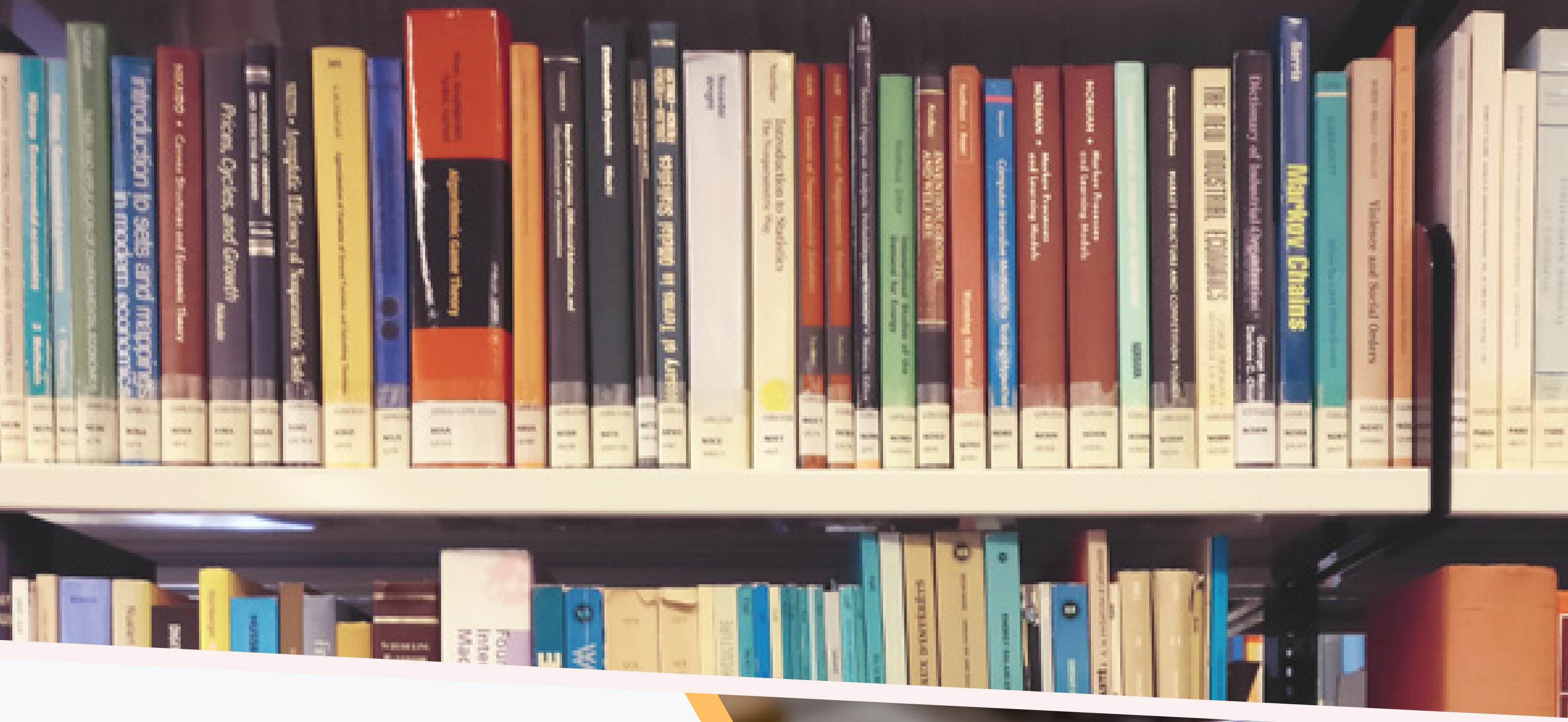

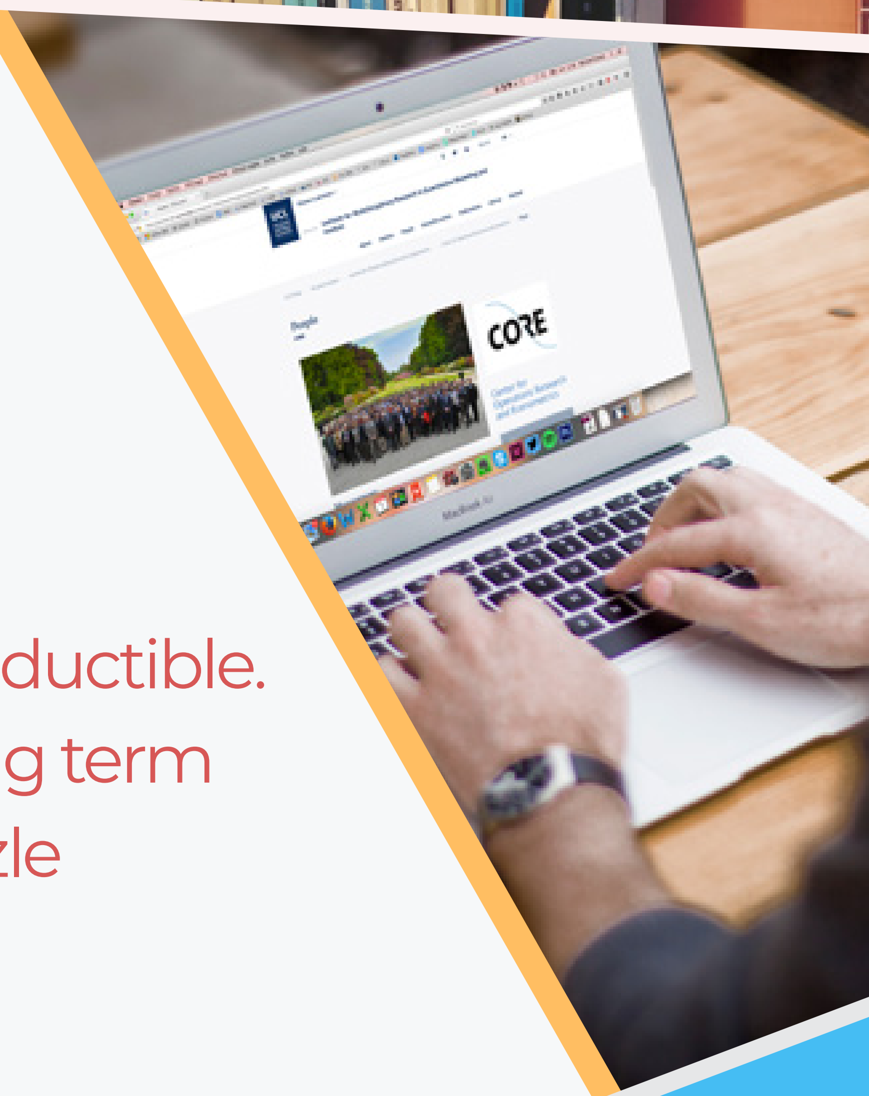

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Insurance with a deductible. A way out of the long term care insurance puzzle*

Justina Klimaviciute† and Pierre Pestieau‡

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Abstract

Long-term care (LTC) is one of the largest uninsured risks facing the elderly. In this paper, we first survey the standard causes of what has been dubbed the LTC insurance puzzle and then suggest that a possible way out of this puzzle is to make the reimbursement formula less threatening for those who fear a too long period of dependence. We adopt a reimbursement formula resting on Arrow's theorem of the deductible, i.e. that it is optimal to focus insurance coverage on the states with largest expenditures. It implies full self-insurance for the first years of dependency followed by full insurance thereafter. We show that this result remains at work with ex post moral hazard.

Keywords: long-term care insurance, deductible, Arrow's theorem, reimbursement rule

JEL codes: G22, I13, J14

1 Introduction.

Due to the ageing process, the rise in long term care (LTC) needs constitutes a major challenge of the twenty-first century. Nowadays, the number of persons in need of LTC is substantial. According to Frank (2012), in 2010 nearly 10 million Americans required ongoing help through LTC. This number is expected to grow to reach 15 million by 2020. Similarly in Europe, the number of persons in need of LTC is expected to grow from 27 million in 2013 to 35 million by year 2060 (see EC 2015).

The expected rise in the number of persons in need of LTC raises the question of the provision of care. As stressed by Norton (2000), about two thirds of LTC is generally provided by informal caregivers (mainly the family, i.e. spouses,

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daughters and step-daughters). Recent figures in Frank (2012) show that about 80% of dependent individuals in the U.S. receive informal care from relatives and friends. The remaining of LTC is provided formally, that is, through services that are paid on the market. Formal care can be provided either at the dependent's home, or in an institution (care centers or nursing homes). Besides the family, the state provides formal care as well as, but to lesser extent, the market.

