The Norwegian disability pension system: actuarial challenges arising from new regulations

Bård Støve* Sissel Rødevand
University of Bergen Actecan

Hans Michael Øvergaard Mats Sollie
Kommunal Landspensjonskasse Storebrand

Abstract

In this paper we describe the new Norwegian disability pension system that were introduced on January 1st 2015. In particular, we focus on the difference between the regulation for public and private sector companies. We start by describing the disability benefits given by the Norwegian National Insurance Scheme (NIS) and the relationship to the retirement pension scheme. We present approaches of pricing and reserving the disability benefits under the new regulation by multiple state Markov models. The approach is based on well-known methods, see e.g. Haberman and Pitacco (1999), but we highlight certain specific challenges, as how to estimate future reduction of the disability benefits due to income, lack of information of changes in the disability degree, changed risk for the insurance company due to changes in the benefits according to different levels in salary, and for private pensions schemes, a challenge regarding pricing or handling vested disability benefits from earlier employers.

Keywords: Disability benefits, Norwegian regulations, pricing and reserving

*Corresponding author: University of Bergen, Department of Mathematics, Postbox 7800, 5020 Bergen, Norway. Tel. +47 55 58 28 86. E-mail: Bard.Stove@math.uib.no.

1 Introduction

The public social security system in Norway is called the National Insurance Scheme (NIS). This system encompasses old age retirement pensions, sickness benefits, unemployment insurance, health insurance, and people who are permanently unable to work due to illness, disease, injury or disability accepted as a medical condition, are secured with disability benefits (DB) from age 18 to 66. From age 67, the recipient is transferred to age-retirement pension.

On January 1st 2015, new regulations for the disability benefits were introduced in the NIS. These changes also affected additional benefits, in particular disability pensions, from public and private mandatory occupational pension schemes. Thus, the change in NIS concerning the disability benefits, also called for new regulations concerning the disability benefits arrangements outside NIS.

The disability insurance scheme place a heavy burden on the Norwegian welfare state. Bratberg et al. (2015) reports that in 2011, 9,5% of the population aged 18-67 was disability pensioners. Further, the OECD, see OECD (2010), state that the recipiency rate in 2008 in Norway was about 10%, whereas the average in OECD was just below 6%. The Norwegian Labour and Welfare administration (NAV) reports that in 2014, 9,4% of the population aged 18-67 was disability pensioners. For women 11,1% was disability pensioners and for men the number was 7,1%. The number of people who receive disability pensions are different for different ages, and highest for the highest ages, see also figure 1. This figure is from NAVs quaterly statistics on the development of disability pensions, 31st of December 2014.

The main reasons for changing the rules regarding the disability benefits from the NIS are as follows; firstly, to simplify the current regulations, secondly, designing a regulation that encourage people to work more, and finally, making a more clear-cut difference between the old age retirement pension and income-protection/disability benefits. However, the estimated total cost for the government related to the disability benefits under the new regulation will approximately be at the same level as before (source: NAV).

Another main reason for changing the regulations concerning disability benefits, was that the Norwegian pension system had undergone a major reform, approved by the parliament in the spring of 2009 and in force January 1st 2011. Under the old system the disability pension and the old age pension were interconnected, for instance, the disability pensioners

