 37% for old-age pension expenditures and overall NIS expenditures, respectively.

Generational Accounting. Hagist et al. (2013, 2014) employ the method of generational accounting to estimate intertemporal public pension liabilities to assess the sustainability of the Norway's pension policy. In contrast to the fiscal gap calculated by Fredriksen et al. (2015), the fiscal or sustainability gap in the generational accounting analysis of Hagist et al. (2014) captures both the explicit and implicit public pension debt. Hagist et al. calculated that Norway's reform would reduce the sustainability gap by almost half, compared to the pre-reform system. However, even under the new system, the fiscal gap is around 144% of GDP, which is considered to be unsustainable. It needs to be pointed out that their analysis does not account for the value of Norway's oil and gas reserves (and also changes in taxation revenues from the labour market incentives introduced by the pension reform). The authors indicate that taking into account the present value of these reserves would significantly decrease the sustainability gap.

Overall Assessment and Comments. There is no doubt that the pension reform will considerably improve the long run sustainability of the Norwegian pension system. As shown by other studies discussed above, the reform has had the positive effects of significantly reducing the old-age pension expenditure, the required contribution rates and both the implicit and explicit fiscal gap. Nevertheless, even under the new system, overall spending on public pensions is expected to increase to 14% of GDP by 2050, which is above the OECD average spending of 11.7% of GDP in 2050 (OECD, 2013a). Note that in some developed countries like Australia and United States, public expenditure on pensions is projected not to increase above 5% of GDP in 2050 (OECD, 2013a). Norway's social security contributions (with current rates of 8.2% of wages for employees, and 5.2% of pensions for pensioners) are too low to finance social security expenditures even now (Christensen et al., 2012). Population ageing including the imminent retirement of the baby-boom generation will further increase the government expenditure on pensions, which will require social security contributions and/or other taxes to increase significantly. In addition, there are no automatic mechanisms to address imbalances in Norway's public pension system such as those built in the pension systems in Sweden, Germany or the Netherlands. For example, in Sweden if pension assets and liabilities are not balanced, the indexation of pension entitlements during working years and pension benefits received in retirement is automatically lowered until the balance is restored.

Higher take-up of the new flexible old-age pensions combined with work (around 90% of pension recipients in the second quarter of 2011 stayed on working (OECD, 2013b)) indicates a large labour supply potential after the age of 62. It also suggests that raising the new minimum access age may significantly reduce public spending on pensions and so further strengthen financial sustainability of the pension system. Therefore, the need for (and political risks associated with) new reforms involving tax (social security contribution) hikes and/or further pension cuts, remains.

The final point of this subsection relates to the new model for accumulating pension entitlements. As mentioned, the model has many features of the NDC system, but it abstracts from an automatic mechanism that would link the final balance and benefits with macroeconomic and demographic conditions. Thus, it is the government that bears all macroeconomic and demographic risks. This is also somewhat the case for the longevity risk that has only partly been transferred to individuals. Notice that despite the new life expectancy adjustment of pensions, the annuity conversion factors (that are applied to

notional pension wealth to determine annual pension benefits) for ages between 62 and 75 are calculated only once for each cohort at the age of 61. As life expectancies were systematically underestimated in the past, the government potentially faces a large longevity risk. Figure 3 demonstrates this point with the example of official Australian projections for male and female life expectancies at birth since 1945. It shows that each newer projection updated life expectancy at birth for males and females upwards and in many occasions these increases were significant.