The question of the funding of formal LTC will become increasingly important in the future, where it is expected that the role of informal LTC provision will decrease and it is not clear that the state will be able to fill the gap. The implication of this is that financial risks associated with meeting LTC needs will grow and therefore the development of mechanisms for absorbing these risks will gain in importance.

Given that each person has a large probability to enter a nursing home when becoming old and given the large costs related to LTC, one would expect that private LTC insurance markets expand, in order to insure individuals against the - quite likely - substantial costs of LTC. However, although markets for private LTC insurance exist in most countries, these remain thin. This thinness of the market is coined the "long-term care insurance puzzle".[1] For various reasons, lying both on the demand side and on the supply side of that market only a small fraction of the population buys LTC private insurance. One can thus hardly rely only on the development of private LTC insurance markets to fund the cost of LTC.

The goal of this paper is first to survey the standard causes of the LTC insurance puzzle and to suggest as a possible way out to make the reimbursement formula less threatening for those who fear a too long period of dependence.

2 LTC insurance puzzle.

As noted in Brown and Finkelstein (2011), the need for long-term care is one of the largest uninsured risks facing the elderly and understanding the reasons for non-insurance of this risk is a first-order issue in improving household welfare and the economic and health security of elderly people. Even though the risk of dependence is well defined and concerns the majority of people, the long-term care insurance market is surprisingly thin. This phenomenon that has been labeled the LTC insurance puzzle has received a lot of attention from researchers who try to explain it.

2.1 Standard explanation

One may distinguish among explanatory factors those that pertain to the supply side of the market and those that belong to the demand side. On the supply side, one finds the price level and the reimbursement formula. There are indeed

[1] On this, see Cutler (1993), Brown and Finkelstein (2007, 2008, 2009, 2011) and Pestieau and Ponthiere (2011).

supply-side limitations on the provision of LTC insurance. Prices are quite high. Cutler (1996) discusses the difficulties of insuring inter-temporal risk. Brown and Finkelstein (2007) document evidence of adverse selection. Financial frictions and statutory regulations affect the profitability of insurance companies and may explain the relatively high loading costs they apply. The reimbursement formulas are also not attractive for those who fear to incur a too long period of dependence, as we show in the next section.

There may also be significant demand-side reasons explaining the low holdings of LTC insurance. The first reason is the crowding out from government provided care (Brown and Finkelstein (2008)) with means tested programs having effects on both low wealth and affluent households. In the US, Medicaid has a depressing effect on LTC insurance purchase. Medicaid is means-tested, which imposes a high implicit tax on self-insurance via saving and it is a secondary payer, which generates a high implicit tax on the purchase of LTC insurance.

Family solidarity can be another reason for the LTC insurance puzzle. Pauly (1990) argues that an explanation for the low LTC insurance demand could be intra-family moral hazard: parents might refuse to buy insurance since it reduces children's incentives to provide care.

There are also alternative explanations of the puzzle that involve some kind of behavioral imperfections and are thus fundamentally different from the previous ones. Individual choices – either to purchase or not to purchase LTC insurance – are not necessarily based on the actual risk of old-age dependency, but, rather, reveal how elderly persons perceive the risk of old-age dependency, which is something different. Such a gap between the actual and the perceived level of risk can be due to ignorance but also to some lack of self-control.[2]

Finally, let us note that old-age dependency is, by its very nature, a singular event in one's life, and, as a consequence, the insurance against LTC costs cannot be treated as a standard insurance (e.g. against domestic fires). Dementia, like death, generates anxiety, and this may imply the possibility of denial. Refusal to face up to the reality of dependence may help explain an inadequate purchase of LTC insurance .

2.2 LTC insurance benefits payment.

In this paper, we argue that a key factor explaining the LTC insurance puzzle might be the unpalatable formulas of benefits payments. There exist two main formulas as to how benefits are paid out. They depend on whether the benefits are paid on a cash indemnity basis or a reimbursement basis.

Reimbursement LTC insurance policies pay for the actual daily (or monthly) cost of care. For example, if your selected daily benefit is \$100 and the actual cost of care you receive is \$90, your LTC insurance policy will pay \$90. Any excess daily benefit remains for your future care needs. If your care cost is \$120 daily, you will receive \$100 per day and you must pay the excess amount. A

[2]Boyer et al. (2018) show on the basis of a survey conducted in Canada that ignorance explains part of the non take up of LTC insurance.

potential advantage to this type of payout is that your benefits can last for a longer period of time, if your actual cost of care is less than your daily benefit. One of the problems of such a formula is that it comprises a ceiling in the amount of the benefits and in the length of the reimbursement. In other words, it does not cover the big risk that a long and severe dependence implies.

