



norden

NORDIC ECONOMIC POLICY REVIEW

CHALLENGES IN HEALTH CARE FINANCING AND PROVISION

Introduction

Tor Iversen and Sverre A.C. Kittelsen

Ageing populations: More care or just later care?

Terkel Christiansen, Jørgen Lauridsen and Mickael Bech

Lifestyle, health and costs – what does available evidence suggest?

Kristian Bolin

The economics of long-term care: A survey

Helmuth Cremer, Pierre Pestieau and Gregory Ponthiere

The role of primary health care in controlling the cost of specialist health care

Stephen Beales and Peter C. Smith

Payments in support of effective primary care for chronic conditions

Randall P. Ellis and Arlene S. Ash

An economic assessment of price rationing versus non-price rationing of health care

Luigi Siciliani

Should pharmaceutical costs be curbed?

Kurt R. Brekke, Dag Morten Dalen and Steinar Strøm

Productivity differences in Nordic hospitals:

Can we learn from Finland?

Clas Rehnberg and Unto Häkkinen

The economics of long-term care: A survey^{*}

Helmuth Cremer^{**}, Pierre Pestieau^{***} and Gregory Ponthiere^{****}

Summary

This paper surveys recent theoretical economic research on long-term care (LTC). LTC differs from health care: it is about nursing; it is mostly provided by unpaid caregivers (mainly spouses and children), whereas both the market and the state play a modest role. The future of LTC appears to be gloomy: sustained population ageing and recent societal trends (e.g., children's mobility, changes in family values) generate a mounting demand on the state and on the market to provide alternatives to the family. In this paper, we review these causes, and the extent to which we can expect them to fade away in the future. Then, we turn to the design of a sustainable public LTC scheme integrating both the market and the family.

Keywords: long-term care, social insurance, dependence, family solidarity.

JEL classification numbers: I11, I12, I18, J14.

^{*} Financial support from the Chaire "Marché des risques et creation de valeur" of the FdR/SCOR is gratefully acknowledged. We would like to thank Erik Schokkaert, Chiara Canta, Thorolfur Matthiasson and the editors for insightful remarks and helpful suggestions.

^{**} Toulouse School of Economics (IDEI, GREMAQ and Iuf), helmuth.cremer@tse-fr.eu.

^{***} CORE, University of Louvain; CREPP, University of Liège; IDEI, Toulouse School of Economics, p.pestieau@ulg.ac.be.

^{****} Ecole Normale Supérieure, Paris – Paris School of Economics, gregory.ponthiere@ens.fr.

Long-term care (LTC) concerns people who depend on help to carry out daily activities such as eating, bathing, dressing, going to bed, getting up or using the toilet. It is delivered informally by families – mainly spouses, daughters and step-daughters – and, to a lesser extent, formally by care assistants, who are paid under some form of employment contract. Formal care is given at home or in an institution (such as care centers and nursing homes). The governments of most industrialized countries are involved in either the provision or financing of LTC services, or often both, although the extent and nature of their involvement differs widely across countries.

In the future, the demand for formal LTC services by the population is likely to grow substantially. LTC needs start to rise exponentially from around the age of 80. The number of individuals aged 80 years and above is growing faster than any other segment of the population. As a consequence, the number of dependent elderly at the European level (EU-27) is expected to grow from about 21 million people in 2007 to about 44 million in 2060 (EC, 2009). Thus, we anticipate an increasing pressure on the resources demanded to provide LTC services for the frail elderly, and this pressure will be on the three institutions currently financing and providing LTC services: the state, the market and the family.¹

These three institutions have their pluses and minuses. The family provides services that are warm, cheap and distortionless. However, these services are restricted to each individual's family circle. Furthermore, some families are very poor and some dependent persons cannot count on family solidarity at all.² The state is the only institution that is universal and redistributive, but its information is quite often limited and its means of financing are distortionary. Finally, the market can be expensive, particularly where it is thin and without public intervention, it only provides services to those who can afford it.³

¹ The existence of LTC provision outside markets leads to ambiguous predictions about the future growth of the formal LTC market. Indeed, as argued by Lakdawalla and Philipson (2002), aging may actually *reduce* the per capita demand for market LTC, provided that it raises the supply of non-market care produced by other elderly people.

² See Duée et al. (2005) on the predicted rise in the number of dependent elderly without family help in France. Note that large divorce rates may substantially increase the role of children in comparison to spouses for LTC provision.

³ Regarding LTC provision in institutions, the quality of LTC services is strongly variable with the LTC techniques used (more or less labor intensive), which significantly affect the health of the elderly (see Cawley et al., 2004).

In assessing the adequacy of LTC financing and provision and in making projections, it is important to bear in mind the extent to which countries will be able to rely on the informal provision of care in the future. The bulk of LTC is indeed provided informally.⁴ Informal provision has no direct bearing on public finances,⁵ but it is not clear that such a situation is desirable and, in any case, will last. Family solidarity is very uneven, and its propensity to provide care could diminish, due to changes in family structure and the growing participation of women in the labor market, which may constrain the future supply of informal care provision within households.

The market for LTC insurance is still negligible, with the exceptions of France and the US. As to the public sector, few countries have a formal social LTC insurance. Even though they do not have a formal social insurance on LTC, most countries devote resources to the financing of LTC services, most often at the local level, but the share of GDP devoted to these is small. One may hope that both private and social LTC insurance will grow substantially in coming decades. But there is a number of problems that both the state and the market have to solve before they can replace family solidarity.

In the next section, we first study the nature of dependency in old age. Then, we present some recent forecasts regarding future needs of LTC. In Section 2, we study what explains the underdevelopment of private insurance for LTC; this is labeled as the LTC insurance market puzzle. Section 3 is devoted to the role of family, more specifically, to different ways of modeling the interactions among parents, spouses and children. These interactions can be triggered by some sort of altruism or just by a mechanism of intergenerational exchanges. Section 4 deals with the design of a sustainable public LTC scheme that integrates the role of the market and the family. A final section concludes the paper.⁶

⁴ According to Norton (2000), about two thirds of LTC is provided informally. Naturally, that figure is a simplification, since there exist strong international differences in LTC provision (see below).

⁵ It clearly has indirect incidence by reducing female labor participation.

⁶ For earlier surveys, see Norton (2000), Brown and Finkelstein (2009), Cremer et al. (2009) and Cremer and Pestieau (2010).

1. Concepts and facts

Loss of autonomy or old-age dependency can be defined as the inability, due to old age, to carry out basic daily activities, such as, for instance, eating, dressing, washing, walking, etc. As a consequence of that inability, dependent elderly people require LTC assistance. The LTC phenomenon is thus permanent, non-accidental and due to old age and, as such, it should be distinguished from other phenomena, such as illness, disability and handicap.

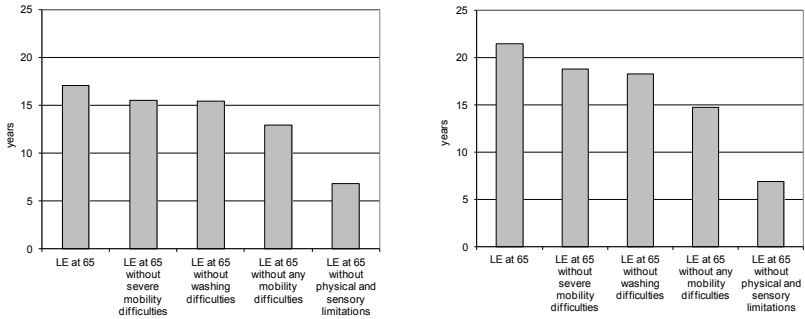
Measuring the loss of autonomy among the elderly is not straightforward, since it requires classifying the elderly as either autonomous or non-autonomous, whereas autonomy is a matter of degree. There exists a *continuum* of health states between the perfectly autonomous young adult and the fully dependent very old person. Several measures have been developed around the world to measure the prevalence of old-age dependency. The well-known Katz scale, which is used by US insurers, counts as dependent the elderly who are unable to carry out at least two out of six activities of daily life (bathing, dressing, transferring, toilet use, eating and continence). Another scale is the AGGIR scale, which is used by the French national system for personal LTC allowances.⁷

The prevalence of various autonomy restrictions at old age is well illustrated by the concept of disability-free life expectancy, i.e. the average life duration without particular autonomy limitations.⁸ Figure 1 shows, in the case of France, the life expectancy at age 65 for men and women, as well as some disability-free life expectancy statistics, for 2003. Obviously, women live, on average, longer than men, and they also enjoy longer periods of life without disability. However, the periods with disabilities are also longer for women than for men. For instance, men spend, on average, 1.5 years with serious mobility restrictions, against 2.7 years for women.

