"Long-term care: the state, the market and the family"

Pestieau, Pierre ; Sato, Motohiro

ABSTRACT

In this paper we study the optimal design of a long term care policy in a setting that includes three types of care to dependent parents: public nursing, private nursing and assistance in time by children. Private nursing can be financed either by financial aid from children or by private insurance. The social planner can use a number of instruments: public nursing, subsidy to aiding children, subsidy to private insurance premiums, all financed by a flat tax on earnings.

CITE THIS VERSION

Long-Term Care: the State, the Market and the Family

By Pierre Pestieau† and Motohiro Sato‡

CREPP, University of Liege; CORE, PSE and CEPR ‡Hitotsubashi University

Final version received 4 October 2006.

In this paper we study the optimal design of a long term care policy in a setting that includes three types of care to dependent parents: public nursing, private nursing and assistance in time by children. Private nursing can be financed either by financial aid from children or by private insurance. The social planner can use a number of instruments: public nursing, subsidy to aiding children, subsidy to private insurance premiums, all financed by a flat tax on earnings.

INTRODUCTION

The ongoing demographic ageing process represents a major challenge from both a social and an economic point of view. This is because ageing can be felt across the board. It touches all age groups. One often cited example is the provision of long-term care insurance for the ‘oldest old’, whether under the form of a private or a public system. Only a handful of countries have set up such long-term care insurance systems, also sometimes called ‘dependency insurance’. The relative scarcity of such systems and the difficulties of organizing them are intrinsically linked to some conceptual problems. This might explain why the theoretical literature on long-term care policy is rather scanty, and why it has had to assume away a number of real-life features.

This paper studies a society consisting of a number of parent–child pairs. In this model parents are not altruistic, while children are altruistic in that they are ready to help their parents as soon as they lose their autonomy. In the absence of a government policy and insurance market, dependent parents can be helped in two ways: either their children can give them some financial aid, or they can provide them with assistance in time. Children have different productivities, and parents have a uniform endowment (wealth, pension); this latter assumption is dropped later. While market productivity varies, productivity in terms of help to dependent parents is the same for all. As a consequence, children of dependent parents are divided into three groups: (i) the low market productivity group, who help their parents with time, (ii) the middle-income children, who let their parents resort to private insurance, and (iii) the high-income children, who provide financial assistance. Before knowing their own health status, parents can give part of their endowment to their children so that in case of bad health they can get better assistance. Alternatively, parents can purchase a private long-term care insurance.

We discuss public policy in terms of four instruments: a uniform payroll tax, a subsidy for children providing assistance (in kind or in cash), a subsidy on private insurance premiums, and institutionalized nursing assistance. Parents who receive this latter benefit do not receive any help from their children. It thus appears that dependent parents whose children are at the middle-income level tend either to go to these nursing homes or to purchase private insurance.

What we are ultimately interested in is the optimal policy chosen by a utilitarian government. We therefore analyse the comparative statics of our model; in particular, we study the effect of policy variables and exogenous variables on the segmentation of our society into three groups. When we introduce heterogeneity in parents’ endowment, we...
show that the optimal policy may involve self-selecting them such that, with children in the middle-income range, rich parents purchase private insurance and poor parents resort to public nursing.

Quite clearly, such a model does not include all the aspects of long-term care, and it rests on a number of assumptions. Some are pretty realistic; others are made to keep the analysis within reasonable limits. The main heterogeneity comes from differences in market productivity. Other characteristics, such as altruism and productivity in assistance to dependent parents, are equal for all. The instruments are a payroll tax, a lump-sum subsidy to assisting children, an ad valorem subsidy to private insurance, and public nursing homes. These restrictive policies are adopted for the sake of simplicity. As could be expected, the choice of private insurance and public nursing is dichotomous, and is influenced by the relative efficiency of the two schemes.

In an earlier paper (Pestieau and Sato 2007) we considered only a tax-transfer policy. The present paper extends this work in two different directions, (i) allowing for the possibility of public nursing homes and for the existence of private insurance and (ii) introducing heterogeneous endowments of parents. We show that public nursing home and private insurance cater to parents with children of middle productivity, while low-wage children prefer to help their parents with time and high-wage children prefer to assist them with financial transfers.

To avoid confusion, it is important to distinguish among the types of resources that dependent parents can count on, and among the types of provider of long-term care. Assistance in time implies that the dependent parents stay home and are taken care of by their child. Assistance in terms of cash or private insurance benefits allows the dependent parents to stay home and get some nursing service, or to go into a private nursing home. The case of public nursing home is self-explanatory.

The scant evidence regarding upward intergenerational transfers from middle-age children to their elderly parents includes the study by Sloan et al. (2002), who use data from the Health and Retirement Study (HRS). They show that a child with a high wage tends to transfer money rather than time, in contrast to a child receiving a low wage. On the basis of the same data, Zissimopoulos (2001) shows that, as children’s wages increase, time tends to be substituted for money. Ioannides and Kan (2000), using data from the Panel Study of Income Dynamics (PSID), reach the same conclusion. It appears that children’s transfers (of both money and time) are determined by their parents’ needs and their own resources. High-income children and those living far away tend to make transfers in money rather than time.

As mentioned above, there is little theoretical work devoted to optimal long-term care policy. Jousten et al. (2005) focus on the moral hazard problem arising when children’s altruism is not observable. There is of course the seminal paper by Pauly (1990), who argues that the demand for long-term care insurance suffers from a particular moral hazard, in that children may decide to diminish their care-giving in favour of low-cost care provided by third parties, such as a public long-term care programme. More recently, Zweifel and Struwe (1998) have shown, in a principal–agent setting, that the existence of long-term care insurance coverage diminishes the amount of care provided by the major ‘natural’ care-givers. The rationale for this result is fairly straightforward: in the face of long-term care coverage, children earning low wages are less constrained to spare wealth by providing care themselves. Anticipating this moral hazard, parents demand low levels of long-term care insurance. Pauly (1996) puts forward a provocative argument: long-term care insurance would largely protect bequests for non-poor, non-needy heirs. This is
an interesting point that cannot be addressed here, as we assume away the bequest motive.

The rest of the paper is organized as follows. The next section presents the basic model along with the laissez-faire solution with private insurance. Section II introduces the public policy tools and some comparative-statics results. Section III discusses the design of optimal tax transfer and nursing homes policy. It deals with the choice between providing public nursing and subsidizing a private long-term care insurance. This choice is shown to depend on the relative efficiency of the two schemes, as well as on the parent’s wealth. A final section concludes.