Figure 3: Official projections of male and female life expectancy at birth (Australia)
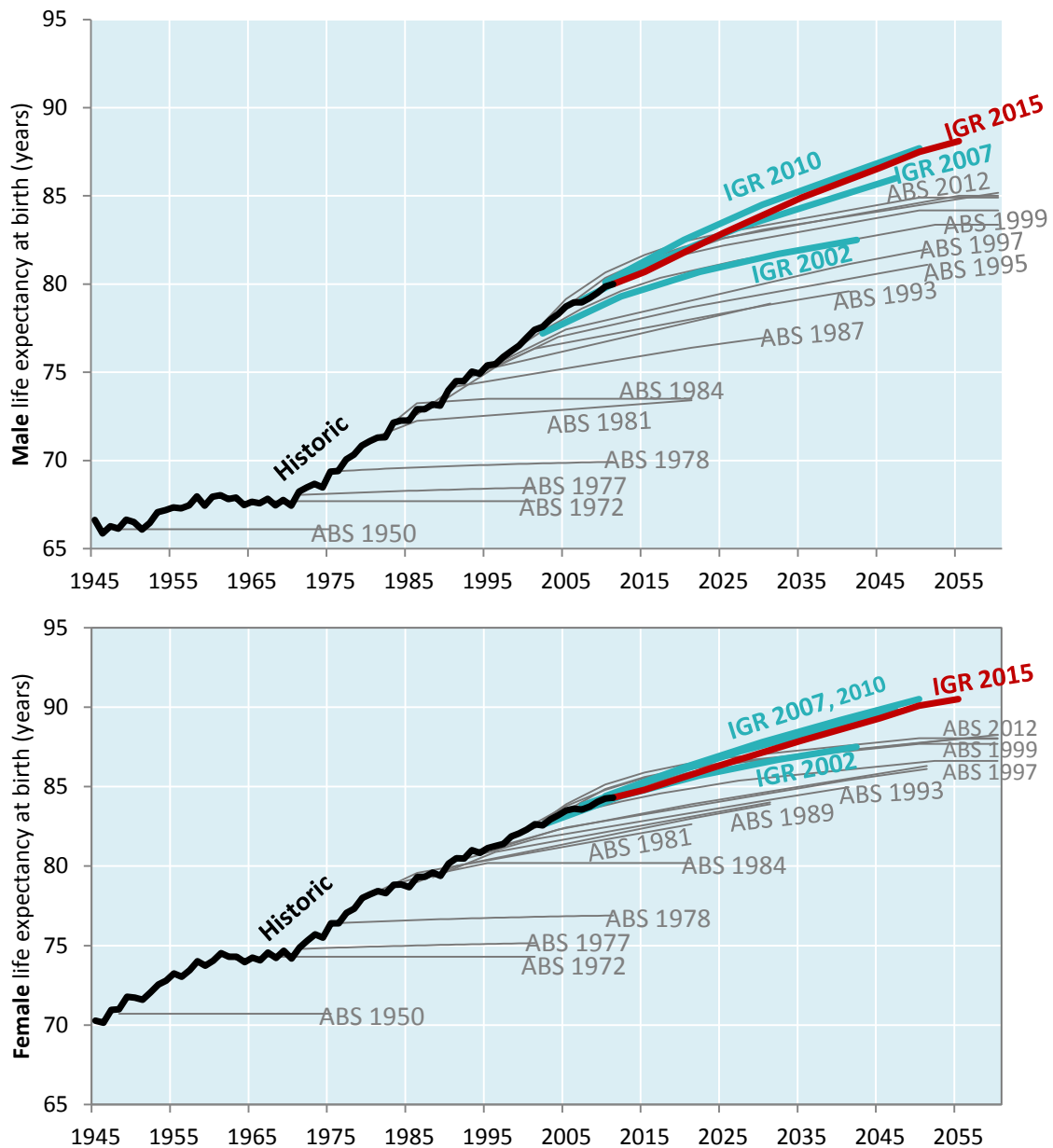
Source: CEPAR (2015).

*Note*: ABS=Australian Bureau of Statistics, IGR=Intergeneration Report.

3.2 Labour Supply Effect

Strengthening labour supply incentives is one of the key objectives of Norway's pension reform. Fredriksen et al. (2015) and Fredriksen and Stølen (2015) discuss in some detail the

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potential effects of the reform on employment through implications on working hours prior to retirement age and through immediate and long-term retirement effects. It is expected that the reform will have a positive impact on labour supply of both the working-age population and older Norwegians aged 62 years and over.

The positive effect on the number of employed persons and working hours prior to retirement (prior to age 62) would be due to a closer connection between pension entitlements and former earnings that effectively reduces implicit marginal tax rates on labour earnings. This closer link is due to the following reform changes. First, under the new NDC model, pension entitlements start to accumulate from the first Krone of earned income, compared to labour income of 1G needed to earn a positive pension point under the old rules. Second, the maximum 40 year period for accumulation of pension entitlements was abolished.[25] Third, the "best 20 year" rule with highest earnings for accumulation of pension entitlements was also abolished. Fourth, the earnings ceiling for full accumulation of pension entitlements was increased from 6G to 7.1G. Fifth, the income test of the minimum guaranteed component of the old-age pension against the earnings-related component of the old-age pension was relaxed, with taper rate reduced from 100 to 80%.

Figure 4: Association between annual labour income and annual old-age pension
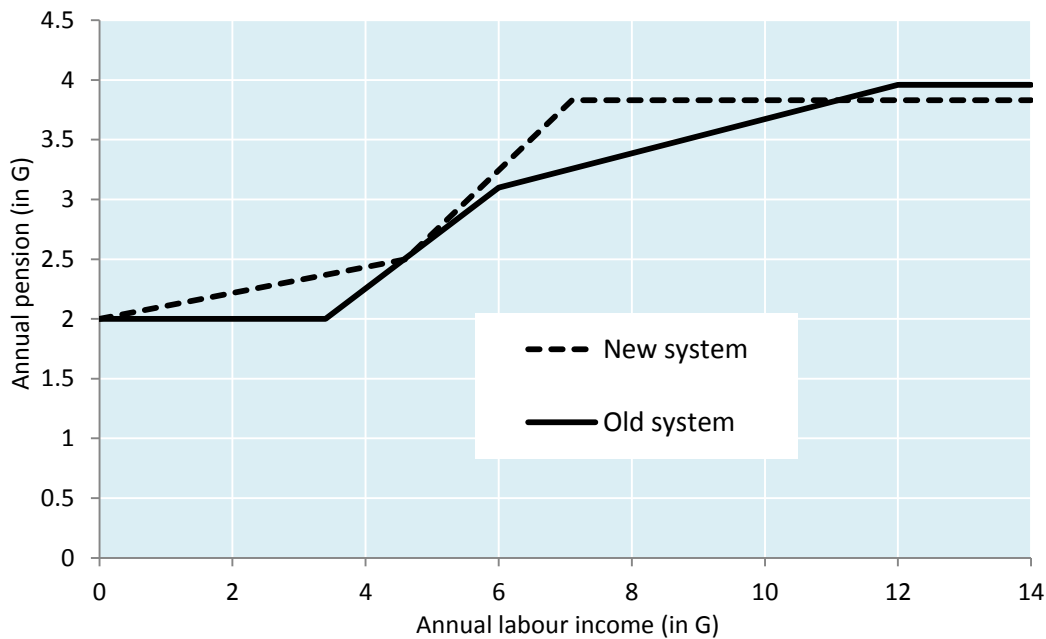
Source: Fredriksen and Stølen (2015).