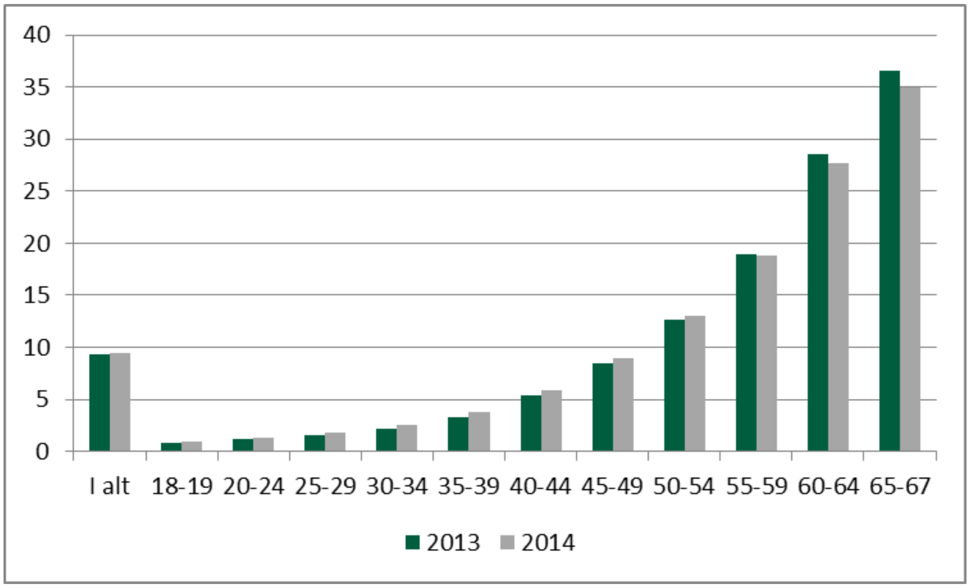

Figure 1: The proportion of people at disability pensions at different ages for the Norwegian population. The two first columns show the total proportion at disability pensions.

usually kept their pension unchanged when they were transferred to the old age pension at age 67. We mention that the important features of the Norwegian pension reform were the adjustment of pensions for changes in life expectancy, flexible retirment starting at age 62 based on actuarial principles, and new rules for indecation of pensions. For an overview of the pension reform in Norway, see Fredriksen and Stølen (2011).

In addition to disability benefits from the NIS and disability pensions from mandatory occupational pension schemes, it is also possible for indivduals in Norway to buy disability insurance from insurance companies. This will typically be lump-sum benefits if disability occurs. However, we will not consider such contracts in this paper.

In this paper we focus on the description of the changes in NIS related to the disability benefits, and the regulatory consequences for the different disability insurance arrangements outside NIS. Further, we highlight some of the actuarial challenges regarding pricing and reserving of these proposed disability pensions. An overview of different disability benefit contracts internationally, and methods for pricing and reserving, can be found in e.g. Haberman and Pitacco (1999) and Pitacco (2014).

The paper is structured as follows; in section 2 we will describe the new disability benefits from NIS, and the relationship to the retirement pension scheme. In section 3 we present the changes in the disability insurance arrangements outside NIS. In particular, we study the disability pensions from mandatory occupational pension schemes, and highlights the difference between public and private sector. Further, we point out some challenges that arises, as how to estimate future reduction of the disability benefits due to income, lack of information of changes in the disability degree, changed risk for the insurance company due to changes in the benefits according to different levels in salary, and for private pensions schemes, a challenge regarding pricing or handling vested disability benefits from earlier employers. In section 4 we examine pricing and reserving these disability pensions outside the NIS, and examine some practical challenges and problems that arises from the new regulation. Section 5 concludes.

2 New disability from the NIS

The new disability benefits from the NIS were in force January 1st 2015, and is regulated by Norwegian law ("Folketrygdloven"). As already mentioned in the introduction, the main reasons for introducing these changes were to harmonize the disability benefits from NIS with the changes that already had been made regarding the retirement benefits from the NIS (implemented January 1st 2011), and also to encourage disabled persons to work, if possible, by making the rules more flexible concerning additional income from working.

The main points of the new regulations are as follows:

- The disability benefit is to be calculated based on the income in the best three years of the last five years before disability occurred (referred to as "final income").
- The replacement rate shall be 66%, i.e. the disability benefit shall be 66% of the final income (before tax), up to a final income limit of 6 G[1] per year.
- The disability benefit is taxed as salary (earlier as retirement income).
- At 67 years of age, a retirement pension will replace the disability benefit.
- The "disability degree" (i.e. reduced work capacity) must be above 50%.

[1] 1 G = 88 370 NOK per May 1st 2014, and is a base amount used in the Norwegian welfare system. The amount is regulated yearly.