I. THE LAISSEZ-FAIRE

The basic setting

We consider a society consisting of two-person families: a parent who may become dependent and require some sort of long-term care, and his child. Families differ in terms of the health of parents and the market productivity of children denoted $w$; the latter has a density $f(w)$, a distribution $F(w)$ and support $(w_{-},w_{+})$. They may also be different with respect to the resources of the parent $I$. The basic model assumes just one value of $I$. In Section III(c), we consider that $I$ takes two values, $I_{H}$ and $I_{L}$, with $I_{H}>I_{L}$. Ex ante, parents face a uniform probability $p$ of losing their autonomy. If this occurs, children may help their parents either in time or in cash, depending on the difference between their market productivity and their nursing productivity. The latter is assumed to be the same for all and is denoted $w_{0}$. Children have a limited altruism, which is triggered by the dependence of their parents and is restricted to long-term care as modelled below. Parents are not altruistic. Before their health status is revealed, they can either leave some gift $G$ to their children, or purchase a private long-term care insurance. We assume that parents who purchase a private insurance ex ante do not expect assistance from their children in case of a loss of autonomy. In other words, family solidarity and market insurance are mutually exclusive.

We can now write a parent’s expected utility as

$$V = v(d) - \pi(D - H) = v(d) + \pi H,$$

where $d$ is consumption, $D$ the utility loss of autonomy and $H$ the help he gets from his child or the compensation he receives from the private insurance company. For reasons of simplicity, $D$ is normalized to 0. Denoting $m$ the help received from children and $a$ the private insurance compensation, we have that in case of assistance from children $d = I - G$ and $H(m)$ and in case of private insurance $d = I - \pi a \theta$ and $H(a)$, where $H'>0$ and $H''<0$, and where $\theta > 1$ expresses the fact that the private insurance, is not actuarially fair. The market price of long-term care is normalized to 1. We can expect that when long-term care private insurance is very inefficient (large $\theta$) no parent will ever buy private insurance.

Turning to the children, their altruism is limited to helping their parents in case of dependency, and this help is restricted to long-term care either in time $hw_{0}$ or in cash $s$. Using superscripts $D$ and $N$ for dependency and autonomy and denoting their consumption by $c$, we write their utility as

$$U^{D} = u(c^{D}) + \beta H$$

and

$$U^{N} = u(c^{N}),$$
where \( c^D = w(1 - h) + G - s \), \( c^N = w + G \) and \( \beta \leq 1 \) is a factor of altruism. Total labour endowment is 1, market labour supply is \( (1 - h) \) and \( h \) is the time provided to dependent parents; \( s \) is the amount of financial aid that allows children to purchase nursing services on behalf of their dependent parents. We assume perfect substitutability between these two forms of assistance; in other words,

\[
H(m) = H(w_0h + s).
\]

With this assumption, \( h \) and \( s \) become mutually exclusive with \( h \) chosen by children for whom \( w < w_0 \) and \( s \) by those where \( w \geq w_0 \).

**Parents’ and children’s choices**

It is time to look at the sequence of choices within the family. In our setting the parent is the first to make a move, before knowing whether or not he needs long-term care (LTC). He knows his child’s productivity \( w \) and how much he can expect from her in case of need. On that basis the parent chooses to leave his child \( G \) or to buy a private LTC insurance. (Note that if \( I \) is too low he can be unable to do either.) The next stage is the loss of autonomy with probability \( \pi \), which is followed by a move from either the child or the insurance company.

Given the complexity of the problem at hand, we adopt logarithmic functions; this clearly restricts the scope of our analysis, but can yield intuitive and manageable results.\(^4\)

**The child’s problem** We consider a child who may have received a gift \( G \). If her parent is healthy, she does not help him regardless of their respective consumption. If her parent needs LTC, she will help him given that he does not fall back on a private insurance. A child with productivity \( w \) then maximizes the following expression:

\[
U^D = \ln(w(1 - h) + G - s) + \beta \ln(w_0h + s),
\]

where \( G \geq 0 \). We have the following optimal levels of either \( h \) or \( s \):

For \( w < w_0 \):
\[
\begin{align*}
   h^* &= \frac{\beta}{1 + \beta} \frac{w + G}{w} \quad \text{if } G \leq \frac{w}{\beta} \\
   s^* &= 0 \\
   h^* &= 1 \quad \text{if } G > \frac{w}{\beta} \\
   s^* &= 0
\end{align*}
\]

For \( w > w_0 \):
\[
\begin{align*}
   h^* &= 0 \\
   s^* &= \frac{\beta}{1 + \beta} (w + G)
\end{align*}
\]

Throughout this paper we assume that \( w_0 < w \) to cover the two types of assistance. We see that \( G \) has a stimulating effect on either \( h \) or \( s \). When \( G = 0 \), \( h^* < 1 \) which is intuitive. Given \( G \), the profile of \( m = w_0h \) or \( s \) is represented in Figure 1. For the time being, private insurance is assumed away. In the following we use the subscripts 1 and 2 to refer to the range of values for which \( h^* > 0 \), \( s^* = 0 \) and \( h^* = 1 \), \( s^* > 0 \).

**The parent’s problem without private insurance** Given the expected behaviour of his child, each parent can decide to leave her a certain fraction of his endowment \( I \). To be precise, the parent aims at maximizing

\[
U^P = \ln(w(1 - h) + G - s)
\]
\[ V = \ln(I - G) + \pi \ln m^*, \]

where \( m^* = w_0 h^* \) for \( w \leq w_0 \) and \( m^* = s^* \) for \( w > w_0 \). When making his choice, he takes into account the effect of \( G \) on \( m^* \). There is no parental altruism. With \( \pi = 0 \) there would be no such a gift. This gift is not strategic; it acts as an insurance premium for LTC within the family. The first-order condition for \( G \) is given by

\[
G^*_1 = \max \left[ 0, \min \left( \frac{\pi I - w}{1 + \pi}, \frac{w}{\beta} \right) \right]
\]

and

\[
G^*_2 = \max \left[ 0, \frac{\pi I - w}{1 + \pi} \right].
\]

There are three reasons for not having such an *inter vivos* gift. First, a private LTC insurance may be more attractive, as we see below. Second, the parent may be too poor: \( I < w/\pi \). Third, the child may be very productive. Indeed, it appears that \( G^* > 0 \) implies \( I > w \); in other words, the parent is wealthier than his child. The inequality \( I > w \) is plausible if we interpret \( I \) as accumulated wealth. Up to Section III(c) we make this assumption.\(^5\)

A child with \( w \in [w_-, w] \) devotes all her available time to her dependent parent where \( w = \pi \beta I/(1 + \pi + \beta) \). A child with \( w \in [w, w_0] \) chooses \( h^* < 1 \) and still receives a positive gift. For \( w \in [w_0, \bar{w}] \), \( s^* > 0 \) and \( G^*_2 > 0 \) where \( w = \pi I \). Finally, for \( w \in [\bar{w}, \bar{w}+] \), \( s^* > 0 \) and \( G^*_2 = 0 \); children have such high earnings that a gift has no effect on the level of \( s^* \).