⁷ On the variety of measures of autonomy loss, see Kessler (2007).

⁸ That measure is directly computed on basis of probabilities of different limitations at each age of life. See Pérès et al. (2005) and Cambois et al. (2008).

Figure 1. Life expectancy without disability for men (left) and women (right) France, 2003



Source: Cambois et al. (2008, p. 293).

While those figures give us an idea of the prevalence of the LTC phenomenon, they only concern an economy at a given point in time. One may also be interested in future LTC prevalence. Forecasting future needs is a daring but necessary undertaking. It requires two steps. First one wants to know the relative number of dependent elderly in the future. Second, one has to allocate those individuals among the various types of LTC: formal *versus* informal, private *versus* public. For the first step, we have good forecasts of the future population structure. According to the population projection by main age groups for EU27, the old-age dependency ratio, calculated as the ratio of people aged 65+ relative to the working-age population, will go from 25.4 percent to 53.3 percent over the period 2008-2060.⁹ The dependency ratio of the oldest-old (people aged 80+ over the working-age population) will increase from 6.5 percent to 22 percent over the same period. Dependency does indeed increase with age, particularly after 75; it is more prevalent among women than among men, as shown in Figure 1.

Regarding the proportion of dependent among the elderly, several forecasts can be made, depending on the predicted future evolution of dependency. As discussed by the EC (2009), two broad scenarios can be

⁹ See EC (2009).

used.¹⁰ On the one hand, the “pure demographic” scenario, according to which currently observed age-specific dependency rates will prevail in the future. In other words, there would be no improvement in the dependency status of the elderly population even though average longevity increases.¹¹ On the other hand, the “constant disability” scenario, according to which the duration of the dependency period will remain unchanged in the future, despite the lengthening of life. These two scenarios are illustrated below.

Forecasts under the “pure demographic” scenario are frightening: in EU27, the total number of dependent elderly will, under that scenario, grow from about 20 million in 2007 to 44 million in 2060, which corresponds to a total growth of 115 percent.¹² The number of dependent old individuals will more than double.

Arguably, this “pure demographic” scenario is quite pessimistic, since it assumes that the average lifetime consumption of long-term care services will increase over time. This “pure demographic” scenario also contradicts empirical studies predicting that the duration of the dependency period remains roughly constant in spite of an increase in the average duration of life; see, for instance, Cambois et al. (2008) who study disability in France above the age of 65. Therefore, one may prefer the “constant disability” scenario, in which there is no extension of the morbidity period (in absolute terms) as the total length of life increases. But even under that more optimistic scenario, the number of dependents will still grow substantially in the next decades.¹³

LTC is provided in different settings: formally and informally (some persons receive no care at all). In the case of formal care, it can be at home or in various types of institutions, including nursing homes and long-stay hospitals. Assuming the “pure demographic” scenario, that is, assuming that the probability (at any given age) of receiving formal care at home and formal care in an institution remains constant at the 2007 level, the percentage change in the number of dependent receiving care in an institution would be 185 in EU27 (155 for EU10); for those receiving

¹⁰ In the projection of EC (2009), the dependency rates are drawn from SHARE – Survey on Health, Aging and Retirement in Europe.

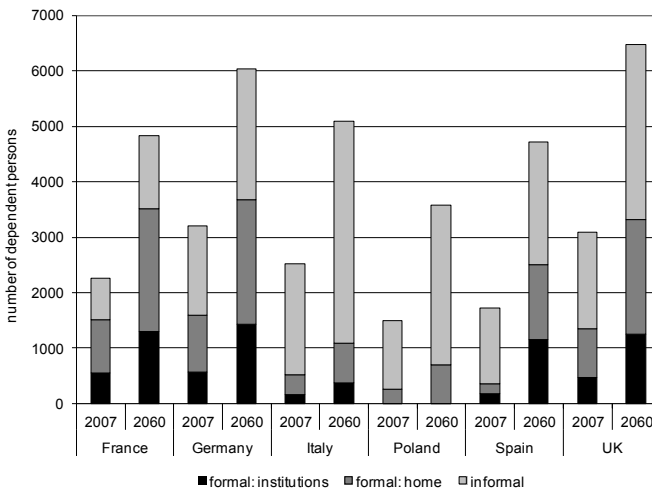
¹¹ In other words, the rate of dependency of an 80-year old in the future is the same as that of an 80-year old today, but there will be more people living up to their 80th birthday in the future than today.

¹² Data source: EC (2009, p. 138).

¹³ Data sources: EC (2009, p. 140).

formal care at home, the percentage change would be 151 (171 for EU10). Finally, the percentage change for those only relying on informal care would be 84 in EU27 (119 in EU10). However, those aggregate trends actually hide strong international heterogeneity, as shown on Figure 2. Whereas the dependent population in France is more or less equally distributed across the three types of LTC, this is not true in many countries. For instance, overall formal care (institutions or home) is nowadays largely underdeveloped in Italy and Poland.

Figure 2. Formal and informal LTC, 2007-2060



Source: EC (2009, p. 138).

We can now turn to the projected public expenditure on LTC presented by the EC *2009 Ageing Report* (EC 2009). Assuming the “pure demographic” scenario, LTC public expenditure is projected to on average increase by 115 percent for EU27. The projected increase ranges from 65 percent in France and the UK to 175 percent and above in the Czech Republic, Spain, Malta, Poland, Romania and Slovakia.

Extrapolating on the basis of existing policies and expenditures does not capture the full scale of the policy challenge. Future changes in the number of people receiving informal or no care, and whether they will receive the care services they need, are also crucial policy questions. Countries with low levels of formal care provision today (and thus low levels of public expenditure), such as Italy, will also witness a very large

increase in the projected number of individuals in need of care. Pressure is likely to emerge in the future for policy changes to increase formal care provision, especially as the future availability of informal care is likely to diminish rather than increase. The gap between the need for care and the supply of formal care will widen due to the growing numbers of elderly people and a likely reduction in the supply of informal care within households.¹⁴

2. The LTC insurance market puzzle

For a large majority of individuals, the cost of LTC in case of severe dependence is high, if not prohibitive. To illustrate this, let us focus on the example of France. Whereas the average pension of a French household is about EUR 1 200 a month, the cost of a good nursing home runs much above that figure. The average cost of institutional long-term care for old people in France is currently at EUR 35 000 per dependent per year (see OECD, 2006), whereas the yearly price of a nursing home in the US ranges between USD 40 000 and USD 75 000 (see Taleyson, 2003).

But despite those large costs, and despite the significant probabilities of becoming dependent in old age (Kemper and Murtaugh, 1991), the LTC private insurance market remains small. This underdevelopment of the LTC private insurance market goes against simple theoretical predictions and, as such, constitutes what is now commonly called the LTC insurance puzzle. In this section, we survey some major factors explaining that puzzle.¹⁵ We shall distinguish between, on the one hand, factors based on perfect rationality and, on the other hand, factors presupposing behavioral imperfections.

2.1 *Excessive costs*

Maybe the simplest explanation of the LTC insurance puzzle lies in its high price which, following standard microeconomics textbooks, leads to a low demand. Various empirical studies show that, for most individuals,

¹⁴ Although the scale of this effect will depend on the starting employment rates of women, among other factors.

¹⁵ Other recent surveys on that issue include Brown and Finkelstein (2011) and Pestieau and Ponthiere (2011).

a private LTC insurance is something very expensive, which they cannot afford. According to Rivlin et al. (1988), only 20 percent of US citizens could purchase insurance for less than 5 percent of their income. Those figures are confirmed by those in the *Lifespans Surveys* (1992): 91 percent of those who do not purchase a private LTC private insurance find that this is far too expensive (see Cutler, 1993). Hence, in the light of this, it appears that explaining the LTC insurance puzzle *a priori* looks quite simple: the high price suffices to explain everything.