- Income up to 0,4 G will not reduce the disability benefits. Income above this limit will reduce the disability benefit, by using the “compensation rate”, which depends on the income before disability. The disability degree will not change because of working.

This means that there is a change in level of the benefits, with higher benefits for income below 6 G and lower benefits for income between 6-12 G. Income over 12 G has never given any rights to disability benefits. Also the way to calculate the benefit has changed from regarding the 20 best years of income to just look at the income in the last 5 years.

The older regulation did not have the flexibility to allow for a combination of work and receiving disability benefit, as the last point above states for the new scheme. Note further that the new regulation implies on average an increase of the disability benefit of 15% before tax, but on average the same net benefit as before. Finally, we note that there is no directly need for methods for pricing or reserving of these benefits, as NIS is a “pay-as-go system” financed by the Norwegian government.

However, these changes in the disability benefits from the NIS, have effects on the additional disability pensions, from public and private sector occupational pension schemes. This will be described in the next section. For an even more thorough discussion of the changes to the disability benefits from the NIS, we refer to Veland (2014).

3 Disability benefits outside the NIS

The changes in the disability benefit scheme in the NIS from 2015 also implied that additional disability pensions from public and private occupational pensions schemes needed to be amended, and new regulations introduced. The Norwegian Parliament has adopted a new disability scheme for the Norwegian Public Service Pension Fund (Prop. 66 L (2013-2014)) and the Ministry of Finance has proposed a new regulation of disability benefits in private occupational schemes, in the law proposition Prop. 42 L (2014-2015). In the next paragraphs we briefly explain why these regulatory changes are necessary.

Disability benefits are mandatory in the public sector. Under the old regulation, the disability benefit from public sector occupational pension schemes was coordinated with the benefit from the NIS. This benefit in total gave a replacement rate of 66%. For private sector, the benefits could vary, from a replacement rate below 60% and up to 70%. Given that the new disability benefit from the NIS shall constitute 66% of the “final income”, it could actually happen that there would be no additional benefit from the occupational pension schemes at all. This would mean a cut in the disability benefits, in particular for low income earners, which was not the intention of the new framework. Thus, this also called for new regulations regarding the disability benefits from occupational pension schemes, which will be presented in the next paragraphs.

Under the new regulation, in the public sector, all employees are entitled to a disability pension from the occupational pension scheme in addition to the benefit from the NIS. This is not the case for private sector employees, as this will be up to the company itself or via a collective bargaining agreement. In 2013, around 30% of the members of a private pension scheme also had a disability pension from their pension scheme[2].

The new disability benefit from the public sectors occupational pension schemes can be summarized as follows: The benefit will be directly added to the disability benefit from the NIS, with the following replacement rates:

- 3% of income up to 6 G
- 69% of income between 6 and 12 G

Further, it will be an additional fixed amount of 0,25 G independent of income, but limited by 6% of the income. These rates depends on the number of years the disabled has been a member of the arrangements (number of years in service), in order to get the maximum rate, 30 years is required (sum of member years before disability + number of years from disability until 67 years old). The disability degree must be at least 20% in order to obtain disability benefits. Further, having children will increase the benefits (child supplement) by 4% of income (before disability) up to 6 G, per child, but maximum 12% of income (i.e. three children). These additional benefits are paid until the children reach the age of 18. At 67 years old the disability benefit is replaced by retirement pension. Note that if a public employee changes employer to a private company, the earned rights from the public pension scheme will follow the employee, however scaled by possible years of service until the age of 67 divided by a number between 30 and 40 years.