Cash indemnity LTC insurance policies pay your selected daily benefit as soon as you qualify for benefits. It pays cash benefit regardless of your actual expenses. This allows you to use the payment for anything or anyone (caregiver can even be a family member), even anywhere in the world. Generally, the benefit is relatively low but may last forever like an annuity. It then does cover the dependent for all his/her lifetime but it is not sufficient to cover the needs of severe dependence.

The two countries that are known to have a somehow developed LTC insurance market are the US and France. In the US the reimbursement formula tended to prevail up to recently. Now most policies are of the cash indemnity type within a limited period. In France the lifetime cash indemnity is the rule.

Note that the relevancy of those reimbursement rules just discussed depends on the assumptions made. The reimbursement formula rests on the existence of moral hazard that is standard in health care. To obtain the flat lump sum compensation, one needs family solidarity as in Cremer et al. (2016) and Klimaviciute (2017).

As it is clear, neither formula meets the concern of those who fear to turn penniless or even to depend on their children because of too long and severe disability. In that respect, according to a recent US study[3], slightly more than half (52%) of individuals turning age 65 will have a high need of LTC over their remaining lifetime (see Table 1). This need on average is expected to last about two years, although for 26% of individuals, it will last longer. Women tend to be more dependent than men. 17.8% of them will have a period of severe dependence of 5 and more years. Moreover, there is an inverse relationship between length of need and income. For example, whereas 22% of individuals in the highest income quintile will require care for more than two years, for individuals in the lowest quintile, the proportion increases to 31%.

[3] Nordman (2018).

Table 1: Length of dependence. People 65+

	% with LTC Need	Average Years of High LTC Need	Distribution of need (% of cohort)				
			None	< 1 Year	1-1.99 Years	2-4.99 Years	>= 5 Years
Men	46.7	1.5	53.3	18.4	7.4	11.1	9.8
Women	57.5	2.5	42.5	19.4	8.1	12.3	17.8

Source: Nordman (2018)

3 Reimbursement formula with a deductible.

Quite clearly there exists a sizable fraction of the elderly who may incur very large LTC costs that would force them to sell all their assets and prevent them from bequeathing any of them. Their concern is not met by current LTC practices. It could be dealt with by a system in which individuals' contributions to their LTC costs are capped at a certain amount after which individuals would be fully covered for all further expenditures. Such a system was proposed in the UK by the Dilnot Commission (2011). The Dilnot Commission describes the rationale for this suggestion in terms of the benefits of insurance. While only a fraction of the dependents (in their estimates around a third) would reach the proposed cap of about £35,000, everyone would benefit from knowing that if they ended up in the position of facing these costs, they would be covered, removing the fear and uncertainty of the current system.

We argue that this proposed formula could be justified as an efficient insurance policy, applying Arrow's (1963) theorem on insurance deductibles. This theorem goes as follows: "If an insurance company is willing to offer any insurance policy against loss desired by the buyer at a premium which depends only on the policy's actuarial value, then the policy chosen by a risk-averting buyer will take the form of 100% coverage above a deductible minimum" (Arrow, 1963). Arrow was addressing the issue of health care. Compared to health care the random and costly nature of LTC introduces two specific dimensions: the risk of becoming dependent and the length of dependency. Drèze et al. (2016) show that Arrow's theorem holds in the form of full self-insurance for the first years of dependency followed by full insurance thereafter. Following Drèze and Schokkaert (2013), we now extend this proposition to account for ex post moral hazard. But first we lay out the model without moral hazard.

3.1 The model without moral hazard

We will use the subscript s ($s = 0, ..., S$) to denote the state of nature. We will assume that the severity of dependence increases with s, which can be viewed in a dynamic setting as reflecting the number of years of dependence. We start with what can be viewed as a stock of autonomy A that can be depleted by a state dependent variable loss of autonomy denoted by L_s and improved by an amount of care denoted by D_s. The level of autonomy in state s is thus given by $m_s = A - L_s + D_s$. We assume that $m_s < A$; in other words, care cannot totally recoup full autonomy. The state of nature in which the individual does not suffer from any disability is given by $s = 0$. Care can be expressed in monetary terms and implies expenditure that is subtracted from the resources of the individual in the relevant state of nature. Given an initial income w, the consumption in state s can be given by $c_s = w - D_s(1 - \alpha_s) - \pi - b_s$, where b_s stands for bequests, α_s $(0 \leq \alpha_s \leq 1)$ for the rate of insurance (or reimbursement) and π for the insurance premium. The coinsurance (or copay) rate is given by 1-α_s. Naturally in state 0, we have $c_0 = w - \pi - b_0$.