The price of a private LTC insurance has been studied in detail by Brown and Finkelstein (2007). Those authors estimate, on the basis of HRS (Health and Retirement Survey) data, that a private LTC insurance purchased at age 65 has a *load factor* equal to 0.18.¹⁶ This means that, for any dollar spent on LTC costs, one can hope to get 0.82 dollars back. That load factor of 0.18 is much larger than for standard health care insurance, where the load factor lies between 0.06 and 0.10 (see Newhouse, 2002). At a first glance, it is tempting to conclude, from those figures, that the low covering rate of the private LTC insurance does no longer look like a puzzle.

However, things are not so simple. Brown and Finkelstein (2007) also provide estimates of the load factor by gender, and find significant differences across gender: men face a load factor of 0.44, whereas women benefit from a load factor equal to -0.04 (that is, better than actuarially fair prices).¹⁷

Quite surprisingly, the participation rate is almost *equal* for men and women, despite that large differential in load factors. That result either suggests that there is a strong correlation, within households, about insurance decisions, or, alternatively, that prices, although high, may not explain the entire picture of the LTC insurance puzzle.

What can explain those high load factors? According to Brown and Finkelstein (2007), it is hard to discriminate, on the basis of empirical observations, between four causes: administrative costs, imperfect competition, asymmetric information and aggregate risk of rising costs. All those causes imply a high loading factor, as well as limits in the benefits

¹⁶ The load factor is defined as the ratio: one minus the expected discounted present value of monetary benefits divided by the expected discounted present value of insurance premia.

¹⁷ This large men/women differential may reflect gender differences in the LTC utilization, due to women's higher longevity but, also, that elderly men are more likely to receive informal aid from their spouses, as compared to elderly women.

comprehensiveness (i.e. quantity rationing), which are also observed (i.e. the typically purchased policy covers only 1/3 of the expected LTC expenditures).

But beyond the actual level of the LTC insurance price, the presence of asymmetric information may make the LTC insurance price even more excessive. Despite recent medical advances, it remains very difficult for an insurer to forecast, for a given individual, the evolution of his autonomy and health status across the lifecycle. In other words, the probability of old age dependency remains very hard to extract for the insurer. At the end of the day, the best informed individual remains the future elderly himself. But if the elderly is more informed than the insurer, the standard *adverse selection* problem arises: only individuals with a sufficiently large probability of old-age dependency will purchase LTC private insurance. Note that this better information about future autonomy prospects may lead individuals to postpone, as much as possible, the purchase of LTC insurance, as suggested by Meier (1999).¹⁸

The existence of asymmetric information on the LTC insurance market is studied by Finkelstein and McGarry (2006). Using AHEAD data (US), they show that there exists no positive correlation between, on the one hand, the fact of having purchased a private LTC insurance and, on the other hand, the probability of institutionalization (nursing home). In other words, the ratio of LTC insured persons to the whole population among individuals admitted to nursing homes does not significantly differ from unity. However, this absence of correlation does not imply that no asymmetric information exists. Finkelstein and McGarry show that the subjective probability of institutionalization within 5 years (which is not observable) is positively correlated with the fact of being insured against LTC. Hence, there exists some asymmetric information, and the absence of correlation between insurance and institutionalization comes from *another* selection mechanism, preferences-based selection, which counterbalances the standard risk-selection mechanism. According to Finkelstein and McGarry, precautionary behavior, as measured by the past purchase of other insurance, is positively correlated with the purchase of LTC insurance, but negatively correlated with institutionalization. This

¹⁸ This alternative explanation of the LTC insurance puzzle is even more likely once it is acknowledged that LTC insurance is associated with large yearly administrative costs (see below). Those costs discourage an early purchase of LTC insurance, and favor postponement.

double selection mechanism explains the contraction of the LTC private insurance market despite the absence of correlation between the purchase of insurance and the institutionalization.

The existence of an adverse selection problem on the LTC insurance market is confirmed by Sloan and Norton (1997). On the basis of two surveys for the US (AHEAD – *Asset and Health Dynamics* – and HRS – *Health and Retirement Survey*), Sloan and Norton find a positive and statistically significant correlation between the subjective probability of entering a nursing home and the probability of purchasing LTC insurance.¹⁹ More recently, Courbage and Roudaut (2008) find, on the basis of SHARE data for France (*Survey on Health, Aging and Retirement in Europe*), that there exists a positive and statistically significant correlation between, on the one hand, having a high risk of dependency (e.g. high BMI scores and high alcohol consumption) and, on the other hand, the purchase of LTC insurance. Hence, the plausible presence of adverse selection may contribute to explain the high LTC insurance costs and, as a consequence, the LTC insurance puzzle.

Note also that, besides that standard, static adverse selection, some studies also highlighted the possible existence of a *dynamic* adverse selection, which would also explain the underdevelopment of the LTC private insurance market. The underlying idea, studied in Finkelstein et al. (2005), is the following. Even in the absence of asymmetric information, there may be an inefficiency of the LTC insurance market in a dynamic environment where agents are strongly encouraged to break their insurance contract. According to the HRS database, the probability of institutionalization is lower among those who break their insurance contract. Note that such a lower probability of institutionalization could, at first glance, be due to standard moral hazard (those keeping the insurance would spend more on LTC).²⁰ However, Finkelstein et al. (2005) reject that hypothesis, on the grounds that, among those leaving the LTC insurance market, the probability of institutionalization is not influenced by the fact of shifting to another insurance, or giving up all insurance. Note, however, that, in the light of the characteristics of those breaking their

¹⁹ Naturally, one cannot exclude the existence of moral hazard explaining that correlation. However, Sloan and Norton (1997) find that family structure variables (marital status and children), which should here affect the occurrence of moral hazard, do not influence the probability of purchasing LTC insurance.

²⁰ On moral hazard in nursing home uses, see Grabowski and Gruber (2007).

insurance contract, explanations alternative to the revelation of new pieces of information may rationalize the break: either initial mistakes by LTC insurance purchasers or, possibly, (uninsured) negative income shocks.

2.2 Unattractive rule of reimbursement (lump sum)

Another explanation for the LTC insurance puzzle consists of the specific *form* of the LTC insurance contracts currently existing on the market. One would expect, like in standard health care insurance, LTC insurance contracts giving a right to the reimbursement of care and service costs, possibly up to a certain limit and with multiple options, including deductibles. The problem is that an increasing number of insurance markets, typically the French one, provide for the payment of a monthly lump-sum cash benefit, which is proportionate to the degree of dependency involved and adjusted according to the evolution of this dependency. These products are closely related to annuitized products and the limited insurance they provide is justified by some type of *ex post* moral hazard.²¹

The degree of dependency can be assessed quite objectively. However, the extent of the needs of a dependent person is much more difficult to assess objectively. The needs of a dependent person are less easy to assess than in the case of well-known disabilities. The perception of LTC is a very recent phenomenon, and the needs implied by a loss of autonomy are vague and susceptible to various interpretations, depending on family background and the social environment. For example, washing difficulties may give rise to a demand for various kinds of services, depending on the person concerned. This diversity of potential needs and demands may give rise to a large number of costly discussions. Hence, to avoid these discussions, insurance firms prefer to offer a cash benefit that dependent people can use in their own way, with the consequence that some individuals feel shorthanded.

Although the precise form of LTC insurance contract may seem irrelevant for the explanation of the LTC insurance puzzle, the associated incompleteness of the LTC insurance contract has often be proposed as a major cause of the underdevelopment of private LTC insurance markets.

²¹ This type of moral hazard cannot allegedly be taken care of by the traditional co-payments or deductibles.