Note: Calculations based on single person with constant labour incomes for 40 years.

The relationship between annual labour income and annual old-age pension under the old and new systems is plotted in Figure 4. The calculation is based on a single person with constant labour income for 40 years and taken from Fredriksen and Stølen (2015). The new system is shown to strengthen the connection between labour earnings and public pension benefits for earnings up to about 11G. This is due to *(i)* the relaxation of the income test applied the minimum guaranteed pension, impacting those on lower incomes, and *(ii)* the

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[25] This old rule meant that people working for more than 40 years would see no increase in their annual pensions.

increased ceiling on annual income for full accumulation of entitlements. Notice, however, that the new relationship between labour income and accumulation of pension entitlements is eliminated for earnings above 7.1G.[26]

The labour supply effects of the pension reform disaggregated by implications for working-age population and for retirement behaviour from relevant literature are summarised in Table 3. In relation to the reform effect on the labour supply of working-age population prior to the minimum access age, papers from various authors at Statistics Norway assume a 2.5% increase (see Holmøy and Stensnes (2008), Christensen et al. (2012), Fredriksen and Stølen (2015) and Fredriksen et al., 2015). This increase is assumed to be divided into higher labour market participation rates and average working hours, increasing by 1.25% each. This assumption built into their models is based on Stensnes (2007) who (using Statistics Norway's micro-simulation model MOSART) estimated that the reform would reduce implicit marginal tax rates on labour earnings by 5 percentage points. This implicit tax reduction (assuming a marginal compensated elasticity of 0.5) yields a rough estimate of the 2.5% increase in labour supply at the intensive margin, as pointed out by Christensen et al., 2012).

Table 3: Labour supply effects of Norway's pension reform

Study	Labour supply (working-age)	Retirement (immediate)	Retirement (long-term)	Total labour supply
Stensnes (2007)	2.50%	-	-	-
Holmøy and Stensnes (2008)	2.50%	0.6 years	2.47 years	11% [a]
Christensen et al. (2012)	2.50%	0.24 years	-	6.8% [b]
Fredriksen et al. (2015) & Fredriksen and Stølen (2015)	2.50%	0.24 years	2.74 years	7.1% [c]
Hernæs et al. (2016)	-	[d]	-	-

Note: [a] Total labour supply effect of 11% in 2050 includes indirect effect of 3.4% due to reduced payroll tax rate; [b] More than 4% in total labour supply increase of 6.8% in 2050 is due to postponed retirement; [c] Total labour supply effect is for year 2060; [d] Significantly positive labour effects along both extensive and intensive margins for groups of private sector workers with AFP entitlements.

In addition to a closer connection between pension benefits and former labour earnings, the reform introduced an actuarially fairer system with life-expectancy adjustments of pension benefits combined with flexible retirement between ages 62 and 75. Pension benefits now can be drawn partially or fully from the age of 62 (for those who accumulated enough entitlements to achieve a higher old-age pension than the minimum pension guaranteed at the age of 67). Importantly, work and pension can be combined without any earnings test. Similarly, the second pillar's AFP for private sector workers was reformed into an actuarially fairer system and the earnings test (that was applied to working cohorts aged 62 to 66 years and in receipt of the AFP pension) was abolished. This closer link between private incentives and the social costs of retirement is expected to stimulate people to delay retirement.

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[26] As mentioned, 2G represents about 33% of average wage and 7.1G is just over 115% of average wage. Thus, Figure 4 can also give gross replacement rates as a percentage of average wage (see the next subsection).

There is also a large body of empirical literature, finding that labour supply is more elastic on the extensive margin and the effects tend to be the strongest for retirement decisions (for example, see Heckman (1993) and Blundell and MaCurdy, 1999). Given strong incentives that the reform provided for people to postpone retirement (with significantly higher replacement rates for delaying pension draw-downs discussed in the next subsection), the labour supply effects of the reform are expected to be larger on the extensive margin.

The immediate and long-term impact of the pension reform on retirement estimated or assumed by the relevant literature is also reported in Table 3. The econometric analysis of the pension reform on employment and retirement by Hernæs et al. (2016) shows positive immediate effects along both the extensive and intensive labour margins of private sector workers aged 63 and 64 years. For the group of private sector workers with enough pension rights to access an old-age pension at the age of 62, they find that average labour supply increased by around 30% (46%) of pre-reform hours at the age of 63 (64) and that the probability of continuing work increased by 17 percentage points to 58% (47%) at the age of 63 (64). Hernæs et al. find no effect on claiming disability pension for this group of private sector workers (23% of the population aged 62 years), whereas the probability of becoming a disability pensioner increased for private sector workers not eligible to claim an old-age pension at the age of 62. The implications for labour supply of public sector workers and private sector workers with no AFP entitlements are estimated to be small (but significant).[27]