The problem facing the individual is to choose the insurance rate, the level of LTC and the bequest in each state of nature that maximize:

$$V(\alpha, D, b) = \sum p_s \left[u(w - D_s(1 - \alpha_s) - \pi - b_s) + H\left(A - L_s + D_s\right) + v(b_s)\right]$$

subject to the revenue constraint

$$\pi = (1 + \lambda) \sum p_s \alpha_s D_s.$$

$u(\cdot)$, $v(\cdot)$, and $H(\cdot)$ are strictly concave utility functions and $\lambda > 0$ is the loading factor.

We now write the three FOCs (with $s = 0, ..., S$).

$$\frac{\delta V}{\delta \alpha_s} = p_s D_s \left[u'(c_s) - (1 + \lambda)\Delta\right] \leq 0, \ \alpha_s \frac{\delta V}{\delta \alpha_s} = 0 \tag{1}$$

$$\left[H'(m_s) - u'(c_s)(1 - \alpha_s)\right] - \Delta \alpha_s (1 + \lambda) = 0 \tag{2}$$

$$u'(c_s) = v'(b_s) \tag{3}$$

where

$$\Delta = \sum p_t u'(c_t),$$

that is independent of the state of nature.

Combining (1), (2) and (3) leads to

$$u'(c_s) = v'(b_s) = H'(m_s) \tag{4}$$

Also from (1), we see that for low values of s, $\alpha_s = 0$ and for higher values of s, we have $\alpha_s > 0$ and thus

$$u'(c_s) = (1 + \lambda)\Delta$$

Denoting the threshold value of s as $\bar{s}$, we have that for $s > \bar{s}$,

$$(1-\alpha_s)D_s \equiv F,$$

where F is a constant and stands for the deductible.

We can now write the following expression for reimbursement rate:

$$\alpha_s = max\left[0, \frac{D_s - F}{D_s}\right]$$

Further, we have:

$$u'\left(w - \pi - F - b*\right) = v'(b*) = (1+\lambda)\,\Delta$$

for $s > \bar{s}$. The term $b*$ is constant. In other words, the individual is sure to leave at least $b*$ to his offspring even in case of a long and severe dependency. For $s < \bar{s}$, $b > b*$.

If LTC is smaller than F, expenses are fully borne by the individual. Note that if $\lambda = 0$, we have full insurance with uniform consumption and bequests.

3.2 The model with moral hazard.

Assume now that D_s is chosen after observing the state of nature, namely after the dependence is detected regardless of the time. The problem for the individual is then to choose both D_s and b_s that maximize:

$$U_s = u(w - (1-\alpha_s)D_s - \pi - b_s) + v(b_s) + H(A - L_s + D_s)$$

This yields the following FOCs

$$u'(c_s)(1-\alpha_s) = H'(m_s) \tag{5}$$

and

$$u'(c_s) = v'(b_s) \tag{6}$$

From those two conditions, we obtain the demand functions $D(\alpha_s)$ and $b(\alpha_s)$. For further purpose we define the elasticity of LTC with respect to α_s as:

$$\eta_s = \frac{dD_s}{d\alpha_s}\frac{\alpha_s}{D_s}.$$

Comparing equations (5) and (6) to (4), we see that the marginal utility of consumption is still equal to that of b but larger than that of LTC. In other words, the marginal rate of substitution between LTC and c is smaller than one in all states with $\alpha_s > 0$.