We represent the profile of \( G^*_i \) and of \( V_i \), the utility of the parent, in Figures 2 and 3, respectively.

Given \( I \), by substituting the optimal value of \( G^*_i \) in the parent utility function, we have:

\[
\begin{align*}
V_1 &= \ln(I - w/\beta) + \pi \ln w \\
V_1 &= (1 + \pi) \ln (w + 1) - \pi \ln w - B + \pi \ln \frac{\beta \pi w_0}{1 + \beta} \quad \text{for } w \in [w_-, w] \\
V_2 &= (1 + \pi) \ln (w + I) - B + \pi \ln \frac{\beta \pi w_0}{1 + \beta} \quad \text{for } w \in [w_0, \bar{w}] \\
V_2 &= \pi \ln w + \ln I + \pi \ln \frac{\beta}{1 + \beta} \quad \text{for } w \in [\bar{w}, \bar{w}+] \\
\end{align*}
\]

where \( B = (1 + \pi) \ln (1 + \pi) \).
The parent’s problem with private insurance  Up to now we have distinguished between two regimes depending on $w \leq w_0$. We now consider the possibility of a third and intermediate regime, in which parents purchase a private LTC insurance. This regime is denoted by the subscript 3. Why intermediate? It is clear from Figures 1 and 3 that the child’s assistance is relatively low for productivity close to $w_0$, and it is possible that the parent finds it more attractive to purchase a private insurance. This intermediate regime 3 concerns parents of children with $w \in [\hat{w}_1, \hat{w}_2]$ where $\hat{w}_1 < w_0 < \hat{w}_2$.

If a parent purchases a private insurance policy, he chooses the value of $a$ that maximizes

$$V_3 = \ln \left( \frac{I - \pi a \theta}{\theta} \right) + \pi \ln a.$$

This yields an optimal compensation $a^* = \frac{I}{\theta}[1 + \pi]$, and the parent utility becomes

$$V_3 = (1 + \pi) \ln I - \pi \ln \theta - B.$$

We assume that private insurance and filial assistance are mutually exclusive. In other words, by purchasing a private insurance, parents free their children from the moral obligation of helping them in case of a loss of their autonomy.
To obtain the values of $\hat{w}_1$ and $\hat{w}_2$ (assumed to exist), one respectively solves the following equations:

$$V_3 = V_1(\hat{w}_1) \quad \text{and} \quad V_3 = V_2(\hat{w}_2).$$

Explicitly, this gives

$$V_3 - V_1(\hat{w}_1) = (1 + \pi)\left[\ln I - \ln (\hat{w}_1 + I)\right] + \pi \ln \frac{\hat{w}_1}{w_0} - \pi \ln \frac{\beta \pi}{1 + \beta} = 0$$

and

$$V_3 - V_2(\hat{w}_2) = (1 + \pi)\left[\ln I - \ln (\hat{w}_2 + I)\right] - \pi \ln \theta - \pi \ln \frac{\beta \pi}{1 + \beta} = 0.$$

Figure 4 presents the value of $V$ along the $w$-axis, divided into three regimes: assistance in time, private insurance, and assistance in cash. It is clear that, for high values of $\theta$ (namely for very inefficient markets), the horizontal line $V_3$ could be below the minimum of $V_1$ and $V_2$.

We can summarize the content of this section in a proposition.

**Proposition 1.** If there is no LTC insurance market, or if parents have few resources, the assistance of low-wage children to their dependent parents takes the form of service and declines with earning capacity up to the point where this capacity is equal to children’s nursing productivity is assumed to the same for all. From that threshold point, children’s assistance becomes financial and increases with their earning capacity. Not only the level of assistance, but also the expected utility of parents takes a U-shape along the axis of market wages. If there is a LTC market insurance and parents have sufficient resources, there is an intermediate range of children’s wages for which the parents prefer to purchase a LTC insurance rather than rely on their children’s assistance. Outside this range, parents may make some gift to their children to ensure that, should they need LTC, they will benefit from generous filial assistance.

In our model we have assumed that private insurance and family solidarity are mutually exclusive, i.e. that the parent who has purchased a private insurance and left no gift *ex ante* will not count on his child’s help when he becomes dependent. One might consider that the child, if she is altruistic enough, might provide some assistance anyway.
We now give the condition under which the child indeed has no motive to do so.

Focusing on the child with productivity \( \hat{w}_2 \), her utility is
\[
u^D = u(\hat{w}_2 - s) + \beta H(a^* + s).
\]

One obtains
\[
\frac{d\nu^D}{ds}\bigg|_{s=0} = \frac{1}{\hat{w}_2} + \beta \frac{\theta(1 + \pi)}{I} \leq 0
\]
if \( \hat{w}_2 \leq |\beta\theta(1+\pi)| \). This is a sufficient condition for not having \( m \) and \( a \) simultaneously.

II. PUBLIC POLICY: COMPARATIVE STATICS

We now introduce four public policy instruments: (i) an income tax of rate \( t \) levied on children’s earnings, (ii) a flat subsidy \( s \) for children assisting their dependent parents, (iii) a public nursing home of quality \( g \), and (iv) an ad valorem subsidy \( \tau \) on a private insurance premium. Introducing the government adds an additional stage to the sequence of decisions.

- **Stage 1.** The social planner chooses \( t, \sigma, g \) and \( \tau \) that maximize the sum of utilities of both parents and children.
- **Stage 2.** Each parent chooses whether or not to leave some \( G \) and if so, how much. If he anticipates that, given \( t, \sigma, g \) and \( \tau \), he would be better off in case of bad health in a public nursing home or with a private insurance, he does not leave anything to his child. Otherwise, he expects to receive either \( h \) or \( s \) from his child and *ex ante* may leave him part of his wealth.
- **Stage 3.** The child helps her unhealthy parent by comparing the alternatives—assistance in either time or cash—unless the parent has chosen a private LTC insurance or has decided to go to a public nursing home.

We now proceed backwardly by looking first at the child’s choice, then at the parent’s decision, and finally (in Section III) at the determination of optimal public policy. Throughout this section we keep using the Cobb–Douglas specification and we consider a single value of \( I \).