In a pioneer paper, Cutler (1993) argued that, since there exists a long delay between, on the one hand, the purchase of the LTC insurance and, on the other hand, the first LTC-related costs, there may exist a strong intertemporal variability of LTC costs per dependent person. The risk of a rise in LTC costs per dependent person is common to all members of a cohort and thus, cannot be diversified on a cohort (contrary to the risk of loss of autonomy, which can be diversified on a single cohort). Therefore, the only way for insurers of protecting themselves against too large reimbursements to elderly dependent due to a rise in LTC costs is to carry out intertemporal pooling on several cohorts. But such an intertemporal pooling can only work when LTC costs are not intertemporally correlated. Unfortunately, LTC costs are also strongly correlated over time, which makes intertemporal pooling difficult. As a consequence, the risk of a rise in LTC costs per dependent cannot be fully insured. This explains why LTC insurance contracts now propose lump-sum reimbursement, or numerous limitations to reimbursement (e.g. thresholds). Moreover, Cutler (1993) also emphasizes the strongly risky nature of LTC insurance. This highly risky nature has an immediate corollary for investors: large risk premiums are required, to compensate for the risk taken by the insurers. Those high risk premiums lead to excessive LTC insurance prices (see below).

In sum, the inadequacy of lump-sum reimbursement deters individuals from purchasing a private LTC insurance.²² That explanation differs from the previous one, which presupposed a complete LTC insurance, but questioned the high level of the insurance price. On the contrary, the core of that alternative explanation of the LTC insurance puzzle lies in the necessarily *incomplete* nature of the LTC insurance contract. Rational forward-looking individuals may not want to purchase such an incomplete insurance.²³

²² However, some studies, such as Taleyson (2003) and Kessler (2007), argued, contrary to Cutler (1993), that lump-sum reimbursement is a major factor explaining the dynamism of the French LTC insurance market as compared to the US market.

²³ The formal properties of the fixed reimbursement insurance are studied in detail in Eeckhoudt et al. (2003). See also Cremer, Lozachmeur and Pestieau (2012)

2.3 Crowding out by the family

Another explanation of the LTC insurance puzzle consists of crowding out of private LTC insurance by family solidarity.²⁴ The underlying rationale goes as follows. True, if economic agents were living alone, without any family or friends, there would exist few effective ways of insuring oneself against the substantial – and highly likely – LTC spending at old age. Therefore, in such a narrow context, forward-looking rational agents would definitely buy private LTC insurance. However, the real world is quite different, and many individuals can, once dependent, rely on their spouse or on their children to be helped in case of LTC. Therefore, the low level of private LTC insurance coverage does not result from irrationality. On the contrary, private LTC insurance is regarded as non-optimal by rational individuals who anticipate future help from their family.

Another family-based explanation of the LTC insurance puzzle was proposed by Pauly (1990). Parents actually prefer not to be sent to an institution once they are dependent. Clearly, parents have a strong preference for receiving help from their own children or grandchildren. That preference for family-provided LTC tends, under weak assumptions, to rule out LTC private insurance. Indeed, such insurance tends to reduce the cost of institutionalization and, hence, increases the probability of being sent to a nursing home. Therefore, provided that, in case of old-age dependency, a rational person prefers to be helped by a family member rather than by an unknown social worker, the incentive to purchase a private LTC insurance is low, even in the absence of state assistance.

It should be stressed, however, that the existence of family concerns does not, on its own, suffice to explain the LTC insurance puzzle. The reason is that the precise form of parental *preferences* matters. If a parent is sufficiently altruistic towards his children, then, as argued by Pauly (1996), he will buy LTC private insurance in order to avoid burdening his spouse or children in case of old-age dependency.²⁵ He will do so despite the fact that, from a purely egoistic perspective, he would have preferred being helped by his children or spouse rather than being sent to an anon-

²⁴ That explanation is quite close to the one used in another well-known puzzle: the annuity puzzle (see Brown, 2007). In that context, the family would provide an insurance against an unexpected long life.

²⁵ This burden could be in terms of money (LTC spending) or time (in case of home-based informal help).

ymous institution. However, if a parent is not sufficiently altruistic, he will behave strategically and use the promise of high bequests to be helped by his family (see Norton, 2000).²⁶ Therefore, the mere existence of family concerns only explains the LTC insurance puzzle under particular preferences for parents.

This family-based explanation of the LTC insurance puzzle has been subject to various empirical tests, with quite equivocal results. On the basis of US data, Sloan and Norton (1997) show that the bequests left to descendants do not have any statistically significant effect on the demand for private LTC insurance. That empirical finding does not support the family-based explanation. However, a more recent study by Courbage and Roudaut (2008) shows, on the basis of the French SHARE data, that being married and having children makes it more likely to purchase private LTC insurance. This latter empirical result supports the importance of parental preferences for the issue at stake (Pauly, 1996), but without fully validating the family-based explanation of the LTC insurance puzzle. Indeed, if parental altruism makes parents buy LTC private insurance, then the underdevelopment of LTC insurance would reveal the widespread lack of altruism among parents, which does not seem fully convincing.

2.4 Crowding out by the state

Besides the reliance on the family, another possible explanation for the LTC insurance puzzle points to a potential crowding out by state assistance (Norton, 2000). The underlying idea is the following. By acting as the Good Samaritan, the government can supply some aid to the dependent elderly without resources. Therefore, rational forward-looking individuals have little incentive to buy LTC private insurance, simply because they can benefit from state-provided resources at old age without having purchased any private insurance. Hence, provided that the state can help the elderly dependent in need, buying a private LTC insurance is a waste of resources.

Note that this kind of crowding out argument does not require the actual existence of a large public LTC program. Indeed, only the *expecta-*

²⁶ We assume that children cannot buy an insurance to protect themselves against LTC spending on their parents.

tion of state-provided help to the elderly dependent in need suffices to do the job. Hence, given the distance to old-age dependency, it is easy for individuals to believe that, by the time they become dependent, the state will have developed a new “pillar” of the social security system.²⁷

The hypothesis of crowding out by the state has been largely debated in the US, where social assistance – i.e. Medicaid – is often suspected to be at the origin of the LTC insurance puzzle. Sloan and Norton (1997) show that there exists a statistically significant negative correlation between, on the one hand, the probability of purchasing a private LTC insurance and, on the other hand, the variables determining the eligibility for Medicaid. More recently, Brown and Finkelstein (2008) estimate a lifecycle utility model for an individual of age 65 (men and women) choosing a lifecycle consumption profile under risk for LTC expenditures. They compute the willingness to pay for LTC private insurance under various degrees of risk-aversion and show that, for a wide range of preferences, the utility gain from buying LTC insurance is negative. They also argue that Medicaid, by its role of last resort payer, would explain at least 2/3 of the contraction of the US private insurance market, even when actuarially fair LTC insurance would be available. The hypothesis of crowding out by Medicaid has also been tested by Brown et al. (2007). On the basis of HRS data, they estimate that a USD 10 000 fall of the Medicaid eligibility threshold would increase the LTC insurance coverage ratio by 1.1 points.²⁸

In the light of those results, the crowding out of private LTC insurance by Medicaid in the US seems to be statistically significant. However, the exact size of the crowding out phenomenon remains hard to quantify. This leaves us with two possibilities. Either the crowding out by the state assistance only explains a part of the LTC insurance puzzle; i.e. other factors are also at work. Alternatively, it may be that, rather than the actual assistance by the state, the crowding out may follow from expectations about future state assistance.

To conclude, it should be stressed that the crowding out by state assistance, if it exists, can take various forms, which have different implica-

²⁷ See Section 4 on the difficulties raised by the construction of that pillar.

²⁸ According to Brown et al. (2007), the minor effect of eligibility criteria can be explained as follows. Provided that Medicaid remains a secondary payer, it follows that even without any asset limits to Medicaid eligibility, a large portion of the private insurance benefits are redundant to what Medicaid would otherwise have paid.

tions. First, some individuals may decide to spend all their wealth when being healthy, in order to become eligible for state assistance. Second, one may simply hide one's resources in such a way as to become eligible for social assistance. Third, some individuals may, in contrast, transfer their wealth to their children through *inter vivos* gifts, in order, here again, to become eligible for social assistance. Those three cases are characterized by different individual lifecycle consumption profiles, for individuals and their siblings. But, from the point of view of the state, the outcome is the same: such a strategic behavior makes those individuals eligible for assistance, through means-tested benefits such as Medicaid in the US or the APA in France. Given that the public authorities are often reluctant to reclaim part of the estate of those having benefited from LTC assistance, such strategic behaviors will be adopted and lead to the effective crowding out of private LTC insurance by the state.

