

Fair Long-Term Care Insurance

Marie-Louise LEROUX, ESG UQAM
Pierre PESTIEAU, Université de Liège, CORE and PSE.
Gregory PONTIERE, Université Paris 12, PSE and IUF

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Motivation (1)

- Because of aging, increasingly large proportion of the population falls into dependence, i.e. they would be unable to carry out basic daily activities such as eating, washing, etc.
⇒ Increase in long-term care (LTC) expenses.
- Provision of LTC is extremely costly. What about the financing of these expenses? Informal (family), formal (private or public insurance)?
- *LTCI puzzle*: the private share of LTC spending is on average 15% (OECD, 2011)
- Instead, we may want to favour the involvement of the State, which could intervene in the form of a *social LTC insurance*.
→ the "fifth pillar" of the Welfare State.

⇒ **What would be a fair social LTC insurance?**

Motivation (2)

The goal of this paper is to examine the construction of a fair social LTC insurance. But 2 traps to avoid...

- *The treatment of heterogeneity in preferences within the population, depending on whether one is dependent or autonomous.*
Finkelstein et al (2013): Marginal utility of consumption is higher under good health than under bad health.
How should we treat dependent individuals in comparison with healthy individuals?
→ Answers are very different depending on the social welfare criterion retained.
- *The definition of the population under study.* Tempting to focus only on the elderly population... but the fairness of a social LTC insurance must be evaluated taking into account the *entire* population, and the associated distribution in terms of lifetime well-being.

Motivation (3)

What would be a *fair* treatment of individuals with unequal health and longevity outcomes?

- Utilitarianism faces major difficulties when the population is heterogenous in terms of characteristics (longevity and health) and of preferences.
Equalization of marginal utilities has no sense \Rightarrow inequalities in welfare which are difficult to justify .
- From Fleurbaey (2008), 2 fairness principles:
 - ▶ Principle of Compensation: if inequalities are due to circumstances (i.e. factors outside individual control), they should be abolished by governments.
 - ▶ Principle of Liberal Reward: if inequalities are due to efforts (i.e. factors under individual control), they should be left unchanged.

Motivation (4)

- Part of these inequalities in health and longevity are due to circumstances
 - ▶ *Christensen et al (2006)*: the genetic background accounts for between 1/4 and 1/3 of longevity inequalities within a cohort.
 - ▶ *Farrer et al (1997)*: show a statistical association between risk of alzheimer and genetic background.
- Part of these inequalities are due to lifestyles, but related to socialization and to social environment.
 - ▶ *Contoyannis and Jones (2004) and Balia and Jones (2008)*: 25 % of inequalities in lifetime due to lifestyles (eating behavior, drinking behavior, sleeping patterns).
 - ▶ *Jusot et al. (2013)*: efforts contributes between 6.1% and 8.1% to inequalities in health (against 44.5% or 46.4% for circumstances).

⇒ We propose to apply the Principle of compensation and to rely on the *ex post* egalitarian social welfare criterion, which gives priority to the worst-off in realized terms individual.

This paper...

develops a simple lifecycle model where a population with different labor productivity faces differentiated risks about life duration, as well as risks of dependence at the old age.

- We compare the laissez-faire equilibrium with the utilitarian social optimum
- We derive the the *ex post* egalitarian optimum, which gives priority to the worst-off in realized terms individual.
- We develop a second-best analysis, where a government has only four (uniform) policy instruments: a linear tax on labor earnings, a linear tax on financial products, a pension benefit and a LTC allowance.
→ We compare Utilitarian and Egalitarian results.
- Illustration through a calibration section for France.

- **On the design of optimal LTC social insurance**

Jousten et al (2005), Pestieau and Sato (2008), Cremer and Roeder (2013), Cremer and Pestieau (2014).

- **On compensation for unequal lifetimes**

Fleurbaey and Ponthiere (2013); Fleurbaey, Leroux, Ponthiere (2014); Fleurbaey, Leroux, Pestieau, Ponthiere (2016); Leroux and Ponthiere (2018); Fleurbaey, Leroux, Pestieau, Ponthiere, Zuber (WP).