(a) The child’s choice

A child with productivity \( w \) and with a dependent parent expecting her assistance chooses \( s \) or \( h \) in order to maximize
\[
U^D = \ln(\omega(1 - h) + G + \sigma - s) + \beta \ln(w_0h + s),
\]
where \( \omega = w(1 - t). \) For further use, \( \omega_0 = w_0(1 - t). \) As shown above, we have to distinguish two regimes. For \( w \leq w_0, \) \( s = 0 \) and
\[
h^* = \frac{\beta}{1 + \beta} \left(1 + \frac{G + \sigma}{w}\right) \quad \text{if} \quad G + \sigma \leq w/\beta
\]
\[
h^* = 1 \quad \text{if} \quad G + \sigma > w/\beta.
\]
For \( \omega > \omega_0, \) \( h = 0 \) and \( s^* = \beta(\omega + G + \sigma)/(1 + \beta). \)
It is interesting to note that the child can end up spending all her available time (here equal to 1) taking care of her dependent parent if both parental gift and subsidy exceed her net-of-tax wage divided by the factor of altruism.

We can also write the consumption of the child with a dependent parent:
\[ c^D = \frac{1}{1+\beta} (\omega + G + \sigma). \]

This is the same for the two regimes. The consumption of the child when her parent is healthy is trivial, as it involves no choice:
\[ c^N = \omega + G. \]

(b) The parent’s choice without a nursing home and private insurance

Given the above supply function \( h^*(w,\sigma + G) \) and \( s^*(\omega + \sigma + G) \), the parent of a child with productivity \( w \) maximizes
\[ V_1 = (I - G) + \pi \ln(w_0 h^*) \]
or
\[ V_2 = \ln(I - G) + \pi \ln s^*. \]

This yields two supply functions, \( G^*_1 \) and \( G^*_2 \), depending on whether \( \omega \leq \omega_0 \):
\[ G^*_1 = \max \left[ 0, \min \left( \frac{\pi I - \omega - \sigma}{1+\pi}, \frac{\omega}{\beta} - \sigma \right) \right] \]
and
\[ G^*_2 = \max \left[ 0, \frac{\pi I - \omega - \sigma}{1+\pi} \right]. \]

We also have two indirect utility functions:
\[ V^*_1 = V_1^* \left( \omega, \sigma + G \right) \]
and
\[ V^*_2 = V_2^* \left( \omega, \sigma + G \right). \]

The values of \( \mu(= \omega_0 b \text{ or } s) \), \( G \) and \( V \) can be represented as seen above along the \( w \)-axis. With the logarithmic functions, and assuming away private insurance and public nursing, the utility of the parent first declines and then increases as shown in Figure 5.

When \( G^* > 0 \), \( c < d \). For \( w < w < \tilde{w} \),
\[ G^* = G^*_1 = G^*_2 = \frac{\pi I - w - G}{1+\pi}, \]
yielding
\[ c^D_1 = c^D_2 = \frac{\pi w + \sigma + I}{1+\beta} < d = I - G^* = \frac{w + \sigma + I}{1+\beta}. \]
We also have

\[ d > e^N = \omega + G = \frac{\pi(I + \omega) - \sigma}{1 + \pi}. \]

This result is useful in order to understand the equity implications of intergenerational transfers.

We have adopted a value of \( I \) sufficiently high to lead to some exchange-based gift \( G \) or to buy some private insurance. We also consider below the case where \( I \) is rather low—so low in fact that there is no gift or LTC private insurance.

\( \text{(c) The parent’s choice with private insurance and public nursing home} \)

As we have seen, the parent can opt for a public nursing home or for private insurance in case of bad health instead of relying on family assistance. This choice concerns parents with children having a productivity around \( w_0 \). Depending on the available instruments, the parent will choose either one or the other. In other terms, the choice is dichotomous.

We have seen that private insurance is chosen when children have a productivity belonging to interval \( (\hat{w}_1, \hat{w}_2) \). With a subsidy equal to \( \tau \), the optimal value of \( a \) is given by

\[ a^* = \frac{I}{\theta(1 + \pi)(1 - \tau)} \]

and the parent’s utility in regime 3 is

\[ V_3 = (1 + \pi) \ln I - \pi \ln \theta(1 - \tau) - B. \]

The threshold values \( \hat{w}_1 \) and \( \hat{w}_2 \) are given by \( V_3 = V_1^*((1 - \tau) \hat{w}_1, \sigma) \) and \( V_3 = V_2^*((1 - \tau) \hat{w}_2, \sigma) \). For a low value of \( \theta \) or a low value of \( I \), the interval \( (\hat{w}_1, \hat{w}_2) \) can be empty.

By the equation

\[ V_3(\tau) = V_i^*((1 - \tau) \hat{w}_i, \sigma), \quad i = 1, 2, \]

\( \text{FIGURE 5. Parents’ utility with public nursing.} \)
we have
\[ \hat{w}_1 = \frac{1}{1-t} \varphi_1 \left( \sigma, \tau \right) \quad \text{and} \quad \hat{w}_2 = \frac{1}{1-t} \varphi_2 \left( \sigma, \tau \right), \]
which yields
\[ n_3 = F(\hat{w}_2) - F(\hat{w}_1) = n_3 \left( \frac{t}{t + 1}, \sigma, \tau \right). \]

The effect of \( t \) on \( n_3 \) is ambiguous. Indeed,
\[ (1 - t)^2 \frac{\partial n_3}{\partial t} = F'(\hat{w}_2) \varphi_2 - F(\hat{w}_1) \varphi_1. \]

With a uniform density, given that \( \varphi_2 > \varphi_1 \), the number of parents purchasing the private insurance increases with the tax rate; i.e. \( \partial n_3/\partial t > 0 \).

We now denote by the number 4 the regime wherein children do not help their dependent parents when they choose public nursing. This regime is bounded by \( \hat{w}_1 \) and \( \hat{w}_2 \), which we now define. These threshold values are given by the two equalities
\[ V_{n_1}((1 - t) \hat{w}_1, \sigma) = V_4(g) = \ln I + \pi \ln g \]
and
\[ V_{n_2}((1 - t) \hat{w}_2, \sigma) = V_4(g). \]

Again, there are values for \( g \) that are so low that the parent would never choose to go to the public nursing home. This is clear in Figure 5.