2.5 State dependent utility

So far, we have implicitly assumed that the form of the utility function is the same in all states of the world. LTC prevalence is an instance when this assumption might be violated. The preferences are totally different for someone who is healthy and has a variety of goals in life, and for someone who is disabled, and has well-defined but limited needs. In standard utility maximization problems, the first-order conditions that characterize the optimum equate the marginal utility of consumption across states. If the utility function is the same in all states, an individual equates the marginal utility of consumption by equating the level of consumption across states. Insurance provides a simple mechanism for smoothing consumption across states of the world. Assume that to reach a certain level of welfare, one needs much more resources in a state of disability than in a state of full autonomy and that in case of disability, one quickly reaches some type of satiation (there is a limit to the level of nursing one's needs). In that case, the demand for insurance can be nil or, at best, low.

Let us denote the utility in the state of autonomy as $u(c)$ and the utility in the state of dependence as $H(m)$, where c and m represent the corresponding level of consumption. The probability of dependence is π and θ

is the premium for an actuarially fair insurance. The expected utility can be written as

$$EU = u(w - \theta)\pi + H(w - \theta + \theta/\pi)(1 - \pi) \quad (1)$$

where w is the initial wealth. Clearly, it pays to buy some insurance if $-u'(w) + H'(w) > 0$. In other words, if the marginal utility of wealth is higher in disability than in autonomy. This in turn may depend on the wealth level. When H reaches a saturation level, $u'(w)$ may be larger than $H'(w)$ when the individual is sufficiently wealthy. In other words, once nursing is financed, the wealthy disabled has no more need.

Finkelstein et al. (2008) note that it is *a priori* ambiguous whether the marginal utility of consumption rises or falls with deteriorating health, given that some goods (e.g. travel) are complements to good health while other goods (e.g. assistance with self-care) are substitutes for good health. However, they also provide evidence, using subjective well-being measures from HRS, that a one standard-deviation increase in an individual's number of chronic diseases is associated with an 11 percent decline in marginal utility. They report that this reduces the optimal share of medical expenditures covered by health insurance by about 20 to 45 percentage points. In a theoretical paper, Bien et al. (2012) derive the conditions under which rational forward-looking agents do not buy LTC private insurance; these conditions pertain to the substitutability between three dimensions of welfare: consumption, autonomy and health.

2.6 Myopia or ignorance

So far, we have only considered explanations of the LTC insurance puzzle, which suppose *rational forward-looking* agents. Put differently, when deciding not to purchase private LTC insurance, individuals do not make any mistake or judgment error. According to those explanations, it is rational, in the presence of a high LTC insurance loading factor, not to buy an insurance that only provides quite limited reimbursement under the form of lump-sum payments. The presence of family and state assistance reinforces the incentive not to purchase private insurance. Finally, if state-dependent utility is such that, under old-age dependency, the marginal utility of income is very low, there is also no rational argument for

purchasing private LTC insurance. Hence, under those explanations, agents behave rationally and, as a consequence, the low level of LTC private insurance markets is also individually rational.

Whereas those explanations are plausible, these are not the unique possible ones. It is also possible to rationalize the observed low covering of LTC insurance, while regarding the non-purchasing decisions as *irrational*. This kind of explanation can take various forms, but each of these involves some kind of behavioral imperfection.

A first behavioral explanation consists of an *underestimation*, among the population, of the risk of old-age dependency. There is a well-known downward bias of the probability of occurrence of negative events in life. Old-age dependency obviously being negatively loaded, individuals are likely to minimize its frequency of occurrence. Note, however, that such a downward bias is not benign at all as far as the demand for LTC private insurance is concerned. Under a low probability of old-age dependency, the individual's incentive to purchase insurance is pretty low since the expected welfare gains from such an insurance are not only temporally distant, but, also, highly unlikely, whereas the cost of such an insurance is certain (and high, as shown above). Thus, some underestimation of the risk of old-age dependency may explain a significant part of the LTC insurance puzzle.

The objective probabilities of old-age dependency estimated in the literature are quite high. For instance, according to Murtaugh et al. (1997), an individual aged 65 has a 0.43 probability of entering a nursing home. That probability is also shown to differ significantly across gender: it is equal to 0.33 for men (as their wife will generally be in better health and thus will take care of them), and to about 0.50 for women. Moreover, Murtaugh et al. (1997) show that the stays at nursing homes are long: 15-20 percent of the newcomers will remain more than five years. Taken together, those estimates should, in principle, make a large proportion of the population at risk buy LTC private insurance. Naturally, that claim presupposes that individuals are well-informed and can easily manipulate probabilities.

On the basis of the high objective probabilities of old-age dependency, one can interpret the low demand for LTC insurance as revealing the downward bias in the subjective probabilities of old-age dependency. Finkelstein and McGarry (2006) show, on the basis of AHEAD data (av-

erage age: 79 years), that the distribution of the subjective probability of entering a nursing home within the next five years of life has a singular form, and is not single-peaked. About 50 percent of the population consider that the probability that they will enter a nursing home in the next five years is zero. The second peak of the distribution arises at the value of 0.50: about 15 percent of the population believe that the probability of entering a nursing home equals 0.50. Very few people assign a probability larger than 0.50. Undoubtedly, that singular distribution of the subjective probability of old-age dependency supports the underestimation thesis: the low demand for LTC insurance would thus reveal individuals' – excessive – optimism about future health status.

It should be stressed, however, that subjective probabilities may not explain the LTC insurance puzzle as a whole. To see this, note that, according to Finkelstein and McGarry (2006), eight percent of the individuals who believe that they will definitely not enter a nursing home within 5 years have actually purchased LTC insurance. Given the high age of the surveyed individuals, this figure is somewhat surprising, and suggests that individuals may have difficulties in manipulating small numbers, and in drawing all conclusions from their subjective beliefs.

More importantly, biases in the assessment of old-age dependency risk may tend to vanish over time, as individuals can, over their lifecycle, learn about their health capital, for instance by observing the health of their own, elderly parents. Such a *learning* process may tend to qualify the underestimation hypothesis, by suggesting that this cause of the LTC insurance puzzle would only be valid in a very short time horizon. Regarding this learning effect, Courbage and Roudaut (2008) report, on the basis of French data in SHARE, that the probability of purchasing a private LTC insurance is increasing with the fact of having received an informal help, and is also increasing in the fact of having provided such a help. Those empirical findings cast some light on the formation of subjective beliefs about old-age dependency risk.

In sum, the existing literature – the observed gap between objective and subjective probabilities of old-age dependency – suggests that there may be a strong behavioral explanation to the LTC insurance puzzle. Nonetheless, the precise form of the behavioral imperfection is harder to identify. Low subjective probabilities of old-age dependency may reflect myopia, or ignorance, or optimism, or some other bizarre attitude to risk.

Having stressed this, one can hardly, in the light of the existing empirical literature, keep the standard objective expected utility models with full information as good approximations for the description of real choices in terms of LTC insurance.

2.7 Denial of heavy dependence

Finally, besides the subjective *versus* objective probability issue, another behavioral explanation can be explored here. Clearly, when discussing LTC so far, we did *as if* old-age dependency is regarded as a standard, everyday life issue by individual decision-makers. In that context, purchasing a private LTC insurance would be formally close to purchasing common goods (like cars etc.). This constitutes an obvious simplification. Old-age dependency is the exact opposite of an everyday life issue. Old-age dependency is a unique event in one's life (i.e. something comparable to childhood). Given the singularity of old-age dependency, one can hardly treat the purchase of a private insurance against LTC costs as the purchase of a normal insurance (e.g. against car accidents or domestic fires).

Heavy dependence, like death, is a source of anxiety and, as such, this may imply the possibility of denial of dependence-relevant information, interacting with intertemporal choices. One would try to forget about old-age dependency in the same way as one tries to forget about death. Such a denial of old-age dependency is likely to lead to time-inconsistent decisions and other "behavioral" phenomena.²⁹

The repression of signals of mortality leads to underinsurance for unsophisticated individuals. Note that for forward-sophisticated individuals, the result can be reversed: they may over-insure in anticipation of future denial and seek commitment devices. The refusal to face up to the reality of dependence may help explain an inadequate purchase of LTC insurance. Private LTC insurance only makes sense provided that one acknowledges the mere existence of old-age dependency. Denying that possible event in life makes the purchase of LTC insurance so irrelevant that it will not even enter the set of possible consumption bundles.