→ Use consumption, prevention, labor and retirement profiles, bequests to reduce inequalities between short-lived and long-lived.

→ Here, we include an intermediate life status, i.e. dependence at the old age.

The Model (1)

- **2 period-model:** young and old adulthood.
Probability π_i to survive and in second period, probability p_i to become dependent.
- In case of dependency, agents bear additional exogenous LTC expenditures equal to an amount S .
- **Heterogeneity:** type- i individuals in proportion n_i , differ in productivity, $w_H > w_L$,
which, in turn, implies $\pi_H > \pi_L$ and $\pi_H p_H < \pi_L p_L$.
- **Preferences:**

$$EU_i = u(c_i) + \pi_i(1 - p_i)u(d_i) + \pi_i p_i v(b_i)$$

$$\text{with } b_i = z_i - S$$

The Model (2)

- Disutility of working at the young age for a duration l_i reduces consumption c_i by an amount $e(l_i)$, with $e(0) = 0$, $e'(l_i) > 0$ and $e''(l_i) > 0$.
- **Regarding state-dependent utilities of consumption:** $u'(\cdot) > 0$, $u''(\cdot) < 0$; $v'(\cdot) > 0$, $v''(\cdot) < 0$
- *Being dependent at the old age causes a utility loss with respect to being healthy:*

$$u(d_i) > v(d_i) \quad \forall d_i$$

- *Marginal utility in good health is higher than in bad health:*

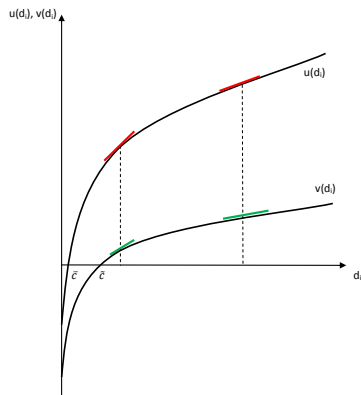
$$u'(d_i) > v'(d_i) \quad \forall d_i$$

- *2 consumption thresholds:* $\bar{c} > 0$ such that $u(\bar{c}) = 0$; and $\tilde{c} > 0$ such that $v(\tilde{c}) = 0 \Rightarrow \tilde{c} > \bar{c}$.

NB: In the rest of paper, we assume an *advanced economy*.

The Model (3)

State-dependent utility functions $u(\cdot)$ and $v(\cdot)$:



The laissez-faire equilibrium (1)

- Fair annuity and LTCI markets.
- **Individuals' problem:**

$$\begin{aligned} \max_{\ell_i, s_i, a_i} u(w_i \ell_i - e(\ell_i) - s_i - a_i) &+ \pi_i(1 - p_i)u\left(\frac{s_i}{\pi_i}\right) \\ &+ \pi_i p_i v\left(\frac{s_i}{\pi_i} + \frac{a_i}{\pi_i p_i} - S\right) \end{aligned}$$

- Rearranged FOCs lead to

$$\begin{aligned} u'(c_i) &= u'(d_i) = v'(b_i) \\ \Rightarrow c_i &= d_i > b_i \text{ and } \frac{a_i}{\pi_i p_i} < S. \end{aligned}$$

- $w_i = e'(\ell_i)$ so that $\ell_H > \ell_L$ for all $w_H > w_L$.

The laissez-faire equilibrium (2)

- Fleurbaey (2010): gives priority to the comparison of *ex-post* well-being situations, on the ground that it is based on informed preferences.
→ Focus on realized longevity and realized health status rather than on life expectancy (under good health).
- **Ex-post inequalities:**

$$\begin{aligned}U^{i,SL} &= u(c_i) \\U^{i,LL,D} &= u(c_i) + v(b_i) \\U^{i,LL,A} &= u(c_i) + u(d_i)\end{aligned}$$

- In advanced economies:

$$U^{H,SL} < U^{H,LL,D} < U^{H,LL,A} \quad \text{and} \quad U^{L,SL} < U^{L,LL,D} < U^{L,LL,A}$$

⇒ strong inequalities depending on productivity, realized longevity and health status.