From the equalities \( V_1 = V_4(g) \) and \( V_2 = V_4(g) \), we can write
\[ \hat{w}_1 = \frac{1}{1-t} \psi_1 \left( \sigma, g \right) \quad \text{and} \quad \hat{w}_2 = \frac{1}{1-t} \psi_2 \left( \sigma, g \right) > \hat{w}_1. \]

We denote by \( n_4 \) the fraction of parents opting for the public nursing home:
\[ n_4 = F(\hat{w}_2) - F(\hat{w}_1) = n_4 \left( \frac{t}{t + 1}, \sigma, g \right). \]

As for \( n_3 \), the effect of \( t \) on \( n_4 \) is ambiguous in general but \( \partial n_4/\partial t > 0 \) if \( w \) is uniformly distributed. With a uniform density, given that \( \psi_2 > \psi_1 \), the number of dependent parents going to nursing homes increases with the tax rate.

The choice between \( g \) and \( a \), i.e. public nursing and private insurance, is dichotomous. Public nursing is preferred over private insurance if
\[ V_4 \left( \frac{g}{g} \right) = \ln I + \pi \ln g > V_3 \left( \frac{\tau}{\tau} \right) = (1 + \pi) \ln I - \pi \ln \theta (1 - \tau) - B \]
or
\[ g > \hat{g} \left( \frac{\tau}{\tau} \right) \equiv \frac{I}{\theta (1 - \tau)(1 + \pi)^{(1+\pi)/\pi}}. \]

Note the difference between the two ways of financing long-term care: \( g \) is paid by the young generation, whereas \( a \) is paid by the parent himself. Note also that, when \( g > \hat{g}(\tau) \), \( \hat{w}_1 < \hat{w}_1 \) and \( \hat{w}_2 > \hat{w}_1 \).
The government collects a proportional tax on children’s earnings, and uses it to finance both subsidies and nursing homes. As seen above, with only one value of \( I \) and \( \tau \) and \( g \) are mutually exclusive. Also, it is not impossible that \( \tau \) or \( \sigma \) turn to be negative. The subsidy is then a tax.

To keep the presentation simple, we retain the assumption of a unique value of \( I \) and distinguish two regimes: private insurance and public nursing.

We start with private LTC insurance. Then the revenue constraint becomes

\[
\varphi(t, \sigma, \tau) = t\bar{y} - \pi(1-n_3)\sigma - n_3\tau\theta a^*,
\]

where

\[
\bar{y} = (1-\pi)\bar{w} + \pi \int_{w_1}^{w_1^*} w(1-h^*)dF(w) + \pi \int_{w_1}^{w_1^*} wdF(w).
\]

In this expression \( \bar{y} \) and \( \bar{w} \) are, respectively, average income and average wage; \( h^* \) and \( \hat{w}_1 \) are functions of policy tools. The labour supply of workers with productivity higher than \( \hat{w}_1 \) is 1; that of workers with productivity lower than \( \hat{w}_1 \) is \( 1-h^* \) or 1, depending on whether or not their parents are dependent.

Turning to public nursing \((g > \hat{g})\), let us introduce the parameter \( q \) that reflects the cost of providing nursing home services. We expect that \( q > 1 \), which implies some inefficiency. The revenue constraint can be written

\[
\varphi(t, \sigma, \tau) = t\bar{y} - \pi(1-n_4)\sigma - \pi n_4qg,
\]

where \( \bar{y} \) is defined as above replacing \( \hat{w}_i \) by \( \hat{w}_i \).

III. OPTIMAL POLICY

(a) Unconstrained first-best

As a benchmark, we first consider the resource allocation that a social planner would implement if he had perfect information and full control of the economy. The objective that we find appropriate is the sum of individual utilities, after removing the altruistic component from the children’s utility. In other words, we consider the following social welfare function:

\[
SW = \int_{w_-}^{w_+} \left\{ \pi[u(cD) + v(dD) + H(m)] + (1-\pi)[u(cN) + v(dN)] \right\} dF(w).
\]

This view is not properly utilitarian. Yet if we were adding individual utilities, this would amount to weighting the welfare of the elderly people by \( (1+\beta) \) and not by \( 1 \).

Long-term care can be supplied using the most efficient technology. First, the least productive workers would devote all their available time to long-term care not only of their own parents, but also of others. If it is not enough, additional resources, denoted by \( T \), would be devoted to long-term care in the same way as \( s \), i.e. with a unitary productivity. In other words, the resource constraint is equal to \( \pi m = \int_{w_-}^{w_0} w dF(w) + T \) and \( c + d = \int_{w_0}^{w} w dF(w) - T \) or \( \pi m = \int_{w_-}^{w_0} w dF(w) + T \) and \( c + d = \int_{w_0}^{w} w dF(w) \), where either \( T \) or \( \hat{w} \) depends on \( m \).
Maximizing $SW$ subject to these constraints implies the equality

$$u'(c^p) = v'(d^p) = u'(c^N) = v'(d^N) = H'(m).$$

Decentralizing such a first-best optimum calls for a much richer assortment of tools than those used here. On the production side, one would need a market for long-term care services that would be open to workers with productivity below $w_0$. One would also need individualized transfers allowing for redistribution across individuals, between the two generations, and between the two states of nature.

(b) Second-best optimality

We now turn to a second-best setting with imperfect information and restricted policy tools: namely, linear taxation, lump-sum but conditional subsidies, and public nursing homes. We keep in mind that public nursing homes and private insurance are mutually exclusive. The former dominates the latter if $g \geq \hat{g}$. In other words, we can have a partition of the interval $(w_-, w_+)$ either in the three subintervals $(w_-, \tilde{w}_1), (\tilde{w}_1, \tilde{w}_2), (\tilde{w}_2, w_+)$ if public nursing prevails, or in the three subintervals $(w_-, \tilde{w}_1), (\tilde{w}_1, \tilde{w}_2), (\tilde{w}_2, w_+)$ if private insurance happens to be more attractive ($g < \hat{g}$).

We focus on alternative pairs of instruments. For example, we start by looking at the optimal values of $t$ and $\sigma$ with private insurance (thus $\tau = g = 0$).