The regulations concerning the disability benefit from private sector occupational pension schemes are not in force, but will most likely be in force before the end of 2015. In

[2]Source: Finance Norway

the following we summarize the suggestions from the law proposition from the Ministry of Finance. Again, note that it is voluntarily for a private sector company to provide disability benefits in addition to the benefits from the NIS. The benefit will be directly added to the disability benefit from the NIS, as for the public sector, with the following *maximum* replacement rates:

- 3% of income up to 6 G
- 69% of income between 6 and 12 G

Further, it will possible with an additional fixed amount of 0,25 G independent of income, but limited by 6% of the income. The benefits can thus be similar as the public sector. Income over this limit, will be subtracted from the total disability benefit. Also, the disability degree must be at least 20% in order to obtain disability benefits. However, the child supplement will be lower than in the public sector, consisting of maximum 0,1 G for one child and maximum 0,2 G for two or more child (until 21 years of age). Further, these benefits are not dependent on the number of years in service, as for the public sector.

Note also that if one has earned rights of disability benefits from, either a private and/or a public mandatory pension scheme, this will be deducted from any benefits from the private sector scheme. This may be done in advance, at the premium calculation stage, however, we will return to this point in section 4. As for the public sector, at 67 years old the disability benefit is replaced by a retirement pension. Further, note that if a private employee changed employer to the public sector, no earned rights from the private pension scheme related to disability pension will follow the employee.

From the information above, one see that the best disability pension from a private sector company can be as good as the disability pension from the public sector. However, it is likely that many private sector companies will choose a disability pension with a fixed percentage of the salary, without the fixed amount. Private sector companies have also possibilities to choose other combinations of pensions, than can give a much smaller disability pension than public sector. Table 1 summarizes the most likely disability pension, if any, in the private sector together with the maximum private sector and the public sector pension. We have now exluded the possiblity of an add-on of 0,25 G.

The child supplement in the disability pension is not mandatory for the private sector, and as already mentioned slightly lower than in the public sector. This difference is highlighted

Salary	Public sector / max. private sector	Private sector (3%, 69%)
4 G	75	69
6 G	73	69
8 G	72	69
10 G	72	69
12 G	71	69

Table 1: Disability pension in percentage of salary, inclusive the disability pension from the NIS

in figure 2.

Note that even though the disability pension may be equal for the public and private sector, the difference in child supplement can lead to large differences in the disability pension finally paid out. Even if the maximum rates are choosen in a private sector scheme, the total disability pension will be smaller than the public one when the disabled has a child. We note that the child supplement is of particular importance for low income earners.

3.1 Practical aspects related to disability benefit payouts

We end this section by explaining briefly how payout of disability pensions are handled in Norway. Typically, there will be a one year waiting period before a disability pension is paid out. This is due to the fact that the employee has a right to sickness benefit lasting one year paid partly by the company and partly by the NIS. After the first year of sickness benefits, one is entitled to receive work assessment allowance (AAP) before a potential disability benefit is granted from the NIS. This means that several years may pass after disibility has occured until disability benefit is paid out from the NIS. A private sector occupational pension scheme will pay out disability benefits after one year, either to the disabled or to the pension schemes premium fund[3], if the disabled are still on AAP. For a public sector occupational pension scheme, the disability pension will only start once the disabled does not receive AAP, and there will be no payouts to the scheme's premium fund.

[3]The premium fund is a fund where profit from the pension scheme is allocated and this fund can be used to pay future premiums