The optimal problem now amounts to maximizing:

$$V(\alpha) = \sum p_s\left[u(w - \pi - (1-\alpha_s)\,D_s - b_s) + H(A - L_s + D_s) + v(b_s)\right]$$

subject to

$$\pi = (1+\lambda) \sum p_s \alpha_s D_s.$$

and both demand functions $D(\alpha_s)$ and $b(\alpha_s)$. We thus obtain:

$$\frac{\delta V}{\delta \alpha_s} = p_s \left[u'(c_s) \left(D_s - (1-\alpha_s) \frac{\delta D_s}{\delta \alpha_s} \right) + H'(m_s) \frac{\delta D_s}{\delta \alpha_s} \right] - (1+\lambda) p_s \left[D_s + \alpha_s \frac{\delta D_s}{\delta \alpha_s} \right] \Delta \leq 0.$$

with

$$\frac{\delta V}{\delta \alpha_s} \alpha_s = 0.$$

The derivative $\frac{\delta b_s}{\delta \alpha_s}$ disappeared from this expression thanks to the use of the envelope theorem.

We can simplify the above expression as:

$$\frac{\delta V}{\delta \alpha_s} = p_s D_s \left[u'(c_s) - (1+\lambda)(1+\eta_s) \sum p_t u'(c_t) \right] \leq 0$$

We can thus derive the optimal LTC insurance in case of moral hazard: Either $\alpha_s = 0$, or

$$u'(c_s) = (1+\lambda)(1+\eta_s) \sum p_t u'(c_t)$$

If we assume that the demand elasticity of LTC is invariant to the length of dependency, which is plausible, we are back to Arrow's theorem with a deductible that is higher than in the absence of moral hazard.

3.3 Deductible in social insurance.

The deductible result can also be applied to the design of an optimal social insurance. Klimaviciute and Pestieau (2018a) analyze a setting with a non-linear scheme of income taxation and LTC insurance and explore how the optimal deductible amounts should be designed for individuals with different productivities. They show that the optimal deductibles for high- and low-productivity individuals are not always the same and that their comparison depends on absolute risk aversion and on whether both individual types have the same or different LTC needs. While in Klimaviciute and Pestieau (2018a) all individuals are assumed to have the same probability of dependence, Klimaviciute and Pestieau (2018b) explore the case when this probability is negatively correlated with income. In addition, they focus on a more restricted public policy with linear instruments and the same level of deductible for all individual types. They show that the negative correlation between income and dependence probability makes the case for social insurance stronger and might result in the optimal level of deductible being equal to zero or even negative.

4 Concluding comments.

In our aging societies, individuals face significant late-in-life risks with an increasing need for LTC. Yet, they hold little LTC insurance. In this paper we have argued that one prominent reason for what is coined the LTC insurance puzzle is the type of compensations that is offered by the insurers. They do not cover individuals against the large risk of a too long period of dependence that would impoverish them and prevent them from bequeathing. We propose the adoption of insurance policies with deductibles, namely totally covering the dependant beyond a certain number of months. The puzzle, if any, is why we do not find such a product on current LTC insurance markets.

In this paper we assume that for each state of nature, the needs of LTC are well defined. If instead we posit that those needs may differ across individuals according to a characteristic that is not observable, we face a different and more complex problem that has been dealt with by Blomqvist (1997), who solved through optimal control theory a model of non-linear health insurance. His model has been extended to the LTC case by Cremer et al. (2016).

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5 Appendix: Model with several periods.

In this appendix, we show why the states of nature used in the above model can be viewed as periods of dependency. We do so using a simple example. Assume 3 periods consisting of the three sequences:

- AAA, with probability $p_0 = (1-\pi)^2$
- AAD, with $p_1 = (1-\pi)\pi$
- ADD with $p_2 = \pi$

where A stands for autonomy and D for dependence. We assume that the probability of dependence is constant and that the state of dependance is irreversible. We want to show that the above model of one period and different states of nature is a reduced form of a multiple period model. We assume no time preference and a zero rate of interest and constant income per period equal to y. People can freely save (s in the first period and σ in the second period).

We can now write the lifetime utilities corresponding to these 3 sequences.

$$U_0 = u(w-\pi-s_0) + u(y-\pi+s_0-\sigma_0) + u\left(y-\pi+\sigma_0\right) + 3H(A)$$

$$U_1 = u(w-\pi-s_1)+u(y-\pi+s_1-\sigma_1)+u\left(y-\pi-\left(1-\alpha_1\right)D_1+\sigma_1\right)+2H(A)+H(A-L+D_1)$$

$$\begin{aligned} U_2 &= u(w-\pi-s_2) + u(y-\pi+s_2-\sigma_2-\left(1-\alpha_2\right)D_2) \\ &+u\left(y-\pi-\left(1-\alpha_2\right)D_2+\sigma_2\right) + H(A) + 2H(A-L+D_2) \end{aligned}$$