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

Bård Støve, University of Bergen, Department of Mathematics, Norway
Sissel Rødevand, Actecan
Hans Michael Øvergaard, Kommunal Landspensjonskasse
Mats Sollie, Storebrand
Describe the new Norwegian disability pension system that were introduced on January 1st 2015
Difference between public and private sector
General approach to pricing and reserving
Some challenges!
The Norwegian disability system

The public social security system in Norway - National Insurance Scheme (NIS):

- old age retirement pensions
- unemployment insurance
- health insurance
- disability benefits (DB) from age 18-66, from age 67 transferred to age-retirement pension
- $1 \text{ G} = 90\,068\,\text{NOK}$ (as May 1st). Base amount - regulated yearly.

The disability insurance scheme place a heavy burden on the Norwegian welfare state. The Norwegian Labour and Welfare administration (NAV - 2014):

9.4% of the population aged 18-67 was disability pensioners.

Additional DB provided by mandatory occupational pension schemes (OTP) in both the public and private sector.
Figure: 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.
Why change the regulation concerning disability benefits?

- Simplification of the rules
- Design a system that encourages working (increase flexibility)
- A more clear-cut difference between old-age retirement and disability benefits
- Changes in the Norwegian pension system (implemented 2011)

Note: the estimated total cost for the government related to DB should not change (at transition)
Disability benefits from the NIS

Old rules:

- Benefits are calculated as retirement pension
- No (little) flexibility combining work and disability benefits
- Disability benefits taxed as retirement income (i.e. lower tax rate, \(\approx 15 - 25\%\))

New rules:

- The DB calculated based on the income in the best 3 years of the last 5 years before disability (the final income). Minimum 2,48 G.
- The replacement rate: 66% of final income (before tax) up to a final income limit of 6 G per year
- The disability benefit is taxed as salary (\(\approx 25\% - 35\%\))
- At 67 years of age, a retirement pension replaces the DB
- The disability degree (i.e. reduced work capacity) must be above 50%.
- Income up to 0,4 G will not reduce the DB. Income above this limit will reduce the DB. The disability degree will not change because of working.
Disability benefits from the NIS

**Figure:** Old (dotted line) and new (solid line) DB (before tax) from the NIS. X-axis: salary in G before disability

Kilde: Prop 130 L (2010-2011)
Kommentar: X-aksen viser lønn målt i G
Disability benefits outside the NIS

Changes in the DB scheme in the NIS ⇒ regulatory change regarding additional disability pensions from public and private occupational pensions schemes (OTP).
Main reason:
The disability pension from public/private schemes was dependent on the level of the DB from the NIS.
Public sector schemes

Mandatory for public sector employers.

Old rules:
- DB from public sector scheme coordinated with the DB from the NIS, in total a replacement rate of 66%
- Disability degree must be above 0%
- DB increases with 10% for each child under 18 years

New rules:
- DB from public sector scheme will be directly added to the DB from NIS with replacement rates; 3% of income up to 6 G, 69% of income between 6 and 12 G (maximum rates req. 30 years, years of service bef. disability + years of disability up to 67)
- Additional DB of 0.25 G (independent of income, but limited by 6% of income)
- Disability degree must be above 20%
- Child supplement: 4% of income (before disability) up to 6 G, max. 12% (i.e. three children)
Private sector schemes

The employer can choose whether they would provide extra DB via their pension schemes, in 2013, 30% of the members in these schemes also had the possibility of DB.