Combination $t$ and $\sigma$ When the only available instruments are $\sigma$ and $t$, we write the problem of the government with the following Lagrangean expression:

$$\mathcal{L} = \int_{w_-}^{\tilde{w}_1} (\tilde{u}_1 + V_1) dF(w) + \int_{\tilde{w}_1}^{\tilde{w}_2} (u_3 + V_3) dF(w) + \int_{\tilde{w}_2}^{w_+} (\tilde{u}_2 + V_2) dF(w)$$

$$- \mu[(1-n_3)\pi \sigma - t\tilde{y}],$$

(1)

where $\tilde{u}_i$ denotes the child’s utility net of the altruistic component:

$$\tilde{u}_1(w) = \pi u(\varepsilon(w(1-t))(1-h^*) + G^*_t + \sigma) + (1-\pi)u[\varepsilon(w(1-t)) + G^*_t]$$

$$\tilde{u}_2(w) = \pi u[\varepsilon(w(1-t)) + G^*_s + \sigma - s^*] + (1-\pi)u[\varepsilon(w(1-t)) + G^*_s]$$

$$u_3 = u[\varepsilon(w(1-t))].$$

The FOC for the social optimum can be expressed in compensated terms as

$$\frac{\partial \mathcal{L}^c}{\partial t} = \frac{\partial \mathcal{L}}{\partial t} + \frac{\tilde{y}}{(1-n_3)} \frac{\partial \mathcal{L}_1}{\partial \sigma},$$

where the superscript $c$ denotes the fact that the change in both $t$ and $\sigma$ must respect the budget constraint. After a few manipulations, we obtain the following formula for $t$:

$$- \mu \frac{\partial \tilde{y}^c}{\partial t} t = \left( \int_{w_-}^{\tilde{w}_1} + \int_{\tilde{w}_2}^{w_+} \right) \left( \pi(1-\beta)H' \frac{\partial m^c}{\partial t} + (\tilde{u}' - \tilde{v}') \frac{\partial G^c}{\partial t} \right) dF$$

$$- \left[ \text{cov}(\varepsilon u'(c), y) + \sum_{j=D,N} \pi_j \text{cov}(u'(c^j), y^j) \right] + \left( \hat{\Delta}_1 \frac{d\hat{w}_1^c}{dt} - \hat{\Delta}_2 \frac{d\hat{w}_2^c}{dt} \right)$$

$$+ \left[ E\varepsilon u'(c^D)/w \leq \tilde{w}_1, w \geq \tilde{w}_2 \right] - E\varepsilon u'(c) \right] \tilde{y} + \mu \pi \sigma \frac{\partial m^c}{\partial t}. $$

© The London School of Economics and Political Science 2007
To interpret (2), we consider each of its components. On the LHS, besides the tax rate, we have \( \mu(>0) \) the shadow price of public funds and \( \partial \bar{y}/\partial t \), which represents the traditional efficiency terms. It is negative, as both the tax on earnings and the subsidy tend to foster \( h \) and thus to discourage market labour supply. On the RHS we first have the two effects of our tax transfer on the child’s assistance and the parental gift, if any. It is indeed important to realize that, even when parents do not have enough resources to buy a family or a market insurance, formula (2) remains valid. The role of \( \beta \) is important. When \( \beta = 1 \), both social planner and children have the same view of the parents’ utility and therefore there is no reason to use a tax transfer to modify the level of assistance.

Using the logarithmic example, we see that \( \partial m^e/\partial t > 0 \) for \( w < \max[w_0, \bar{y}/\pi] \), whereas \( \partial G^c/\partial t < 0 \) for \( w < \bar{y}/\pi(1 - n_3) \). If the majority of children have a low productivity, i.e. below \( w_0 \) and \( \bar{y}/n \), the term \( \partial m^e/\partial t \) is positive and will push for a positive tax if \( \beta < 1 \). Under the same circumstances (a majority of children with low productivity), the effect of the tax transfer on gifts that are narrowing the gap between the marginal utilities of children and parents \( (\bar{u} - v > 0 \text{ when } G > 0) \) is negative and this rather pushes for a negative or at least a lower tax.

We now turn to the covariance terms. These concern the consumption of children and their income. The first one is the covariance between groups of children with and without dependent parents, and the second is the within-group covariances. All are expected to be negative and clearly to push for a higher tax transfer.

The third term of the RHS gives the effect that the tax transfer \((t, \sigma)\) combination has on the bounds \( \hat{w}_1 \) and \( \hat{w}_2 \), each being weighted by the change in utility that the child incurs in going from one regime to another:

\[
\hat{\Delta}_1 = \bar{u}_1(\hat{w}_1) - u_3(\hat{w}_1) \quad \text{and} \quad \hat{\Delta}_2 = \bar{u}_1(\hat{w}_1) - u_3(\hat{w}_2).
\]

It can be shown that \( \hat{w}_1^c \) is increasing in \( t \), whereas the sign of \( d \hat{w}_2^c /dt \) is ambiguous. Note that, ceteris paribus, increasing the tax rate raises \( \hat{w}_2 \), but a compensated increase in the subsidy \( \sigma \) works in opposite direction. With our log functions, we can also see that \( \hat{\Delta}_1 \) decreases with \( w \) and \( \hat{\Delta}_2 \) increases with it. In the following, we assume \( d\hat{w}_2^c /dt < 0 \), \( \Delta_1 > 0 \) and \( \hat{\Delta}_2 < 0 \), which seems to be plausible. Then the third term of the RHS of (2) is positive and thus pushes for a higher tax and subsidy.

The fourth term of the RHS concerns the difference between the conditional expected utility of children assisting their parents and the expected utility of all children. We would normally expect this term to be positive, as children helping their parents have a lower disposable income than those having the same productivity but healthy parents. Finally, there is the fifth term pertaining to the cost of financing the subsidy to \( \pi(1 - n_3) \) parents. If as assumed \( \partial n_3^c/\partial t > 0 \), this term is positive and induces a higher tax and subsidy.

To conclude, with our assumption on \( \hat{\Delta}_1 \) and \( \hat{w}_1 \), the last four terms are positive. The sign of the first term depends on the distribution of \( w \). It is interesting to see what formula (2) would become if we assume that \( I \) is so low that \( G \) and \( n_3 \) vanish. In that case the third and fifth term of the RHS of (2) would disappear, as would \( \partial G^c/\partial t \). The case for a positive tax transfer increases particularly if most children have a productivity below \( w_0 \).

We summarize the message of this subsection with a proposition.

**Proposition 2.** When the instruments are restricted to a flat tax on earnings and a subsidy on children’s assistance, the level of both the tax and the subsidy is likely to be high when parents have a low endowment and when the majority of children have a productivity below \( w_0 \).

© The London School of Economics and Political Science 2007
We now analyse the incidence of additional instruments. We will see that formula (2) will not basically change, except for the last two terms of the RHS. The fourth term represents the effect of the additional instrument on the individuals’ welfare and the fifth term the cost that it implies.