Although that denial explanation of the LTC insurance puzzle shares some psychological, behavioral features with myopia or ignorance (see above), one should be careful to avoid mixing those two types of explana-

²⁹ On the denial of death and its behavioral consequences, see Kopczuk and Slemrod (2005).

tions. Clearly, while one may think about (more or less) easy ways of correcting for myopia or ignorance (e.g. information campaigns, adequate taxes or subsidies), the same is not that obvious in case of denial of old-age dependency. The reason is that a denial is not due to the failure to perceive things, or to collect or process the required information. On the contrary, a denial consists of a lack of will to do so. This kind of behavioral imperfection seems harder to overcome by means of standard policy instruments.

3. The role of family solidarity

As already mentioned, most seniors with impairments reside in their home or that of their relatives, and they largely rely on volunteer care from the family. These include seniors with severe impairments (unable to perform at least four activities of daily living). And many people who pay for care in their home also rely on some donated services. The economic value of volunteer care is significant, although the estimates of it are highly uncertain.

Whether this solidarity is sustainable at its current level is an important question. There are numerous sources of concern. The drastic change in family values, the increasing number of childless households, the mobility of children, the increasing labor participation of women are as many factors explaining why the number of dependent elderly who cannot count on family solidarity is increasing.³⁰

An important feature that is often neglected is the real *motivation* for family solidarity. For long, we have adopted the fairytale view of children or spouses helping their dependent parents with joy and dedication, what we call pure altruism. We now increasingly realize that family solidarity is often based on forced altruism (social norm) or strategic considerations (reciprocal altruism). In this section, we review some recent work on these issues.

Knowing the foundation of altruism is very important in order to see how family assistance will react to the emergence of a private or public scheme of LTC insurance. For example, the introduction of LTC social

³⁰ See Duée et al. (2005) on the factors explaining the rise in the number of elderly dependent individuals in need who cannot benefit from someone's informal help.

insurance is expected to crowd out family solidarity based on pure altruism, but not necessarily that based on forced altruism. In families where solidarity is based on strategic exchanges (bequest or *inter vivos* gifts in exchange for assistance), the incidence of a social LTC scheme will be a decline in intergenerational transfers. The issue of crowding out is pervasive as it does not only concern the possible substitutability between family solidarity and formal schemes, but also between social and private LTC, as we will see below. We now survey a sample of recent microeconomic papers dealing with LTC and family relations.

3.1 Strategic bequest motive

The classic paper on strategic bequests by Bernheim et al. (1985) shows that parents can, in theory, extract from their children the maximum amount of attention and/or assistance, by playing them against each other with the prospect of inheritance. In this type of model, parents have a hold on the game. That strategic bequest motive is shown, in that same paper, to be empirically supported by the existence of a positive correlation between the attention paid to parents (the number of visits and phone calls) and the (potential) wealth inherited by children.

Note, however, that the strategic bequest motive presupposes that the dependent elderly has sufficiently good cognitive skills. The reason is that the elderly dependent can only take part in exchanges with his children provided that he remains the effective decision-maker regarding the allocation of his resources. Thus, under the strategic bequest motive, children's care is conditional on parental cognitive awareness, unlike under pure family altruism.³¹

This observation has been used in subsequent empirical studies in order to test the existence of a strategic bequest motive. Hoerger et al. (1996) show, on the basis of *National Long Term Care Survey* (NLTC) data, that the level of parental cognitive awareness has no impact at all on the attention and care received from children. It even appears that, among cognitively able parents, the received informal help is smaller among

³¹ For cognitive skills along the lifecycle, see recent studies by Adam et al. (2007) and Agarwal et al. (2007). The cognitive performance decreases beyond the age of 60, with slopes varying with the socio-professional group.

richer parents. This contradicts the existence of a strategic bequest motive.³²

Sloan et al. (1997) consider an alternative family model where the elderly parent derives some welfare from the child's informal aid. The child is not purely altruistic, but he would like his parent to be helped. The levels of informal and formal care are then treated as the outcome of an intrafamily bargaining process. Informal aid is, in theory, increasing with the number of children (as this makes the threat of no bequest more plausible), increasing in the degree of parental cognitive awareness (see above), and in the parent's wealth (since this makes the child follow his parent's will better). Empirical tests using NLTC data lead to the rejection of all those theoretical predictions. Thus, there is little empirical support for the hypothesis that care giving by children is motivated by the prospect of receiving bequests from their parents. Moreover, Sloan et al. (1997) show that Medicaid subsidies have not "crowded out" informal care provided by relatives and friends of the dependent elderly, nor have they reduced wealth accumulation by the elderly.

3.2 Family games: The dependent elderly and his children

A central aspect of LTC consists of the precise living arrangement concerning the dependent elderly. Hoerger et al. (1996) develop a model where the family chooses a living arrangement, in such a way as to maximize family welfare subject to the family budget constraint. Three living arrangements are considered: (1) the dependent elderly lives at home; (2) the dependent elderly lives in a nursing home; and (3) the dependent elderly lives in an intergenerational household. Hoerger et al. (1996) also examine the effects of public subsidies on the living arrangements of the disabled elderly. Direct subsidies for nursing home care and state policies which significantly limit nursing home beds or reimbursement affect the choice of living arrangement. State policies which subsidize community living have little effect on nursing home entry, although they increase the probability of living independently.

Hiedemann and Stern (1999)³³ argued that, in the previous literature on living arrangements for the elderly, the number of children was largely

³² See also Sloan et al. (1997) for similar results.

³³ See more recently Hiedemann et al. (2012).

ignored. As a consequence, little attention was paid to strategic interactions among children. In order to study those interactions among children, Hiedemann and Stern develop a family model with one dependent elderly and several children. Three living arrangements are available: (1) the dependent parent lives alone; (2) only one child (the primary caregiver) provides some care to his parent; (3) the dependent parent is sent to a nursing home.

The decision process has two stages. In the first stage, each child decides whether he proposes to serve as the primary caregiver. Then, in a second stage, the dependent parent chooses the best living arrangement among the available ones (i.e. children's bid in the first stage, plus living alone or in a nursing home). Given that the child proposes his service as a primary caregiver only if there is a net positive expected utility gain from such a proposition, the first-stage decision obviously depends on the parent's preferences (in particular on the probability that he regards the child's proposal as the best).

Assuming, in the first stage, that only one component of the direct utility assigned by a particular child to a particular living arrangement is common knowledge, whereas the second component is a stochastic component, Hiedemann and Stern solve the model numerically, under different structures of preferences (e.g. free riding by children, or, alternatively, children with exclusivity tastes for care giving). They derive the equilibrium, which here consists of a vector of each child's probability of proposing his help, such that all beliefs of all children are consistent with each other. Hiedemann and Stern then estimate, on the basis of NLTC data, the determinants of the family member's utility. They show that dependent women value children's informal help more than dependent men, and that the help of a caregiver of the opposite gender is, on average, more valued by the dependent parent. More importantly, Hiedemann and Stern show that two imperfections prevent the maximization of aggregate welfare: imperfect information and coordination failures.

Stern and Engers (2002) compare two family decision models. On the one hand, the unitary household model, where the entire family chooses the best living arrangement for the dependent elderly, that is, the living arrangement maximizing the family (aggregate) utility function. On the other hand, the voluntary model, where each family member is allowed to choose not to take part in the caring decisions. In that second model, the

chosen option is the one that maximizes the total utility of the participating family members. Stern and Engers also rely on data from the NLTCs to estimate and test the parameters of their models. Then, they use the parameter estimates to simulate the effects of the existing long-term trends in terms of the common but untested explanations for them. They also simulate the effects of alternative family bargaining rules on individual utility to measure the sensitivity of their results to the family decision-making assumptions they adopt.

More recently, Pezzin et al. (2007) use a two-stage bargaining model to analyze the living arrangement of a disabled elderly parent and the assistance provided to the parent by her adult children. In the first stage, the living arrangement of the parent is chosen (living alone, in a nursing home, or with a child). In the second stage, the assistance/transfers from the children to the elderly dependent are determined, given the living arrangement chosen in the first stage.