Some of the estimates from Hernæs et al. (2016) are built into the modelling framework applied by Fredriksen et al. (2015) to study the fiscal effects of the pension reform. They assume an average immediate increase in the retirement age of 0.24 years, driven by postponed retirement of private sector workers covered by AFP. Specifically, the increase of 0.24 year is derived as 30% of the population (=private sector workers with AFP) * 1.2 years + 30% of the population (=public sector workers) * 0 years + 40% of the population (=private sector workers with no AFP) * -0.3 years. As for the long-term effects on average retirement due to increasing life expectancy, they also take into account different responses to longevity increases from different groups and derive an average delay of retirement by 0.5 years for each life expectancy increase by one year. The life expectancy (average for males and females) at the age of 62 is estimated to increase by about 5 years over their projection period of 2013-2060 and so the total retirement effect in 2060 is 2.74 years (0.24+0.5*5) for those who are not disabled at the age of 62. The total labour supply in 2060 is then assumed to increase by 7.1% relative to the pre-reform scenario, with around 4.15% of this increase due to postponed retirement. Notice that Holmøy and Stensnes (2008) project a more positive reform effect of 11% on total labour supply in 2050. This increase also includes indirect (or feedback) effects of reduced payroll tax rates that is assumed to balance the government budget with increased tax revenues and reduced pension expenditures as a result of the reform.

Overall Assessment and Comments. One of the main objectives of the Norwegian pension reform is to provide individuals with incentives to work more and over a longer period of their lifetimes. The key features of the reform – closer connection between pensions and former labour income, actuarially fairer calculation of pension benefits, increased flexibility and incentives to combine work and pension without any earnings test – are supposed to deliver that objective. Initial empirical results show positive labour supply responses of the

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[27] Specifically, the reform effects are shown to be positive on the labour supply of public sector employees aged 63 and 64 years and negative on the labour supply of private sector workers aged 63 and 64 years with no AFP entitlements.

age-eligible population in the private sector to these new pension rules (Hernæs et al. (2016) and OECD, 2013b). An obvious shortcoming is that a large proportion of the age-eligible population employed in the public sector (i.e., 40% of those aged 60 in the sample used by Hernæs et al., 2016) is not affected by any of the changes listed above between ages 62 and 66 unless they give up their AFP entitlements.[28] According to OECD (2013b) (that included disability pensioners), the reform has so far impacted substantially only about 40% of new pensioners. And more than half with no AFP entitlements may actually reduce their labour supply because of the reduced minimum access age of the old-age pension, as indicated by Hernæs et al. (2016) for private sector workers with no AFP coverage. The initial results for private sector workers indicate that reforming the public sector AFP in a similar way to the AFP reform in the private sector would positively impact labour supply of public sector workers aged 62 to 66 years and add to the overall labour supply increases reported in Table 3.[29]

The immediate retirement effect of the reform assumed by Fredriksen et al. (2015) and Fredriksen and Stølen (2015) is much smaller than the labour supply effect on the working age population and the long-term retirement effect in these studies. It is quite reasonable to think that *(i)* the working-age population will increase their life-cycle labour supply due to a closer association between pension benefits and former labour earnings and *(ii)* older people will postpone their retirement due to unexpected longevity increases affecting their pensions. To quantify these effects over time, a numerical overlapping-generations (OLG) model is required. This type of models embodies dynamics and general equilibrium, and has been used extensively to examine economy-wide implications of a pension or tax reform, including implications for life-cycle labour supply and saving, for macroeconomic aggregates and for welfare of households of different ages and skill types. The Norwegian pension reform (including the changes to funded occupational pensions) is likely to have a significant impact not only on labour supply but also on savings, having potentially large effects on Norway's capital stock. Note that none of the studies listed above examined the effect of the reform on saving and capital accumulation (and the feedback or general equilibrium effect through implied changes in the factor prices).

The seminal work of Auerbach and Kotlikoff (1987) that developed a computational multi-period OLG model also simulated the effects of benefit-tax (or contribution) linkage in a pay-as-you-go DB system. One can think of this policy reform to be similar to the component of Norway's pension reform that strengthened the link between pension entitlements and former earnings. Auerbach and Kotlikoff show that the this type of "benefit-tax linkage" reform increases capital stock significantly (relative to no linkage), but the increase in aggregate labour supply is only modest and declining over time due to the income effect of increasing assets. Note that Lassila and Valkonen (2008), using an OLG model stylised to the Finnish economy, find that the impact of life-expectancy adjustments on labour supply is quite small. While retirement is exogenous at age 65 in both Auerbach and Kotlikoff's (1987) model with social security and Lassila and Valkonen (2008), an OLG model with endogenous retirement is applied by Kudrna and Woodland (2013) to study the

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[28] Recall that the AFP system in the public sector has not been reformed and so the annual pension (paid up to the age of 66) is mostly independent of the retirement age, reduced in proportion to the labour income and cannot be combined with a new old-age pension.

[29] Another issue related to the different AFP schemes for private and public sector workers is job mobility between the sectors and also within each sector (due to the strict eligibility criteria). It is important ensure that pension rights are preserved for people who change jobs within each sector or across sectors.

labour supply and saving effects of private pension reforms and by Kudrna (2016) to examine the effects of public pension reforms.