The utilitarian optimum (1)

In the light of these (arbitrary) welfare inequalities, what should be the optimal design of a social LTCI?

- The social planner's problem:

$$\begin{aligned} \max_{\ell_i, x_i, d_i, b_i} \quad & \sum n_i [u(c_i) + \pi_i(1 - p_i)u(d_i) + \pi_i p_i v(b_i)] \\ \text{s.t.} \quad & \sum n_i \ell_i w_i = \sum n_i (x_i + \pi_i(1 - p_i)d_i + \pi_i p_i(b_i + S)) \end{aligned}$$

with $c_i = x_i - e(\ell_i)$.

- FOCs lead to $e'(\ell_i) = w_i \Rightarrow \ell_H^u > \ell_L^u$,
and $u'(c_i) = u'(d_i) = v'(b_i) = \mu$ so that

$$\begin{aligned} c_H = c_L = d_H = d_L = c^u \\ b_H = b_L = b^u. \end{aligned}$$

and $c^u > b^u$. \rightarrow **Efficiency argument.**

The utilitarian optimum (2)

- Ex post utilities are:

$$\begin{aligned}U^{SL} &= u(c^u) \\U^{LL,D} &= u(c^u) + v(b^u) \\U^{LL,A} &= 2u(c^u)\end{aligned}$$

→ independent of productivity type.

- In wealthy economies,

$$U^{H,SL} = U^{L,SL} < U^{H,LL,D} = U^{L,LL,D} < U^{H,LL,A} = U^{L,LL,A}.$$

⇒ Only the inequalities regarding differences in productivity are neutralized. Health and longevity inequalities are still present.

⇒ **Is it fair that these welfare inequalities remain?**

The ex post egalitarian optimum (1)

- *Ex post* well-being inequalities in our economy are due to pure circumstances.

Under the *Principle of Compensation* (Fleurbaey and Maniquet 2004, Fleurbaey 2008), individuals who are disadvantaged either because of a short life, or because of a bad health status at the old age, should be compensated.

→ The SW criterion will give priority to the worst off in realized terms.

- The problem of the *ex post* egalitarian social planner can be written as:

$$\begin{aligned} \max_{\ell_i, x_i, d_i, b_i} \quad & \min \left\{ \begin{array}{l} u(c_L), u(c_H), u(c_L) + v(b_L), u(c_H) + v(b_H), \\ u(c_L) + u(d_L), u(c_H) + u(d_H) \end{array} \right\} \\ \text{s.t.} \quad & \sum n_i \ell_i w_i = \sum n_i (x_i + \pi_i(1 - p_i)d_i + \pi_i p_i(b_i + S)) \end{aligned}$$

The ex post egalitarian optimum (2)

- The problem can be rewritten as

$$\begin{aligned} \max_{\ell_i, x_i, d_i, b_i} \quad & u(x_L - e(\ell_L)) \\ \text{s.t.} \quad & \sum n_i \ell_i w_i = \sum n_i (x_i + \pi_i(1 - p_i)d_i + \pi_i p_i(b_i + S)) \\ \text{s.t.} \quad & u(c_L) = u(c_H) \\ \text{s.t.} \quad & u(c_i) + u(d_i) = u(c_i) \\ \text{s.t.} \quad & u(c_i) + v(b_i) = u(c_i) \end{aligned}$$

- At optimum, we have: $\ell_H > \ell_L$ and

$$c_L = c_H = c^e > b_L = b_H = b^e = \tilde{c} > d_L = d_H = d^e = \bar{c}$$

- **opposite of Utilitarianism:**

- decreasing consumptions over the lifecycle, and in old age, they are set to their minimum level.
- higher consumption for dependent than for healthy individuals.

- No welfare inequality remains: $U^{i,SL} = U^{i,LL,A} = U^{i,LL,D} \forall i$.

