Helping Long Term Care Coverage via Differential on Mortality?

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Abstract This paper seeks to help draw up a flexible design for pensions for dependents that can help reduce the costs of their situation while precisely increasing the amounts that they receive. The way is a system for the automatic adjustment of pension benefits taking into account the dependency level of the beneficiary. Thus, pension benefits increase in the new state as the cost of care increases. To that end we propose a model with a benefit correction factor that includes a specific mortality rate for dependents, thus enabling us to adapt benefits to the profile of each beneficiary. Special attention is paid to mortality rates among dependents as the determinant for the correction factor. This new model has many practical implications, as it can be implemented without much difficulty and indeed at no additional cost. This enables coverage to be universal in private capitalization-type pension plans. However, it does increase the cost of social security systems funded on a pay-as-you-go basis.

Keywords Elderly · Pension evaluation · Sustainability factor · Pension schemes

1 Long Term Care as a Coverage

In the field of private insurance, a distinction is drawn between natural coverage and long-term care [1, 2], with problems of dependency being alleviated with products suited to demand. The combination of different benefits [3] simplifies matters and

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includes an important aspect of retirement pensions, which is usually dealt, with separately: an acknowledgement of the potential need for dependency care, resulting in higher benefits being paid when the beneficiary is dependent. This approach is proposed by [4] and [5] as a combination of retirement income and higher income on becoming dependent.

2 Differential on Mortality

We assume that when the beneficiary becomes a high-level dependent at age x the amount of the benefit is automatically increased by a percentage λ_x^d, which helps to pay for dependency care services. This factor λ_x^d is applied when a beneficiary becomes a dependent then only the probability of death while classed as dependent remains to be determined. The probabilities of suffering from high-level dependency have been determined in various studies [6], on the basis of which life expectancy figures for individuals in the severest states of dependency have been calculated.

On that basis, [7] determine the probabilities of death among high-level in Spain. They find that the gap between excess mortality and general mortality rates decreases from age 96 onwards. To reflect this effect they include a mixed correction factor: an additive modification, and a multiplicative correction:

$$
{}^{d}q_x^m = \begin{cases} q_x^m + \frac{\delta}{1+\gamma^{x_i - x}} \forall x_i < 95 \\ q_x^m \cdot (1+\beta) + \frac{\delta}{1+\gamma^{x_i - x}} \forall x_i \geq 95 \end{cases}
$$

δ: Maximum value to be incorporated in line with the age at which figures converge asymptotically.
γ: Slope factor.
x_i: Age at the point of inflection where the curve changes from convex to concave.
β: Multiplicative correction factor applied to general mortality.

Once the probability of death of severe and high-level dependents is known, the correction factor to be applied is the following:

$$
\lambda_x^d = \frac{\sum_{h=x}^{w} {}_{h-x}p_x^m}{\sum_{h=x}^{w} {}_{h-x}{}^{d}p_x^m} = \frac{e_x^m}{{}^{d}e_x^m}
$$

$\sum_{h=x}^{w} {}_{h-x}p_x^m$: Sum of probabilities of being alive from age x to h years more.
$\sum_{h=x}^{w} {}_{h-x}{}^{d}p_x^m$: Sum of probabilities of a dependent to be alive from age x to $x+h$.

3 An Application to Spain

Based on PERM/F-2000P dynamic tables for Spain fitted to HID 98-01 statistics for France with the values obtained by [7] for δ, γ, β & x_i with an ordinary least squares procedure for the gross values for high-level dependency estimated for Spain (Table 1):

The mortality rates obtained for high-level dependents are markedly higher than general mortality rates from age 35 onwards (Figs. 1, 2 and 3).

The application of these calculations to high-level dependents in line with their year of birth shows pension increases of practically threefold in all cases. At younger ages the correction factor has values of just over one, in sharp contrast with the values found from retirement age onwards.

Table 1 Excess mortality factors for dependents

Factors	Men	Women
δ	0.245	0.165
γ	1.135	1.09
x_i	62.50	58.61
β	0.1142	0.0962

Source: [7]