**Combination t and τ** We now consider the idea of subsidizing private LTC insurance with an earning tax. Note that all the compensated terms of the tax formula so modified must be adjusted:

\[
\frac{\partial \mathcal{L}^c}{\partial t} = \frac{\partial \mathcal{L}}{\partial t} + \frac{\bar{y}}{n_3 \theta a^w} \frac{\partial \mathcal{L}^o}{\partial \tau}.
\]

The optimal formula is equal to (2) in which the last two terms of the RHS are replaced by

\[
+[v_3'(E_0(c))\bar{y} - \mu \left( \tau \frac{\bar{y}}{a^w} \frac{\partial a^w}{\partial \tau} + (\tau \theta a^w - \pi \sigma) \frac{\partial n^c_3}{\partial \tau} \right)].
\]

The first term reflects the redistributive effect of the tax transfer which transfers resources from the workers to the parents benefiting from an LTC insurance. One may reasonably expect that this term is negative: parents with enough resources to make gifts and buy a LTC insurance tend to have a higher disposable income than their children. The second term represents the budgetary cost of the subsidy. If \(a^w\) increases as one might expect, we have a depressive effect on both instruments. In the same line, if the tax subsidy increases the number of insurees, and if the per-unit insurance subsidy costs more than the subsidy granted to children, one has another depressive effect on both instruments.

**Combination t and g** We now look at the case when public nursing prevails over private insurance \((g > \tilde{g})\). Compared with the two previous cases, we now have threshold values of \(w\) equal to \(\tilde{w}_1\) and \(\tilde{w}_2\) and \(n_4 = F(\tilde{w}_2) - F(\tilde{w}_1)\). The optimal tax formula is given by (2), in which the last two terms of the RHS are replaced by

\[
+[H'(g)/q - E_0(c)]\bar{y} - \mu \pi (qg - \sigma) \frac{\partial n^c_4}{\partial \tau}.
\]

In this case the revenue constraint implies that the compensated change in \(g\) becomes \(\frac{dg}{dt} = \bar{y}/n_4 qg\). As above, the first term pertains to some intergenerational redistribution from children to parents using public nursing. The second term pushes for lower taxes and less public nursing if these instruments increase \(n_4\) and if per-unit public nursing costs more than assistance subsidy.

In the second-best optimum, either private insurance subsidy or a nursing home is chosen. The two policy instruments are mutually exclusive. To see this, define the value \(\tilde{\tau}\) that equates the government spending between the two policies:

\[
E_3 \equiv \pi(1 - n_3)\sigma + n_3 \tilde{\tau} \theta a^w = E_4 \equiv \pi(1 - n_4)\sigma + n_4 qg(\tilde{\tau}),
\]

where \(g = \tilde{g}(\tilde{\tau})\) yields \(V_3(\tilde{\tau}) = V_4(g)\). Note that we have \(n_3 = n_4\) when the parents are indifferent between private insurance and a public nursing home. After substitution, we obtain

\[
\tilde{\tau} = \frac{1}{\theta} \left( \frac{1}{1 + \pi} \right)^{1/\pi}.
\]
Consider the private insurance subsidy that is optimized at \( \tau^* \) alongside with other policy instruments \( t \) and \( \sigma \) given \( g = 0 \). If \( \tau^* \) is larger than \( \bar{\tau} \), switching from the optimal insurance subsidy to public nursing at \( g = \hat{g}(\tau^*) \) implies less public spending and thus raises social welfare. Social welfare will be further enhanced by optimizing \( g \) so that \( g^* \). Consequently \( g^* \) dominates \( \tau^* \) when \( \tau^* > \bar{\tau} \). The opposite is verified if \( \tau' \) is such that \( g^* = \hat{g}(\tau') \) is less desirable than \( \bar{\tau} \).

\( \text{(c) Parents with different endowments} \)

Up to now we have assumed that parents have some resources \( I \) that these are the same for all, and that they are sufficient for some parents to \textit{ex ante} ‘buy’ the assistance of their children in case of dependence and for others to purchase a private LTC insurance. It was acknowledged that if \( I \) were low enough parents would not make any transfer to their children and that some of them — those who receive little family assistance — would use public nursing facilities.

We now consider the case where there are two levels of parental endowment, \( I_H \) and \( I_L \) with \( I_H > I_L \). In the present context, the insurance subsidy and the public nursing home may not be mutually exclusive but can be used as a device to separate the two types of family.

Using the logarithmic utility, we define \( \hat{g}^j \), \( (j = H, L) \), such that

\[
V^j_3(\tau) = V^j_4(\hat{g}^j)
\]

or

\[
(1 + \pi) \ln I^j + \pi \ln \frac{1}{1 - \tau} + \pi \ln \frac{1}{\hat{\vartheta}} + B = \ln I^j + \pi \ln \hat{g}^j.
\]

From this equality, we derive the function \( \hat{g}^j(\tau) \):

\[
\hat{g}^j = I^j \left( \frac{1}{1 - \tau} \frac{1}{\hat{\vartheta}} \left( \frac{1}{1 - \pi} \right)^{(1 + \pi)/\pi} \right).
\]

When \( V_3 = V_4 \), total spending by the government with \( \tau \) or \( g \) is generally not equivalent. In other words, subsidizing private insurance can be either cheaper or more expensive than providing nursing. The value of \( \tau \) for which such equivalence would hold is given by (3).

In Figure 6 the dotted vertical line represents the value of \( \frac{1}{C_{22}} \): to the right of \( \frac{1}{C_{22}} \) public spending is higher with a subsidy on private insurance, and to the left of \( \frac{1}{C_{22}} \) this is the other way around.

The two functions defining \( \frac{1}{C_{22}} \) and \( \hat{g}^j(j = L, H) \) partition the \((g, \tau)\) plane in four areas. Note that \( \bar{\tau} \) is independent of \( I \). This partitioning can be useful for comparing the desirability of \( g^* \) and \( \tau^* \), the optimal values of those two parameters obtained through separate optimization.

Note that if \( I_L \) is low enough it is possible that parents cannot afford to leave any gift \( G \) to their children. This implies a simple way to express both \( V^1_{L} \) and \( V^2_{L} \).

Figure 6 can be used to show when it might be desirable to have a subsidy \( \tau \) for the rich parents and public nursing \( g \) for the poor parents. Consider that there is only the insurance subsidy, which is optimized at \( \tau^* \); \( \tau^* \) is granted for both the rich and the poor parents \textit{ex ante}. Suppose that the optimal subsidy \( \tau^* \) is to the right of \( \bar{\tau} \) where \( \bar{\tau} \) is as defined in Section III(b) and is applied to each type of parent. Then choose the value of \( g \) given by \( \hat{g}^L(\tau^*) \). If we give this amount of public care to the \( n^2_L \) poor parents,
nothing changes except that there are some available resources, which increase social welfare. It is of course important to make sure that the rich parents are not going to be tempted to use public nursing as well. For that, it suffices that they are better off with $\tau^*$ than with $\hat{g}^L(\tau^*)$. This is the case, given that $\hat{g}^L(\tau^*) < \hat{g}^H(\tau^*)$. The welfare is further enhanced by optimizing $g$ and $\tau$ subject to the self-selection constraints such that the poor prefers $g$ and the rich chooses the subsidy.