Working by backward induction, Pezzin et al. (2007) first calculate the level of assistance that each child would provide to the parent in each possible living arrangement. Using these calculations, they then analyze the living arrangement that would emerge from the first-stage game. Various types of games are considered. One major result is that, since coresidence tends to reduce the bargaining power of coresident children (and, thus, to put him in a bad situation in stage 2), that living arrangement, though Pareto-efficient, is unlikely to emerge from the first stage in the absence of explicit commitment about assistance at stage 1. That is, the outcome of the two-stage game need not be Pareto efficient.

Whereas most game-theoretical family models of LTC provision have either focused on the children-parent relationship, or on the strategic interactions among children, an important exception is Pezzin et al. (2009) who study whether the presence of children has any impact on the LTC assistance provided by a parent to his/her dependent spouse.

3.3 Family solidarity in a dynamic world

Finally, whereas the articles surveyed so far study the behavior of family members in a static context, two recent papers focus on the role of the family in the provision of LTC in a dynamic set up. Canta and Pestieau (2012) develop an overlapping generations model where each cohort of

adult children is divided between, on the one hand, traditional agents, who provide an amount of LTC help equal to what was provided by the previous generation and, on the other hand, opportunistic agents who choose LTC by maximizing their expected lifetime welfare, while anticipating that, if they have traditional children, providing low LTC to their parent will imply low LTC received once being dependent. Assuming exogenous transition probabilities across types, Canta and Pestieau then characterize the optimal LTC policy at the stationary equilibrium, and discuss the occurrence of crowding out of private LTC insurance in their results. They find two reasons for public action: redistribution and an informational externality.

In another recent paper, Ponthiere (2011) examines whether state-provided LTC can crowd out family-based LTC in an economy where each adult cohort is divided between altruistic and non-altruistic individuals, and where the transmission of the altruistic trait follows a socialization process à la Bisin and Verdier (2001). Ponthiere shows that if the state provides LTC to dependent parents who are not helped by their children, parental socialization efforts aimed at transmitting altruism are necessarily reduced. However, that fall in the investment in the values of children does not necessarily lead to a crowding out effect. The existence of crowding out depends on the form of the dependent's utility function, on the cost and form of the socialization mechanism at work, and may also depend on the initial conditions (i.e. the current prevalence of family altruism).

In sum, although non exhaustive, this short survey suggests that considerable efforts have recently been made to open the family "black box", in such a way as to represent it as a set of interdependent individuals, whose behavior in terms of LTC provision, dependent living arrangements, or own spatial localization, is not necessarily based on pure altruism but, also, on strategic considerations or social norms.

4. Social LTC insurance

There are very few countries with explicit LTC social insurance programs. Furthermore, these programs are not very generous: they only cover a small fraction of the LTC cost (typically EUR 500 a month) and

yet their sustainability is uncertain. Let us as an example describe the most developed of these schemes, the German one that was introduced in 1995 and has been coined as the “5th pillar” to the social security system.³⁴ This LTC insurance covers the risk of becoming dependent on nursing care and attention and it is taken out with the company providing health insurance. If the individual is covered by state health insurance, he automatically has long-term care insurance. If he has private health insurance and is entitled to general hospital care, he also has private long-term care insurance. As for health insurance, public long-term care insurance is financed through contributions of 1.7 percent of the gross salary split equally between employer and employee. Employers deduct contributions directly from the wages and transfer them to the health insurance funds.

To be fair, in most countries, health care systems cover the medical aspects of dependence and the assistance side of social protection provides means tested LTC nursing services. The best-known example of that is the American Medicaid that is suspected to discourage the development of an efficient market for LTC insurance. As we have seen above, there exists some work on this issue, mostly empirical. There is little theoretical work on the issue of LTC social insurance.

To approach this issue, one has to consider a social planner with some objective function comprising equity and efficiency aspects. This planner typically acts as a Stackelberg leader, that is, it can commit to a policy and anticipates the supply and demand responses of individuals and the behavior of families and private insurers. In other words, both families and markets act as followers. If, by any chance, market forces and family solidarity yield a desirable outcome, our central planner does not intervene. A few questions have already been addressed in this area. Jousten et al. (2005) focus on families with different levels of altruism. Given the cost of public funds, the central planner tries to induce the more altruistic families to assist their dependent parents and only provide aid to the dependent elderly whose children are less altruistic. This may imply a suboptimal quality of public LTC. Pestieau and Sato (2006, 2008) study the problem of evenly altruistic children who differ in their earning capacities, that is in their wages and thus, in the opportunity cost of the time they can volunteer assisting their dependent parents. In case of parents’ dependency, the more productive children will tend to provide financial

³⁴ The first four pillars are: health, family, unemployment and retirement.

help whereas the less productive children will opt for assistance in time. Parents with sufficiently high pensions or other resources and who do not expect enough assistance from their children will purchase some private insurance. The social welfare maximizing government can subsidize either private assistance or private insurance; it can also directly provide nursing services. The final outcome is shown to depend on the loading cost of private insurance, the cost of public funds and the wealth of the parents.³⁵

In the remainder of this section, we present a great deal of ongoing research on social insurance for LTC. But first of all we discuss some conceptual issues underlying the assumptions that have to be made when modeling a public LTC scheme.

4.1 Conceptual issues

In designing an optimal public insurance scheme for LTC, one faces a number of conceptual hurdles. We first need to define the social welfare criterion that will be used in such a design. In particular, if we are concerned by the wellbeing of both parents and children and if children help their parents in case of disability out of altruism, it must be decided whether or not the altruistic component of children's utility has to be taken into account or simply laundered out. Laundering out filial altruism is often advocated to avoid double counting. If the altruistic part of the children's utility were kept, the welfare of the disabled parents would be attributed too much weight.

Another issue arises when the aid coming from children is not motivated by altruism but by a social norm. In that case, family solidarity should not only be laundered out but could even be negatively weighted to account for the indirect cost inflicted on the aiding persons.

One delicate ethical issue is how to treat the state of severe dependence, which is a state where the dependent are unable to recognize those close to them or even their own reflection. This is a state where care is needed but not acknowledged. It might be tempting to think that the value of life in that state is lower than when the dependent are fully conscious.

There is also the issue of (new) paternalism that arises in case of misperception. Typically, if the individuals ignore or underestimate the risk

³⁵ The assistance from children decreases if the parents' wealth increases.

of disability in old age, one expects the government to induce them or even force them to take the appropriate protective steps.

Finally, there is the pitfall of utilitarianism when dealing with different preferences. Consider two individuals who live for two periods. Individual 1 will be autonomous all his life; individual 2 is expected to be disabled in the second period of his life. Denoting the utility of consumption by $u(c)$ for the first period and $u(d)$ for the second period and that of long-term care by $H(m)$, the problem of the social planner is to maximize:

$$u(c_1) + u(c_2) + u(d_1) + H(m_2), \quad (2)$$

subject to the resource constraint: $c_1 + c_2 + d_1 + m_2 = Y$, where Y represents the available resources and both the rate of interest and the time discount rate are 0. From the FOCs, one obtains that $c_1 = c_2 = d_1 = c \geq m_2$ depending on the utility functions.

The question of social insurance for LTC is very complex and it is impossible to deal with all issues at the same time. Consequently, we will divide it into four problems: (i) social insurance with uncertain family solidarity; (ii) social insurance along with private insurance; (iii) social assistance with strategic impoverishment; and (iv) social insurance determined by majority voting. First, we present what can be viewed as a canonical model.

Consider the lifetime utility of an individual facing a double uncertainty: that of dependence, π , and (conditional on being dependent) that of getting his child's aid, p . In the first period, the individual consumes c and enjoys a utility level of $u(c)$. He devotes e units of time to boost the probability of altruism of his child and the rest, $1 - e$, to market labor at wage w . His earnings $w(1 - e)$ finance his consumption c , saving s , and private insurance θ . He faces a probability π of becoming dependent. Thus, with probability $1 - \pi$, he will have a healthy second period and consume d , which comes from the proceeds of his saving, Rs . His utility is given by $u(d)$. In case of dependence, his welfare is given by $H(m)$ where m denotes the amount of LTC. One expects that $u(x) > H(x)$, namely to reach the same level of utility, one needs more resources in a state of disability than in a state of autonomy. In case of dependence, the individual will receive some help from his child with probability $p(e)$.