3.3 Adequacy and Distributional Effects

Adequacy. The impact of the reform on replacement rates is reported in Table 4. The gross (pre-tax) replacement rates are calculated by Christensen et al. (2012) for two cohorts born in 1949 and 1980 who are assumed to retire at the age of 67 after 40 years of work with constant labour income at 67%, 100% and 150% of average wage. For the older cohort, the old-age pension is calculated under the old DB "pension points" rules. In contrast, the pension entitlements for the 1980 birth cohort are completely based on the new NDC rules. The table shows only a modest decrease in the gross replacements for the older cohort that is mainly due to lower indexation of pension payments over this cohort's expected remaining life. For the younger cohort who is fully impacted by the reform changes, the gross replacement rates are shown to decline significantly – almost 14% for those formerly earning an average wage (AW100) relative to the pre-reform gross replacement rate.[30] This decline in the gross replacement rate is due to the life-expectancy adjustments and lower indexation of the publicly provided old-age pension that were introduced in 2011.

Table 4: Gross replacement rate of the NIS old-age pension (as % of average wage)

	1949 birth cohort			1980 birth cohort		
	AW67	AW100	AW150	AW67	AW100	AW150
Before reform	56.8	52	43.5	56.2	51.2	38.8
After reform	55.1	50.5	42.3	48.7	44.2	34.4
Difference (%)	-3.0	-2.9	-2.8	-13.3	-13.7	-11.3

Source: Christensen et al. (2012).

Note: AW=average wage; A retirement age of 67 assumed.

Table 5 presents the replacement rates – taken from Christensen et al. (2012) and calculated under the new rules – distinguished for the two cohorts by the age of retirement (starting a pension draw-down). The table demonstrates significant incentives to delay retirement for both cohorts. For example, for the younger cohort (AW100) postponing retirement by 5 years from the minimum access age of 62 to 67 increases the gross replacement rate of the old-age pension by 13.4 percentage points to 44.4%. This increase is mainly due to the actuarial effect of the longevity adjustment but also to some extent caused by additional pension entitlements earned after the age of 62.

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[30] A similar decline in replacement rates by 18% (over the period 2010-2060) was calculated by Hagist et al. (2014) who use the benefit ratio concept of measuring replacement rates – a ratio of old-age pension expenditure to population aged 65 years and over to mainland GDP.

Table 5: Gross and net replacement rates (as % of average wage)

Former wage	1949 birth cohort				1980 birth cohort			
	62	65	67	70	62	65	67	70
Gross replacement rates for old-age pension								
AW67	[a]	48.6	55.1	66.5	37.5	43.8	48.9	57.6
AW100	36.4	44.6	50.3	60.8	31.0	38.3	44.4	55.4
AW150	30.5	37.8	42.7	50.9	23.9	30.0	35.1	43.0
Net replacement rates for old-age pension, AFP and occupational pension (DC2%)								
AW67	[a]	74.5	81	92.3	68.3	75.2	80.7	90
AW100	58.8	65.7	72.2	83.5	57.3	65.7	72.8	84.6
AW150	48.5	56.7	62.6	72.8	48.1	55.6	61.8	72.1

Source: Christensen et al. (2012).

Note: AW=average wage; Life expectancy of 84 years for 1949 cohort and 87 years for 1980 cohort assumed; [a] Condition for pension access not satisfied in this case.

The net replacement rates of the combined pension income are also provided in Table 5. The combined pension income includes an old-age pension, AFP (reformed private sector AFP) and an occupational pension with 2% minimum contributions since 2006. These rates are significantly higher than the reported gross replacements, which is partly due to lower tax rates on pensions (with net replacement rates being typically 10 to 15 percentage points higher) and partly due to the two additional second pillar's payments. Similarly, the incentive to postpone retirement is higher than from the old-age pension alone. For the 1980 birth cohort (AW100), delaying retirement by 5 years (8 years) to age 67 (70), increases total net replacement by 15.5 (27.3) percentage points to 72.8% (84.6%). While the pension reform significantly reduces the replacement rates of the public old-age pension, replacement rates of combined pension income at higher retirement ages are estimated to increase due mainly to occupational pensions. Christensen et al. (2012) show that as a result of the reform, the net replacement rate of the combined pension income for the young cohort (AW100) retiring at the age of 67 increases by 2.4 percentage points to 72.8%, with those retiring at the age of 70 experiencing a relative increase of 13 percentage points to 84.6%. Note also that the net replacement rates at the age of 67 for the young cohort (born in 1980) are significantly higher than for the old cohort (born in 1949) at the age of 65 who has shorter life expectancy by 3 years. Moreover, net overall replacement rates for cohorts currently entering the labour market are likely to be even higher because of the mature DC occupational pension system with contributions in excess of the minimum 2% of annual income for many private sector workers.