We have thus shown that self-selecting the two types of parent can be part of the optimal policy of the social planner. To be complete, we should look for the optimal values of $t$, $\sigma$, $\tau$ and $g$ with and without self-selection. This problem is rather complex and is outside the scope of the present paper. We conclude this section with a proposition.

**Proposition 3.** When parents have different endowments, it might be socially desirable to choose the policy instruments in a way that induces rich parents to buy private insurance and poor parents to resort to public nursing. This separating solution is more likely when there is a wide difference in parental endowment.

### IV. CONCLUDING REMARKS

The purpose of this paper was to design an optimal tax transfer policy for long-term care. The setting is relatively simple. Each elderly person has an altruistic child who will help him in case of a loss of autonomy. Help can be of two types: time for low-productivity children, cash for high-productivity children. To foster help from their children, parents can *ex ante* make a gift to them. The government can subsidize children’s assistance. But it can also directly provide the services of nursing homes. Parents of middle-productivity children tend to rely on nursing homes, but in that case they do not give anything to their children. Private insurance appears to be a substitute for public nursing homes, but not for children’s assistance.

The case of public nursing is quite strong, particularly when private long-term care insurance is inefficient. The case of subsidy for either type of assistance is not clear. For redistributive reasons a scheme of tax subsidy is desirable, as it narrows down some differences in consumption. At the same time, it can have undesirable effects on some types, of assistance and on the level of *inter vivos* gifts. To clear this ambiguity, one has to
kn know more about the distribution of \( w \), the level of \( I \) and the concavity of the utility function.

Two questions can be raised in conclusion. Is it realistic? Is it not too simplistic? The two questions are naturally related. The issue of LTC is a complex one; it involves three institutions—the family, the market and the government—and it comprises several informational difficulties. In this paper we have introduced a number of assumptions and simplifications which we now discuss.

First, we have adopted a very restrictive view of intergenerational transfers within the family: children help their dependent parents, and parents make *inter vivos* gifts to foster such a help. We are aware that the bulk of parental transfers are of a different kind. *Inter vivos* gifts and notably education are motivated by altruism. Some bequests are also altruistic, even though for most people they seem to be rather unplanned. To keep the analysis simple, we consider just those *inter vivos* gifts based on an insurance motive: they foster transfers that will be made in case of dependency when parents find them more attractive than public nursing or private insurance. In that respect, they differ from gifts made by parents to shape their children’s preferences (see Cox and Stark 2005). To conclude on this point, most of our analysis would be valid if we were assuming away such transfers.

In the literature on LTC, the psychological dimension is important. In this paper we take the view that contingent subsidies of rate \( \sigma \) foster altruistic assistance to dependent parents. This is at odds with the view held by psychologists and sociologists for whom such subsidies (extrinsic motivation) can be counterproductive because they undermine the intrinsic motivation. This alternative view, which implies a crowding-out of altruistic behaviour by extrinsic incentive, would lead to different results, particularly regarding the desirability of a subsidy on child’s assistance. If, for example, there is full crowding out, the government should not use any subsidy and should focus on the provision of public nursing and on subsidizing private insurance. Note that not only public subsidies, but also parental gifts could put children off providing altruistic care. Clearly, this question though important is outside the scope of this paper.

The gender issue is also important. Daughters and daughters-in-law seem to be more involved in assisting dependent parents than sons. Also, long-term care has a huge impact on help for persons who most often have a costly and painful aftermath. These dimensions are assumed away, even though we acknowledge their importance.

Another crucial assumption is that the different types of care are mutually exclusive and that the two types of assistance by children are additive. These assumptions were made for reasons of simplicity. For example, if assistance in time and in money were not additive but complementary, we would not get a U-curve for both \( m \) and \( V \) as sharp as the one presented in this paper. That being said, the idea that less productive children provide more time and less financial assistance than more productive children remains quite realistic.

In this paper we have assumed that each parent has a child and that the child is ready to help him in case of dependency. This is questionable for various reasons. Some parents do not have children; all children are not altruistic; in many cases the caring person is the spouse and not the child; and among children daughters appear to be more caring than sons. Again we made this assumption to keep the model as simple as possible. Introducing non-altruistic children would not be too complicated; it would extend the range of parents purchasing private insurance or using public nursing. In this case we are faced with a moral hazard problem, if altruism cannot be observed (see Jousten et al. 2005).
Another difficulty that we have assumed away is that loss of autonomy may not be observable. This leads to another moral hazard problem, as it is tempting for healthy parents to mimic unhealthy parents. Again, this would add a further constraint to the design of an optimal tax-transfer scheme.

ACKNOWLEDGMENTS

We started this project with Maurice Marchand, who died suddenly in July 2003. This paper was presented at the University of Ottawa, at the University of Montreal, at the annual meeting of CIRPEE, at PSE and at Columbia University. We thank seminar participants for helpful comments. We also thank Dario Maldonado for his remarks. We are grateful to two referees for their valuable questions and suggestions which substantially improved the paper. Pierre Pestieau is grateful for financial support from the Belgium Science Foundation (FNRS), and Motohiro Sato is grateful for financial support from the Centre of Excellence Project of the Ministry of Education, Japan.

NOTES

1. In Jousten et al. (2005) optimal long-term care policy is analysed when the only source of heterogeneity is children’s altruism.
2. In a recent paper Finkelstein and McGarry (2004) underline two sources of heterogeneity in long-term care insurance that are not observable: risk types and insurance preferences. They show that this double asymmetric information has negative efficiency consequences on the insurance market. We do not consider this issue here.
3. See also Prouteau and Wolff (2003) for a study based on French data that reached the same conclusion.
4. With isoelastic functions we obtain the same results, but they do not yield simple demand and supply functions. In any case, even with the logarithmic specification, we end up with ambiguous results.
5. In Pestieau and Sato (2004), we represent the solutions to this problem for \( w \in [w_-, w_+] \) and \( I = I_H \) or \( I_L \). For parents with \( I_L \), \( G^w = 0 \) for all \( w \). For parents with \( I_H \) we partition the interval \( [w_-, w_+] \) in different regimes.

REFERENCES