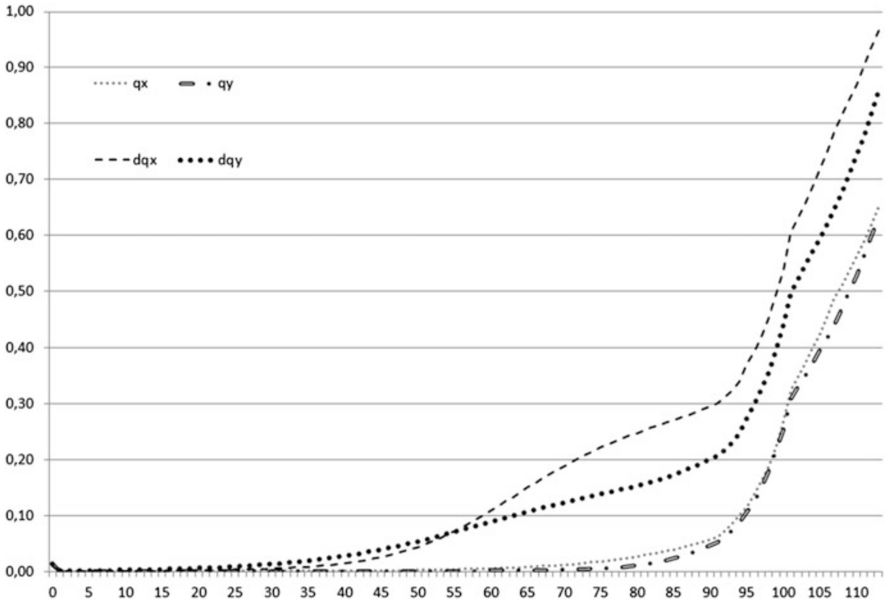

Fig. 1 Mortality among dependents and general mortality rates per age and gender

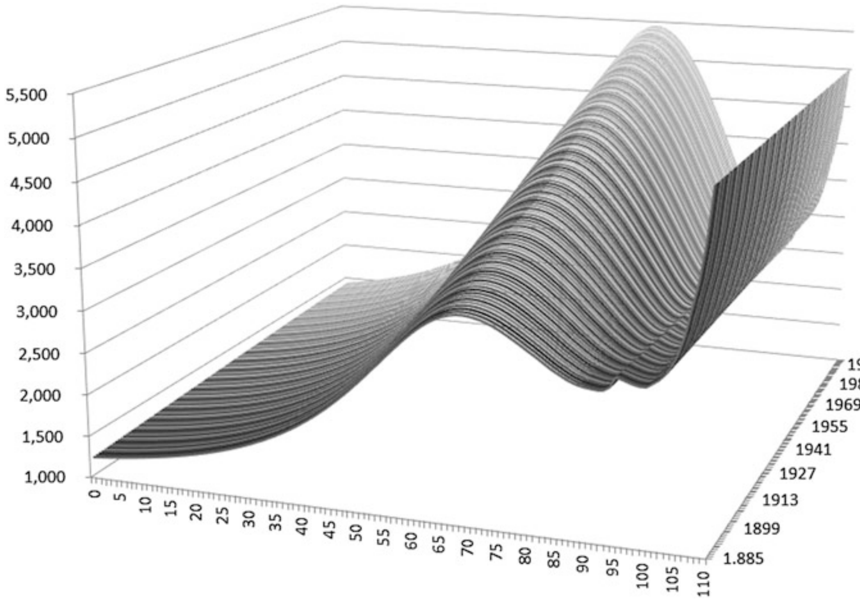

Fig. 2 Correction factor with actuarial income for dependency broken down by age and generation (men). Source: Own work

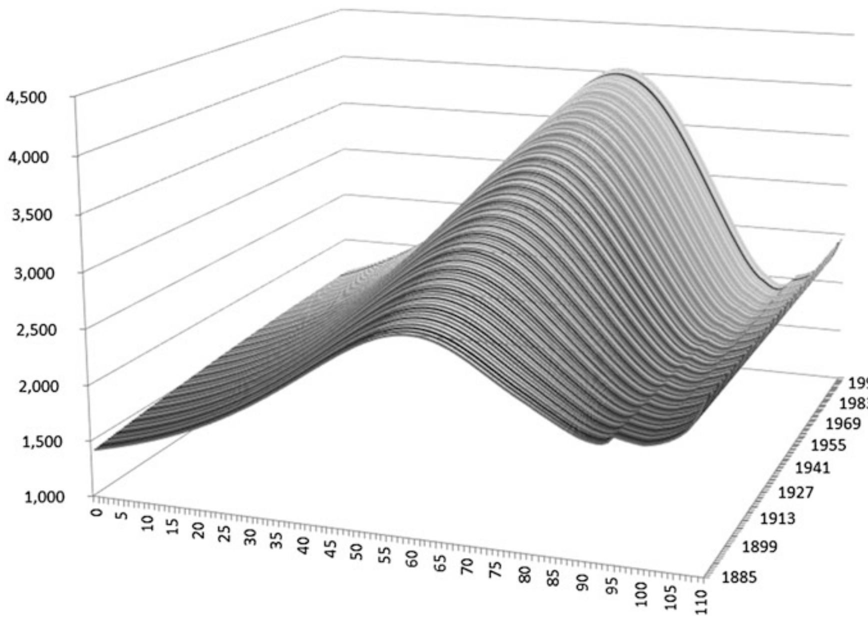

Fig. 3 Correction factor with actuarial income for dependency broken down by age and generation (women). Source: Own work

4 Conclusions

The model has many practical implications, and can be implemented with little difficulty and no additional cost, in capitalization-based private pension schemes. However, if this factor were to be included in a public, defined-benefit system such as the pay-as-you-go social security system it would lead to a direct increase in cost equivalent to the amount of the increase in benefits. Contributions would not increase, so initially a deficit would result.

Finally, public and private dependency coverage schemes alike seek to help meet the costs that dependency entails for individuals, but without necessarily providing all the resources needed to meet demands for coverage. Individuals are provided with a set of measures that can meet their needs as dependents in full: services, use of residence and financial benefits, thus providing higher levels of satisfaction and better monitoring of dependents.

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