Equity. The distributional results in Table 4 indicate that the reform has a similar impact on the gross replacement rates across groups with different former labour income. Importantly, the reformed pension system continues to be redistributive, with (gross and net) replacement rates of public and overall pension income being significantly higher for those on lower income (AW67) and those on higher incomes (AW150). For example, the net replacement rate of the combined pension income for the cohort born in 1980 at age 67 is 80.7% for AW67 and 61.8% for AW150 (Table 5). This is due to redistributive elements (i.e., minimum guaranteed pension, the ceiling on labour income for accumulation of pension entitlements, etc.) of the NIS old-age pension. It needs to be said that net replacement rates for high income earners may be significantly greater than those reported in Table 5, as they can

receive contributions up to 25.1% of annual income into their occupational pension plan. This claim is supported by Hippe and Voien (2014) who calculated replacement rates for groups with different second pillar's entitlements. They show that occupational pension will pay an important role in retirement income provision for future pensioners and particularly for high income earners. They also find a significant public-private pension gap, with replacement rates at age 67 being markedly higher for public sector employees especially if workers in the private sector are not covered by AFP and have occupational pensions with only minimum contributions.

The impact of the reform on old-age pension payments for women is expected to be positive. Firstly, the removal of the minimum ceiling of 1G for earning pension rights combined with the relaxed income test of the minimum guaranteed pension yields a higher old-age pension for those on lower labour incomes. Secondly, and more importantly, the uniform longevity adjustment of pension payments will benefit women, which, on average, have higher than average life expectancy used in calculating the annuity conversion factors under the new rules. Thirdly, women can accumulate pension rights through other than labour income type of entitlements, including entitlements for unpaid home care. Fredriksen and Stølen (2015), using MOSART, find that women have higher returns from the NIS system, as they live longer and benefit more from the aforementioned redistributive measures. Halvorsen and Pedersen (2016), also using MOSART, assess the impact of the pension reform on the gender gap in public pensions. They show that the projected gender gap in average old-age pension benefits for the 1963 cohort declines from 43% to 7% when all the redistributive elements are in place. The decomposition of this impact indicates that the most significant factor is the unisex annuity conversion factor, followed by the changes in the ceilings for accumulating pension entitlements and child (and unpaid care) credits.

To examine the impact of the reform on intergenerational equity, one has to take into account the implications for both pension benefits (that will decline from the public NIS system) and contributions or taxes required to fund the benefits. Fredriksen and Stølen (2015) apply MOSART to calculate present discounted value of both public pensions and contributions in the old and new systems. Their results indicate that cohorts born between 1940 and 2000 lose from the reform (mainly because of reduced future benefits) while younger cohorts would gain as the discounted value of their future contributions is reduced more than the discounted value of their future benefits. It also needs to be said that the reform changes to occupational pensions are expected to benefit young and future generations – accumulating private pensions at higher contributions for their entire working life.

Overall Assessment and Comments. Although the reform has reduced average public pensions, overall replacement rates of the combined pension income (including private pensions) are estimated to increase to over 70% for those on average wage and over 80% for those on median wage – being above the OECD replacement benchmark of 70%. In addition, the homeownership rate is very high in Norway (over 80%), providing an additional financial support for the majority of older Norwegians. And the poverty rate amongst the elderly is very low (less than 5%) due to the adequacy of the minimum guaranteed pension. The distributional impacts of the pension reform are shown to be positive on both intra- and intergenerational equity. The reform has maintained and in some cases strengthened the key redistributive elements of the public old-age pension, and so the reformed system continues to be redistributive (from high-income to low-income individuals and from men to women). The overall reduction in the government expenditure on public pensions (relative to the pre-reform system) means that the reform lowers to some extent the intergenerational cost shifting to future workers.

A significant problem for the distributional effects reported in Tables 4 and 5 may arise from the life-expectancy adjustment of public pensions through uniform annuity conversion factors/divisors. It has been documented that life expectancy differs not only by gender but also by socioeconomic indicators such as education and income (see von Gaudecker and Scholz (2007) for Germany, Villegas and Haberman (2014) for the UK, OECD (2016) for selected OECD countries, including Norway). More specifically, von Gaudecker and Scholz (2007) document a positive correlation between lifetime earnings and life expectancy in Germany, with life expectancy at age 65 differing up to 6 years between the lowest and highest earnings groups. The analysis by Villegas and Haberman (2014) for the UK shows that the more deprived quintiles have experienced slower mortality reductions than the less deprived ones. They project a widening of the life-expectancy gap between the least and the most deprived quintiles to reach 4 (3.1) years in 2030 with a 95% confidence interval of 3.5–4.5 (2.6–3.9) years for males (females). Recently, OECD (2016) provided a quantitative evidence for life-expectancy differentials by educational attainment, income and occupations for selected OECD countries. For Norway, the difference in life expectancy at the age of 65 is given only by education and is shown to be about 2 years between highly and least educated groups for both males and females.

As pointed out by Ayuso et al. (2016), with mortality differentials by socioeconomic characteristics documented by OECD (2016), the pension system that is actuarially fair for the population as a whole will be actuarially unfair to groups with systematically shorter life expectancy (if the same annuity rates are used). Notice that for less educated or paid individuals with shorter life expectancy, the annuity rates (i.e., inverse of the annuity conversion factors) will be higher than those for higher educated or paid individuals. Villegas and Haberman (2014) demonstrate that the variability of annuity rates by socioeconomic characteristics can be more significant than the variability of annuity rates by gender. Thus, the longevity adjustment of public pensions with the uniform annuity conversion factor – a key component of the Norwegian pension reform – may actually unwind the redistributive measures discussed above and result in an unwanted redistribution from low-income (short-lived) to high-income (long-lived) individuals.