Old rules:
- Replacement rates from below 60% and up to 70%,
- Disability degree must be above 20%
- Child supplement: voluntarily (typically as public schemes)

New rules:
- DB directly added to the DB from NIS with maximum replacement rates; 3% of income up to 6 G, 69% of income between 6 and 12 G (maximum rates is not dependent of years in service)
- Possible with additional DB of 0,25 G (independent of income, but limited by 6% of income)
- Disability degree must be above 20%
- Child supplement: as public sector (changed april 2015)
- Earned rights from previous membership in schemes will be deducted
Public vs private schemes

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>
<thead>
<tr>
<th>Salary</th>
<th>Public sector / max. private sector</th>
<th>Private sector (3%, 69%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 G</td>
<td>75</td>
<td>69</td>
</tr>
<tr>
<td>6 G</td>
<td>73</td>
<td>69</td>
</tr>
<tr>
<td>8 G</td>
<td>72</td>
<td>69</td>
</tr>
<tr>
<td>10 G</td>
<td>72</td>
<td>69</td>
</tr>
<tr>
<td>12 G</td>
<td>71</td>
<td>69</td>
</tr>
</tbody>
</table>

Table: Most likely DB replacment rates, inclusive the disability pension from the NIS
Public vs private schemes - more comments

The regulations regarding DB from private sector is not in force, but will probably be by the end of 2015.

If a public employee changes employer to a private sector company, the earned rights from the public sector scheme will follow the employee (but scaled by factor depending on years of service). From private to public: no earned rights follow the employee.

DB payouts:

- One year of sickness benefits (partly by the NIS and partly by the employer)
- Work assessment allowance (AAP) may be granted (max. 4 years) before DB from the NIS
- Private scheme: payouts after one year either to the disabled or premium fund (if AAP)
- Public scheme: payouts once the disabled does not receive AAP (nothing paid to the premium fund)
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. The NIS is a pay-as-you-go system, thus we focus on the DB from the pension schemes.
New principles

In the regulations introduced in Norway, some new principles are introduced which are challenging for the practical pricing of the disability pensions.

- The disability pension from the pension schemes will be reduced if the disabled has any income.
- 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), thus 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.
- DB form pension schemes in the private sector shall be coordinated with DB from other sources at premium payment or at payout of the benefit.
Challenges I

- Work and disability degree:
  The old regulation did not have the flexibility regarding additional income from working, i.e. any income lead to recovery, 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.

- Public schemes: Income will reduce the DB from the scheme.

- Private schemes: Income will reduce the DB to the disabled, but this will be added to the schemes premium fund. Income will thus not effect the overall payout from the scheme!

- Since work/income will not change the disability degree, how should recovery be treated in a pricing model of DB?
Cooperation of DB from private sector schemes, when to take account for DB from previous employers. This matters for the size of the premium. Most people will have such rights. Two possibilities:

1. **At premium calculation stage:** May lead to low premium due to a possible large DB from previous employers.

2. **At (potential) benefit payout stage:** The DB will be reduced, this reduction will be paid into 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 DB without curtailment to its premium fund, up until the employee is 67 years old, even though premium has only been paid for three years.
We suggest splitting the disability state into two states, one “temporary/acute” and one “chronic/permanent”. The probability of recovery from the temporary state is larger than the probability of recovery from the permanent state. 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.

Not a new model, see e.g. Haberman and Pitacco (1999). A simplification; The price and reserve formulas will now follow by applying Thiele’s differential equation, see e.g. Norberg (1995)
Markov model

The four-state disability model

- Active
- Temporarily disabled
- Permanently disabled
- Dead
Data

One of the main aspect of applying the Markov model approach deals with the estimation of transition intensities (or probabilities) - requires a consistent data set where transitions between states of a population are collected. Practical challenge for Norwegian companies (in particular regarding the recovery intensities).

- Finance Norway collects data and make statistics, but challenges regarding this collection (e.g. do not refer to differences in different industries, and do not have any experience from the new system).
- We will therefore expect that the companies use their own data for the new DB, but meaningful data on this will not be available for many years.

We note that in order to take account for individual risk, the transition intensities should be estimated individually, and should naturally be dependent of 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.
Concluding remarks

- We have surveyed the new Norwegian disability benefit (DB) system, in particular the difference in regulation concerning private and public pension schemes.

- We believe the main motivation for the new regulation, creating a more flexible system for combining DB and work is a good idea, but creates challenges for the pricing of the DB, i.e.:
  - 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.

- Suggested a multistate Markov model for pricing and reserving, extensions possible, but lack of relevant data a challenge.