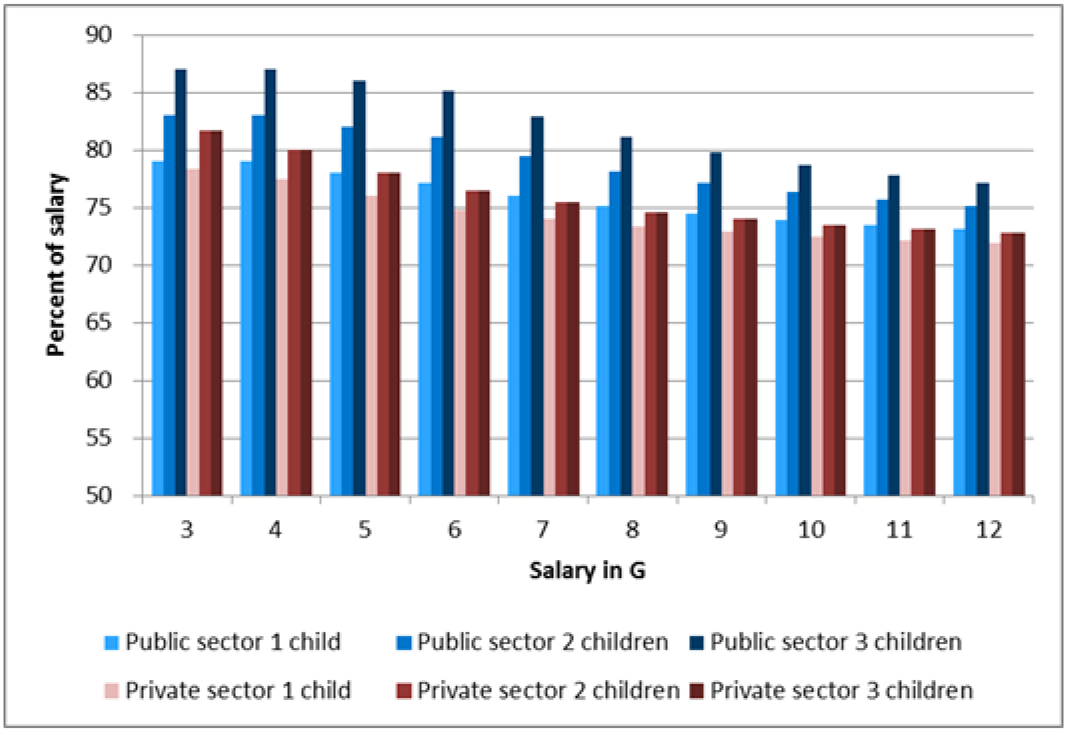

Figure 2: Disability pension in percentage of salary including child supplements (maximum rates for the private sector)

4 Pricing and reserving

Several approaches have been suggested for the valuation of disability insurances. Haberman and Pitacco (1999) and Pitacco (2014) provide an overview of existing actuarial methods for the calculation of premiums and reserves. The current practice in Norway, for pricing the disability pension under the old regulation has been using the so-called "Norwegian method", see Sand and Riis (1980), based on probabilities of being disabled. Lately, most Norwegian companies have also started using a three-state Markov model for pricing and reserving. However, disability pensions are inherently difficult to price partly due to the dependence of the level of economic activity, in particular the unemployment rate, and also the size of the benefits. Disability pensions also have a long-tailed risk, i.e. many years can pass from the first time a person get sick until disability is proven, which entitles benefits from the NIS and a possible occupational pension scheme.

In the regulations introduced in Norway, some new principles are introduced which are challenging for the practical pricing of the disability pensions. In this section, we will examine these principles, and see whether it is possible to take account for (some of) them in the price model adopted. We will suggest a multistate Markov model approach, for both the public and private sector schemes, and the pricing and reserving methodology is thus essentially an application of Thiele's differential equations, see e.g. Hoem (1988) and Norberg (1995) for applications to life contingencies. This will only be sketched, but first we return to the new principles introduced in the regulation;

- The disability pension from the pension schemes will be reduced if the disabled has any income (i.e. curtailment of benefits)
- The disability degree will not necessarily change if the disabled is able to work (part-time or full-time), but the compensation rate may change, i.e. it means that that recovery will appear poorly registered or not registered at all.
- Since the disability benefit under the new regulation will increase for salaries below 6 G, and decreases for salaries over 6 G, one would expect that disability benefits from occupational pension schemes for salaries above 6 G will increase.
- Disability pensions form pension schmes in the private sector shall be coordinated with disability pensions from other sources at premium payment or at payout of the benefit.

Since the regulation is slightly different from public and private sector, the challenges arising from the points above in building the price tariff for the disability pension will thus be different. We proceed by discussing each of the points above in more detail.