3.4 International Comparison

OECD (2013a, 2015b) publications document the pension reforms in the 34 member countries between January 2009 and September 2015.[31] The two publications show that recent pension reforms in most countries have targeted the "financial sustainability" and "work incentives" objectives, while also strengthening adequacy measures aimed mainly at those most in need. Specifically, the pension reform in 29 OECD countries included at least one policy change whose primary objective was to improve the future fiscal sustainability of the pension system or to provide individuals with work incentives. The most common pension policy change among member countries was to phase in gradual increases in the pension access age, with several countries linking such increases to changes in average life expectancy (e.g., Denmark for the public basic and income-tested supplementary pensions). For example, the access age for public pensions in Slovakia is based on the access age in the previous calendar year plus a number of days determined each year by the government in relation to changes in average life expectancy. As a result, the average pensionable age in OECD countries is expected to increase to 65.5 years by 2050, with several countries looking at an access age of 70 years (OECD, 2015b).

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[31] Latvia that joined in 2016 is not included in the OECD (2013a, 2015b).

In contrast with the higher pension access age policy widely adopted by many developed countries, Norway has reduced the access age for the public old-age pension from 67 to 62 years as part of the flexible retirement policy between ages 62 and 75 with the life expectancy adjustments of pension benefits. As suggested by Chomik and Whitehouse (2010), these adjustments – which lower pensions as life expectancy increases – can be seen as a substitute for raising the pensionable age, as people will voluntarily postpone retirement, in order to make up for reduced pension benefits due to increasing life expectancy. Similar longevity adjustments are used in calculating the publicly-provided earnings-related pension in Sweden.

Other measures to improve future fiscal sustainability of developed countries' pension systems have included: *(i)* increasing the contribution period necessary to be eligible for a full public pension (e.g., Spain, France); *(ii)* lowering indexation of public pensions (many countries, including Norway); *(iii)* changes to the pension formula with pension benefits being linked to life expectancy (e.g., Norway, Spain); and *(iv)* introduction of automatic adjustment mechanisms or sustainability factors (e.g., Sweden, Germany, Spain, Luxembourg). The objective of automatic adjustment mechanisms is to mitigate the impact of macroeconomic and demographic risks on the sustainability of pension systems. For example, in Sweden if pension liabilities exceed pension assets, indexation of both entitlements and benefits is reduced until the balance is restored. In Germany, the stability factor ensures that pension point values follow the development of the ratio of contributions to retirees.

The Swedish pension system is the closest to and has many similarities with the reformed Norwegian pension system. It consists of a minimum guaranteed pension (with the minimum 3 year residence period and 40 years of residence to get the full amount) and two earnings-related pension schemes – a public NDC scheme (with longevity adjustments of pension benefits) and privately-managed funded DC scheme. There are, however, important differences between the two pension systems. First, in Sweden there is no distinction between pensions of private and public sector workers. Second, the Swedish pension system has a built-in automatic adjustment mechanism, as discussed above. Third, the access age for the Swedish guaranteed pension is 65 years (compared to 67 years in Norway) and the pension is indexed according to the CPI (compared to Norway where indexation takes into account changes in life expectancy). Fourth, the minimum access age of the public earnings-related pension in Sweden is 61 years (62 years in Norway), but note that for those claiming this pension before turning 65, the annuity factors are re-calculated at the age of 65. As discussed in the next section with final remarks and policy recommendations, some of the features of the Swedish pension system would be worth considering in relation to further reformation of Norway's second pillar pension schemes.

4. Conclusions and Policy Recommendations

In this report, we have described the Norwegian pension reform and have assessed it against a set of objectives defined by the OECD, with a particular focus on the financial sustainability and the reform implications for labour supply and retirement, and for the adequacy and equity of overall retirement income provision. Norway's decade-long reform process has resulted in pension reform with the following main changes to the public old-age pension system:

- new NDC model for accumulation of pension entitlements (phased in gradually for cohorts born after 1953);

- life-expectancy adjustments of pension benefits;

- flexible retirement between ages 62 and 75 with partial or full pension withdrawals that can be combined with work without any earnings test;

- new rules for the indexation of pension benefits (linked to changes in life expectancy); and

- relaxation of the income test applied to the minimum guaranteed pension.

The second pillar's AFP and occupational pension schemes for private sector workers have also been reformed to align these schemes with the main principles of the new old-age pension system.

Our review of the main findings from both empirical and modelling literature on Norway's pension reform indicates that the reform is expected to have a significantly positive impact on the long-run financial sustainability, particularly through strong total labour supply effects with higher employment of the working-age population (due to the closer link between pension benefits and lifetime labour income) and postponed retirement (due to accumulation of additional pension entitlements and life-expectancy adjustments of pension benefits). The impact of the pension reform on replacement rates demonstrates that the new system will continue to be highly redistributive mainly due to maintaining (and in some cases strengthening) the distributional elements of the public old-age pension scheme (e.g. minimum guaranteed pension, ceiling on labour earnings for accumulation of pension entitlements and unpaid care entitlements). In addition, the adequacy of retirement income for young and future generations (especially those on higher earnings) will be improved by the reform changes made to occupational pensions.