Second-Best analysis (1)

- Government does not observe productivities, w_i and has a restricted number of fiscal instruments.
- **4 uniform instruments:**
 - ① a flat tax on earnings τ ,
 - ② a tax on aggregate saving (annuities + LTCL) σ ,
 - ③ a flat pension ψ ,
 - ④ a flat LTC benefit g .
- Still actuarially fair annuity and long term care insurance markets.
- **Individuals decisions:** $s_i^* = s(\psi, g, \tau, \sigma; w_i)$, $a_i^* = a(\psi, g, \tau, \sigma; w_i)$ and $\ell_i^*(\tau; w_i)$ with

$$\begin{aligned}u'(c_i)(1 + \sigma) &= u'(d_i) = v'(b_i), \\ e'(\ell_i) &= w_i(1 - \tau)\end{aligned}$$

Second-Best analysis (2)

- **Utilitarian optimum**

$$\begin{aligned} \max_{\tau, \sigma, \psi, g} W = & \sum n_i \left[u(\ell_i^* w_i (1 - \tau) - (a_i^* + s_i^*) (1 + \sigma) - e(\ell_i^*)) \right. \\ & + \pi_i (1 - p_i) u\left(\frac{s_i^*}{\pi_i} + \psi\right) \\ & \left. + \pi_i p_i v\left(\frac{s_i^*}{\pi_i} + \frac{a_i^*}{\pi_i p_i} + \psi + g - S\right) \right] \\ \text{s.t.} \quad & \sum n_i [\tau w_i \ell_i^* + \sigma (a_i^* + s_i^*) - \pi_i \psi - \pi_i p_i g] \geq 0 \end{aligned}$$

Second-Best analysis (4)

Proposition

At the second-best utilitarian optimum with limited instruments, we obtain the following results:

- *For a given level of government resources, a uniform LTC benefit should be given priority over a uniform pension benefit.*
- *The tax on labor to finance a pension benefit can be positive or negative depending on the size of $cov(u'(d), wl) < 0$ and of $cov(u'(d), \pi) < 0$.*
- *The tax on labor to finance a LTC benefit is most likely to be positive.*

Intuition: Utilitarianism redistributes resources from type-*H* to type-*L*. The LTC benefit is *an inferior good*, consumed first by the dependent elderly (who are mostly type-*L* agents with $\pi_{HPH} < \pi_{LP_L}$).

Second-Best analysis (3)

- **Egalitarian optimum**

$$\begin{aligned} \max_{\tau, \sigma, \psi, g} \quad & u(\ell_i^* w_i (1 - \tau) - (a_i^* + s_i^*)(1 + \sigma) - e(\ell_i^*)) \\ \text{s.t.} \quad & \sum_i n_i [\tau \ell_i^* w_i + (a_i^* + s_i^*)\sigma - \pi_i \psi - \pi_i p_i g] \geq 0 \end{aligned}$$

together with the egalitarian constraints: for all $i = \{H, L\}$,

$$\begin{aligned} \frac{s_i^*}{\pi_i} + \psi &= \bar{c} \\ \frac{s_i^*}{\pi_i} + \frac{a_i^*}{\pi_i p_i} + \psi + g - S &= \tilde{c} \end{aligned}$$

Second-Best analysis (4)

Egalitarian optimum

- Since s_i^* and a_i^* depend on w_i , the only way to satisfy the above egalitarian constraints consists in
 - 1 taxing away both savings and LTC insurance: $\sigma = 100\%$
 - 2 give $\psi = \bar{c}$ to the healthy pensioners
 - 3 $g = \tilde{c} - \bar{c} + S$ to the disabled pensioners.
- τ obtained from the government budget constraint.
- Still, agents supply different labour l_i^* depending on w_i so that:

$$\begin{aligned}U^{i,SL} &= u(l_i^* w_i (1 - \tau) - e(l_i^*)), \\U^{i,LL,D} &= u(l_i^* w_i (1 - \tau) - e(l_i^*)) + v(\tilde{c}), \\U^{i,LL,A} &= u(l_i^* w_i (1 - \tau) - e(l_i^*)) + u(\bar{c}).\end{aligned}$$

⇒ no inequality remains between agents with different length of life or health status, for a given productivity type i .