Curtailment of benefits: A disabled person that is able to work, part time or full time, will receive income. For a person that is 100 % disabled, income above 0,4 G will lead to a reduced disability pension from both the NIS and the pension scheme. Since the old regulation did not have this flexibility regarding addtional income from working, i.e. any income lead to recovery, there is little or no data available of expected proportion of disabled that may try to work, how large such incomes may be and when such incomes may appear. This is information that one ideally should have in order to develop a reasonable tariff.

For the public sector, the income will reduce the disability pension from the pension scheme. For the private sector, the income will reduce the benefit to the disabled, while this reduction will be added to the schemes premium fund. The income will thus not effect the payout from the pension scheme in the private sector.

If the additional income is more than 80% of the income before disability, no disability benefit will be paid out to the disabled or to the premium fund (in the private sector). However, the "disability degree" is not necessarily changed.

Disability degree: Since work and additional income not necessarily change the disability degree, one has to reassess how to include recovery in the Markov-model and thereby the pricing of the disability pensions. We will return to this point when sketching the Markov-model below.

Salary dependent disability risk: Since the disability benefit from the NIS does not give any benefits for salaries above 6 G, there will be increased payouts from the occupational pension schemes for such salaries. This would certainly be the case for the public sector, but for the private sector this will dependend on the choosen replacement rates.

Coordination of disability pensions from private sector schemes: At the time of writing of this paper, the regulation regarding disability pension in the private sector is not finalized. However, it is proposed that the pension schemes can choose when to take into account earned rights to disability pension from previous employers. The pension scheme can either do this at the premium calculation stage or at the time when the potential disability pension is being paid out. This choice matters for the size of the premium. Most employees will have such rights from earlier employment. If these rights are not coordinated at the premium calculation stage, the company will pay a higher premium than necessary (since any benefits from previous employers will be subtracted from the disability pension from the current employer). Many employees will will infact have earned rights to a disability pension that is as high or nearly as high as the pension that may be paid out from the new scheme. This may actually lead to low or no premiums for these employees from the company to the pension scheme.

If earned rights is not accounted for at the premium calculation stage, it must be accounted for at the potential benefit payout stage. This means that the disability pension will be reduced, and this reduction will be paid into the company's premium fund. This means that the pension schemes payouts are independent of earned rights. At the same time, there may be disparity related to the premium payment for the individual member and the disability pension paid out and the amount that goes to the company's premium fund. For example, an employee who becomes disabled after 3 years of employment, but with large earned rights from previous employers, could get zero disability pension. However, the company will receive the full disability pension without curtailment to its premium fund, up until the employee is 67 years old, even though premium has only been paid for three years.

Clearly, the principles discussed above represent challenges any occupational pension scheme must consider when pricing (and reserving) disability pensions. In particular, this applies for the treatment of different values of the disability degree and how to treat recoveries.

We suggest splitting the disability state into two states, one "temporary/acute" and one "chronic/permanent", where the probability of recovery from the temporary state (to the active state) is larger than the probability of recovery from the permanent state. The main reason for splitting up the disability state is as follows; the time period when a person receives AAP payouts (up to 4 years) is captured in the temporary state, and during this time period it is possible to change the disability degree. When the AAP period is over, and a transition to the permanent state is made, the disabled may keep the disability degree as before, even when working. It is thus different dynamics in these two states, and the probability of recovery is thus most likely larger in the temporary state. The model is illustrated in figure 3. We note that this model is suggested in Haberman and Pitacco (1999) p. 38-39. The premium will be paid in the active state with a continous rate, whereas the disability pension will be paid out with a continous rate in the permanent disability state. There is no benefit in the temporary state, as this will typically be covered by the AAP payouts. However, for the private sector there will be paid out a disability pension in the temporary state, but this will be reduced against the AAP payouts. A possible simplification of the model will be to set the probability of recovery from the permanent disability state equal to zero. The price and reserve formulas will now follow by applying Thiele's differential equation, see e.g. Norberg (1995), and solving them by a numerical method. As this may be considered a standard approach, we will not go into the details here, but refer to the aforementioned references.

