

# Optimal consumption, portfolio, and long term insurance in a dynamic framework

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## Background

Demographic changes, ageing in particular, as well as related public expenditure on health and long-term care (LTC), are a source of concern in many European countries. Public health and LTC expenditure have already been growing over the last decades in all European countries and are expected to increase even more, given the significant improvements in life expectancy.

As a result, expenditure on LTC is expected to rise from 1.3 per cent of GDP in 2007 to 2.9 per cent in 2050 (Lipszyc et al. (2012); De la Maisonneuve and Martins (2014)). While demographic ageing impacts on public expenditure have been widely analyzed and assessed in depth, much less attention has been paid to the economic consequences of demographic changes for individuals and households. In OECD countries, the risk of needing long-term care (LTC) is likely a very important driver of savings because it is insured to a lesser extent than medical expenses and it is expensive when paid out-of-pocket.

The increasing demand for health and LTC and the financial vulnerability of older persons might create a significant financial burden for the elderly if related costs are not covered by social protection systems. In particular, out-of-pocket (OOP) expenditures occurring on account of deficits in financial protection might have severe impacts, given their regressive nature, and thus

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increase inequities between the rich and the poor (Scheil-Adlung (2012)). Given the increasing budget pressure faced by governments in developed countries, voluntary private policies covering LTC will become more and more important in the next decades. However, long term care OOP expenditure is still mainly financed with saving (Palumbo (1999); Brown and Finkelstein (2011); Beuren (2017); Crainich et al. (2017)). Thus, understanding the relationship between saving and the purchase of voluntary LTC private insurance is crucial to assess individuals' portfolio choices and future needs for LTC public coverage. Specifically, we aim to assess the financial consequences of LTC expenditure for the elderly, in particular the impact of this expenditure on consumption, assets allocation and wealth accumulation when a private insurance policy is available. Our model allows to explain the evolution of LTC private insurance during the individual life cycle and the reasons leading the individual to decide against a 100% LTC insurance

## Objectives

We study the effects of LTC private insurance coverage on individual choices.

Our model aim at answering some important questions:

- what are the individual strategies to reduce the financial risks related to LTC expenses?
- which type of age profile has this insurance? Do older individuals increase or reduce their insurance level?
- What is the role of regulation and public health insurance? In particular, does public coverage crowd out private instruments? Is a mandate to purchase a minimum level of private coverage welfare improving? Does the total coverage for LTC expenditure increase or decrease in the presence of some form of compulsory public insurance?

## Methods

We solve the problem of an agent who maximizes the expected discounted (HARA) utility of his inter-temporal consumption over a stochastic life time horizon (mortality risk). The agent can invest on a complete and arbitrage free financial market, and faces a health risk which takes the form of a jump Poisson process. If the negative health shock realizes, recovery is not possible and a constant and permanent flow of resources must be devoted to LTC expenditure. The agent may hedge against this risk by subscribing an insurance contract, on which we assume there exists a mark-up, and that reimburses a given fraction of the amount to be paid for LTC in every period. We find a closed form solution for the optimal consumption, the optimal portfolio, and the optimal insurance hedge.

Similarly to Pauly (1990), we interpret LTC insurance as a contract reimbursing to the policy holder an annuity that covers (part of) LTC expenditure if a permanent impairment of everyday life activities realizes. In our model many subsequent permanent health shocks may realize and cumulate in the long run so that we can study the evolution of private coverage purchase and how private coverage for LTC interacts with saving and dissaving.

## Results

The preliminary results of the model show that individuals may reduce their (marginal) insurance coverage through their life time. More interestingly, when reducing private coverage for LTC they simultaneously dissave. Specifically, the model predicts substitutability between private coverage and saving as a mean to finance LTC expenditure, and also show that such substitutability increases with the individual's age. Finally, we show that, in response to a health shock requiring LTC, the individual uses its assets to keep up the level of consumption, in other words, it prefers to smooth consumption patterns rather than wealth, in line with the Life-Cycle Model.

## References

- Beuren, J., 2017. Long term care needs: implications for savings, welfare and public policy.
- Brown, J. R., Finkelstein, A., December 2011. Insuring long-term care in the united states. *Journal of Economic Perspectives* 25 (4), 119–42.
- Crainich, D., Eeckhoudt, L., Courtois, O. L., 2017. Health and portfolio choices: A diffidence approach. *European Journal of Operational Research* 259 (1), 273 – 279.
- De la Maisonneuve, C., Martins, J. O., 2014. The future of health and long-term care spending. *OECD Journal: Economic Studies* 1.  
URL [https://www.oecd-ilibrary.org/content/paper/eco\\_studies](https://www.oecd-ilibrary.org/content/paper/eco_studies) — 2014 – 5jz0v44s66nw
- Lipszyc, B., Sail, E., Xavier, A., Nov. 2012. Long-term care: need, use and expenditure in the EU-27. *European Economy - Economic Papers* 2008 - 2015 469, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.
- Palumbo, M. G., 1999. Uncertain medical expenses and precautionary saving near the end of the life cycle. *The Review of Economic Studies* 66 (2), 395–421.
- Pauly, M. V., 1990. The rational nonpurchase of long-term-care insurance. *Journal of Political Economy* 98 (1), 153–168.

Scheil-Adlung, X.; Bonan, J., May 2012. Can the european elderly afford the financial burden of health and long-term care? assessing impacts and policy implications. ESS Paper Series 31, Scheil-Adlung, X.; Bonan, J.