Second-Best analysis (5)

Comparison Egalitarian & Utilitarian optima:

- *In the utilitarian case*, priority is given to the dependent individuals through a positive LTC benefit (at the expense of the healthy retirees).
... *In the egalitarian case*, priority is given to the short-lived (at the expense of both the healthy and the dependent retirees who are given just enough resources to have a zero utility level in the old age).
- The *tax on financial products* is likely to be lower at the utilitarian optimum
- The *fiscal resources* necessary to finance $g + \psi$ at the egalitarian optimum are likely to be *lower* than at the utilitarian optimum.
 - 1 *Resource argument*: old-age consumptions are minimum, \tilde{c} and \bar{c} .
 - 2 *Compensation argument*: increase welfare in the first-period, which is lived by every agent, by decreasing first-period taxation.

Numerical Exercise (1) - Based on France.

- **Socio-economic variables**

- ▶ *INSEE (2015)*: $w_H = 3176 > w_L = 1681$ with $n_H = 0.4$ and $n_L = 0.6$.
- ▶ *Cambois et al. (2011)*: $\pi_H = 0.46 > \pi_L = 0.41$ and $p_H = 0.6 < p_L = 0.67$.

- **Utility functions:**

$$u(x) = \log(x) + \alpha, \quad v(x) = \delta \log(x) + \beta$$

- ▶ *Becker et al (2005)*: 300€ is considered as the minimum annual income that would make the individual indifferent between survival and death $\Rightarrow \bar{c} = 300/12 = 25$ and $\Rightarrow \alpha = -3.218$.
- ▶ *Finkelstein et al. (2013)*: $v'(x) = \delta u'(x)$ with $\delta \in [0.75, 0.9]$. We set $\delta = 0.9$.
- ▶ *Ferrer-i-Carbonell and Van praag (2001)*: heart diseases is equivalent to a decrease in income equal to 47% $\Rightarrow \beta = -3.180$.
- ▶ $v(\tilde{c}) = 0.9 \text{Log}[\tilde{c}] - 3.18035 = 0 \Rightarrow \tilde{c} = 34.25$.

- **Average monthly cost of a nursing home: $S = 1949\text{€}$**

Numerical Exercise (2)

	SB utilitarian	SB ex post egalitarian
τ^*	42.43 %	24.12 %
σ^*	9.24 %	100.00 %
ψ^*	1060.82	25.00
g^*	1883.09	1958.25
total revenue	974.42	549.70
$U^{L,SL}$	3.66	3.93
$U^{H,SL}$	4.16	4.57
$U^{L,LL,D}$	6.69	3.93
$U^{H,LL,D}$	7.52	4.57
$U^{L,LL,A}$	7.40	3.93
$U^{H,LL,A}$	8.26	4.57

Table 2: Numerical results

→ The structure of the fiscal system depends very much on the social criterion.

Numerical Exercise (3)

To summarize: The structure of the fiscal system depends very much on the social criterion.

In comparison to utilitarianism, the ex post egalitarian second-best solution involves:

- 1 lower overall fiscal revenues
- 2 a lower tax rate on labor earnings,
- 3 a higher tax rate on aggregate savings,
- 4 lower pension benefits,
- 5 higher LTC benefits.

Conclusion

What would be a fair LTC social insurance?

- We develop a simple lifecycle model with risk about the duration of life and about the health status at the old age (autonomy or dependence), while allowing for state-dependent preferences at the old age.
→ The optimal fiscal system and LTC social insurance strongly depend on the social welfare criterion.
- Utilitarianism tends to penalize the short-lived and the elderly dependent (*efficiency argument*)
...while Egalitarianism does justice to the worst-offs and seeks to *compensate* individuals for the inequalities they are not responsible of.
- In the end, how a society treats its dependent elderly and short-lived is crucial
→ normative foundations have to be taken into account in the design of public LTC policies.