One of the main aspect of applying the Markov model approach to disability pensions deals with the estimation of transition intensities (or probabilities), that require a consistent data set where transitions between states of a population are collected. As mentioned above, this is a practical challenge for the Norwegian companies for this type of disability pensions,

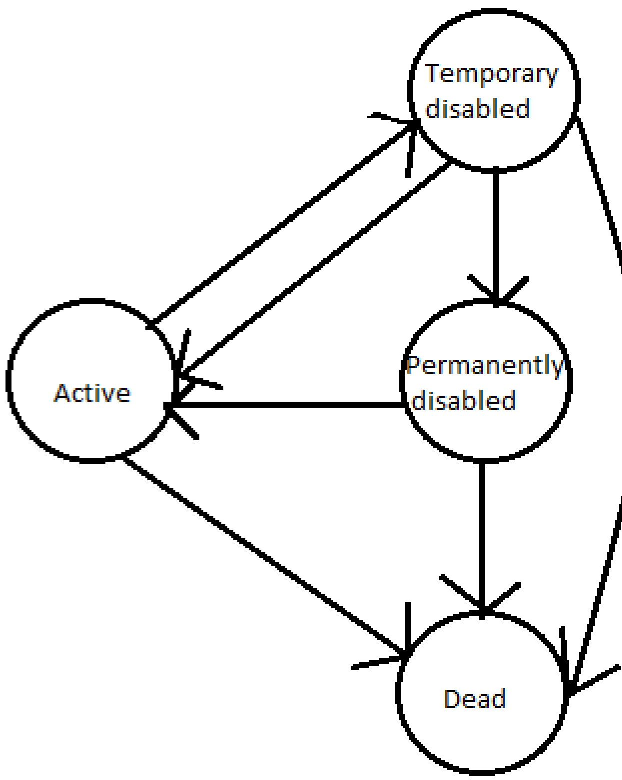

Figure 3: The four-state disability model

in particular regarding the recovery intensities. There is little public data available here. Finance Norway[4] collects data and make statistics, but there are huge challenges regarding this collection, and there are few statistics made. In any case, the statistics do not refer to differences in different industries, and do not have any experience due to the new system. We will therefore expect that the companies use their own data for the new disability pensions, but meaningful data on this will not be available for many years. Of course, historical data from the old regulation are available in the individual insurance companies, and these may be used for this type of estimation. We note that in order to take account for individual risk, the transition intensities should be estimated individually, and should naturally be dependent of

[4]Finance Norway is the industry organization for the financial industry in Norway

age. The practice in Norway today, is that the transition intensities are dependent, besides on age, on sex and typically on some attributes of the company, i.e. office or industry workers. Other risk factors may also be accounted for in the estimation of the transition intensities.

When it comes to reserving, the practice in Norway today regarding disability benefits is as follows; for the one year waiting period (of sickness benefit) the risk premium is held as unearned premium. After the waiting period, one uses traditional reserving methods like Chain-Ladder or Bornhuetter-Ferguson, which relies on claim triangles, measuring the time passed from the end of the waiting period until payout of the disability pension begins. We believe this practice will continue under the new regulation.

5 Concluding remarks

In this paper we have surveyed the new Norwegian disability pension system that were introduced in 2015, with special focus on the regulation concerning disability pensions from mandatory occupational pension schemes, in both the public and private sector. We also note that the regulation for the private sector is not finalized.

We believe the main motivation for the new regulation, creating a more flexible system for combining disability benefits and work income, is a good idea, but this flexibility creates some challenges for the insurance companies regarding how to price the disability pensions, as how to estimate future reduction of the disability benefits due to income, lack of information of changes in the disability degree, changed risk for the insurance company due to changes in the benefits according to different levels in salary, and for private pensions schemes a challenge regarding pricing or handling vested disability benefits from earlier employers.

We have suggested a multistate Markov model for pricing and reserving, but without going into the specifics. In particular, the aforementioned challenges make the pricing difficult. Other designs of the Markov model are possible, but we note that lack of relevant disability data is a major challenge.

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