The initial labour supply responses along both the extensive and intensive margins are estimated to be significantly positive but only for a proportion of the age-eligible population employed in the private sector with AFP entitlements (Hernæs et al., 2016). As pointed out by OECD (2013b), an obvious shortcoming of the pension reform is that it has so far substantially impacted only about 40% of new pensioners – mainly those employed in the private sector. Disabled people and public sector workers still have their pensions calculated to a large extent under the old rules. And so, a challenge will be to ensure broader application of the new system's principles for particularly public sector workers.

The pension reform is projected to substantially improve long run fiscal sustainability, only partly due to reduced government expenditures on public pensions (relative to the pre-reform case) but mainly driven by increased tax revenues resulting from assumed strong labour supply effects (Fredriksen et al., 2015). We have proposed the use of a computable overlapping-generations model with endogenous labour supply and retirement to quantify the labour supply (and saving) effects of the Norwegian pension reform. This type of economic model is also capable of evaluating aggregate efficiency implications of the pension reform with alternative tax policy options to finance future public pension liabilities.

We have identified four major remaining issues with the reformed Norwegian pension system:

- its complexity, largely due to the different second-pillar pension schemes for employees in the private and public sectors;

- no automatic adjustment mechanism (or stability factor) to account for future macroeconomic and demographic risks;

- only partial coverage of the longevity risk as the annuity conversion factors are calculated only once for each cohort at the age of 61; and

- uniform annuity conversion factors and their potential impact on groups of individuals with systematically shorter life expectancy.

The complexity of Norway's pension system has been depicted by Figure 1, showing very different AFP and occupational pension schemes for workers employed in the private and public sectors. Ideally, there should be one funded pension scheme for both private and public sector workers in addition to the earnings-related component of the NIS old-age pension. The first step should be to merge the private sector AFP with occupational pensions. Given annual contributions of around 3.5% to 4% of yearly wage necessary to achieve a typical AFP benefit (Hippe and Voien, 2014), such annual contributions for new cohorts of workers could be paid directly into their occupational pension accounts. These contributions would be additional to the minimum and any other voluntary contributions currently made towards occupational pensions. Such consolidation would simplify the pension system and make pension costs more transparent.

A bigger issue is with the unreformed second-pillar pension schemes for public sector workers that, as already argued by OECD (2013b), need to be aligned with the main principles of the new old-age pension and private sector's earnings-related pension schemes. Notice that many public sector employees aged 62 to 66 years are giving up their AFP entitlements to take up a new old-age pension in combination with work (OECD, 2013b). This suggests that there is a growing support for a similar reform of the public sector AFP to that in the private sector. As for the unfunded occupation pension liabilities in the public sector, these are quite common internationally. For example, the unfunded public sector pension liabilities in Australia amount to around 7% of GDP (more than twice that of the annual government expenditure on the first-pillar age pension). However, this unfunded DB scheme closed to new members in July 2005, and both public and private sector employees accumulate their superannuation (Australia's term for private pensions) through a funded pension system. Norway should follow Australia and other countries by also introducing funded DC occupational pensions for new employees in the public sector.

Although the pension reform is expected to ameliorate the future fiscal situation in Norway, public pension spending will still increase significantly over the next several decades.[32] There is no agreement on how the increased costs on public pensions will be financed. In addition, there is no automatic adjustment mechanism or stability factor to address imbalances in Norway's public pension system in the wake of unfavourable macroeconomic and demographic developments. Such measure is an important feature of pension systems in many developed countries (e.g., Sweden, Germany and the Netherlands) and should be considered in Norway to mitigate the fiscal impact of these risks in the future.

We have also argued that the longevity risk has only partly been transferred to individuals. This is because under the new life expectancy adjustment of pension benefits, the annuity conversion factors for ages 62 to 75 are determined only once for each cohort at the age of 61. Therefore, the government and so taxpayers face a potentially large risk attached to unexpected increases in actual life expectancy that have been very common and often significant in comparison to past projections. Following the life-expectancy adjustments of the Swedish public earnings-related pension, we propose a recalculation of the annuity

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[32] Notice that the Norwegian state pension fund established in 2006 does not operate to solely fund the payments of public pensions and can be used for any other purpose.

conversion factors at the age of 67 for those who claimed an NIS old-age pension before reaching this age.

Last but not least, to address the issue of uniform annuity conversion factors and their distributional effects on groups of individuals with shorter life expectancy, we propose the progressive taxation or means testing of public pensions. That would reduce public pension benefits to higher-paid and longer-lived individuals. An alternative would be to calculate different annuity rates for different socioeconomic groups, let's say by lifetime income. In that case, however, more research is needed in order to produce reliable estimates for life expectancy by this or other socioeconomic indicators. It also should be emphasised that many developed countries that raised their pension access age face the same redistributive problem.

In conclusion, Norway's well-considered reform process has resulted in structural pension reform that is expected to have a significantly positive impact on long-run financial sustainability and labour supply, with the reformed system continuing to deliver adequate and equitable pensions. However, we have identified some key areas for further improvement of Norway's pension system including: reducing complexity particularly by reforming second-pillar pensions in the public sector; applying an automatic adjustment mechanism to account for future macroeconomic and demographic risks; increased coverage of the longevity risk by re-calculating annuity conversion factors at the age of 67; considering progressive taxation or means testing of public pensions to mitigate distributional effects of life-expectancy differentials by socioeconomic characteristics.

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