In that case, the level of care he receives is given by $m_1 = Rs + g + a + \theta\lambda/\pi$, where a is the level of help g , the social benefit financed by a payroll tax of rate τ , and $\theta\lambda/\pi$ the compensation from private insurance with λ being the loading factor. The level of aid a results from an altruistic choice by the child. With probability $1-p$, the parent does not get any aid from his child and his level of care is $m_0 = Rs + g + \theta\lambda/\pi$. We can now write the lifetime utility of the parent:

$$U = u(c) + (1-\pi)u(d) + \pi p H(m_1) + \pi(1-p)H(m_0), \quad (3)$$

or

$$U = u(w(1-\tau)(1-e) - s - \theta) + (1-\pi)u(Rs) + \pi p(e)H(Rs + g + a + \theta\lambda/\pi) + \pi(1-p(e))H(Rs + g + \theta\lambda/\pi). \quad (4)$$

The revenue constraint implies that

$$w\tau(1-e) = \pi g. \quad (5)$$

We now look at four different models. In the first model, private insurance is assumed away. The problem is the design of a LTC scheme (τ, g) that maximizes the lifetime utility of the individual. Heterogeneity of w and p is allowed. The second model focuses on the relation between private and public insurance. Now, family solidarity is assumed away and the main source of heterogeneity is w . Misperception is introduced, in which case the degree of misperception is another source of heterogeneity. The third model deals with the problem of relatively wealthy individuals who could afford to finance their LTC but prefer to benefit from means-tested schemes to increase their bequest capacity. This is done through what is called a strategic impoverishment. Whereas the first three models are normative, the fourth is positive. Society is made of individuals who differ in w , p and π and we look at the existence of majority voting on g .

4.2 Four problems

Public long-term care scheme with uncertain altruism

Cremer, Gahvari and Pestieau (2012) consider a society with two overlapping generations. There are two periods. In the first the parents work, educate their children and save for retirement. In the second, parents retire and incur a certain risk of dependence. Their children work and provide them with assistance in case of loss of autonomy. For various reasons pertaining to migration, health and goodwill, there can here be a default of assistance. The probability of assistance is assumed to partially depend on the time that parents have earlier devoted to their children. The LTC insurance market is assumed away but there is a possibility of developing a social insurance program for LTC. This means that as a protection against dependence, the parents can count on both their children's assistance and social benefits. They can also count on their own saving; that is, they can self-insure.

The authors look at the case of a representative individual and consider a three-stage game. The first stage is the choice by the government of social benefit and a tax to finance it. The second stage is the choice by the parent of education and saving. The third stage is the choice by children of the level of assistance the dependent parent gets. Children's assistance is uncertain; it has a probability that depends on the time that parents devote to shaping their preferences and inculcating them with values. In the *laissez-faire*, LTC will be underprovided; its level will be insufficient for individuals who do not receive assistance from their children. There is thus room for government intervention even with (*ex ante*) identical individuals. The main result is a tax formula which comprises an insurance term and an efficiency term. The tax will depend positively on the gap between the marginal utility of LTC in case of non-assistance and the marginal utility of consumption in the first period and negatively on the compensated effect of the tax on the time devoted to one's children.

Long-term care private and public insurance

One of the main rationales for social insurance is redistribution. Starting with the paper by Rochet (1991), the intuition is the following. We have an actuarially fair private insurance and the possibility of a social insurance scheme to be developed along with an income tax. If there were no

tax distortion, the optimal policy is to redistribute income through income taxation and let individuals purchase the private insurance that fits their needs. If there is a tax distortion, and if the probability of loss is inversely correlated with earnings, then social insurance becomes desirable. Given that low-income individuals will benefit more from social insurance in a distortionless way than high-income individuals, social insurance dominates income taxation. In that reasoning, moral hazard is assumed away but the argument remains valid with some moral hazard.

While the above proposition applies to a number of lifecycle risks, it does not apply to risks where the probability is positively correlated with earnings. This seems to be the case for LTC.³⁶ Dependence is known to increase with longevity and longevity with income. Consequently, the need for LTC is likely to be positively correlated with income, and Rochet's argument implies that a LTC social insurance would not be desirable. This statement does not seem to fit reality, where we see the needs for LTC at the bottom of the income distribution. Where is the problem?

First, we do not live in a world where income taxation is optimal. Second, even if we had an optimal tax policy, it is not clear that everyone would purchase LTC insurance. There is a great deal of evidence that most people understate the probability and the severity of far distanced dependence. This type of myopia or neglect calls for public action. Finally, private LTC insurance is far from actuarially fair; the loading costs are high and lead even farsighted individuals to keep away from private insurance: low income individuals will rely on family solidarity or social assistance and high income individuals on self-insurance.

Cremer and Pestieau (2011) study the role of social LTC insurance in a setting which accounts for the imperfection of income taxation and private insurance markets. Policy instruments include public provision of LTC as well as a subsidy on private insurance. The subsidy scheme may be linear or nonlinear. For the nonlinear part, they look at a society made of three types: poor, middle class and rich. The first type is too poor to provide for dependence; the middle class type purchases private insurance and the high income type is self-insured.³⁷

³⁶ Here, we have in mind disability at very old age.

³⁷ As shown above, this occurs when the marginal utility of LTC is lower than the marginal utility of consumption of healthy elderly.

Two crucial questions are then: (1) at what level should LTC be provided to the poor? and (2) Is it desirable to subsidize private LTC for the middle class? Interestingly, the results are similar under both linear and nonlinear schemes.

First, in both cases, a (marginal) subsidy of private LTC insurance is not desirable. As a matter of fact, private insurance purchases should typically be taxed (at least at the margin). Second, the desirability of public provision of LTC services depends on the way the income tax is restricted. In the linear case, it may be desirable only if no demogrant (uniform lump-sum transfer) is available. In the nonlinear case, public provision is desirable when the income tax is sufficiently restricted. Specifically, this is the case when the income is only subject to a proportional payroll tax while the LTC reimbursement policy can be nonlinear.

Cremer and Roeder (2012) extend this analysis by introducing myopia, and more specifically misperception of LTC risk. They show that social LTC provision is never second-best optimal when private insurance markets are fair. This is perfectly in line with Rochet's results and due to the positive correlation between longevity (and, hence, LTC needs) and productivity. Roughly speaking, the fair private insurance does not redistribute at all while the social insurance redistributes in the "wrong" direction. At the other extreme, when the loading factor in the private sector is sufficiently high, private coverage is completely crowded out by public provision. For intermediate levels of the loading factors, the solution relies on both types of insurance. Regarding private LTC insurance, a myopic agent's tax on private LTC insurance premiums involves a tradeoff between paternalistic and redistributive (incentive) considerations and we may have a tax as well as a subsidy on private LTC insurance.

Means tested long-term care schemes and strategic impoverishment

Public long-term care systems in the OECD are very heterogeneous across and within countries. They vary in generosity, in the levels of government that are involved and in their universality. They are mainly provided by local authorities; they generally only cover a fraction of the needs and range from universal and comprehensive to means-tested systems. In this section, we focus on the means tested systems that seem to prevail in the majority of countries. The best known and the most studied

of them is the Medicaid program in the US, which covers about half of the LTC provision for the American elderly dependents.

Means-testing is rarely a first choice. It is often adopted over universal arrangements because it allows us to devote scarce funds to those who need them the most. The problem is that in reality, needy people do not always have access to means tested programs and well to do individuals can benefit from them. Reasons for this paradoxical outcome can be the fact that the neediest often lack relevant information to take up and fear stigmatization to a larger extent than the members of the middle class. This is particularly true for means-tested public LTC. The reasons are varied. First, there exists a large range of strategies that lead the beneficiary to impoverish himself so as to be eligible. In the US, this is called the Medicaid impoverishment technique.³⁸ Second, most LTC programs seem to favor aid to people who are institutionalized and are unable to meet their financial obligations after a few years. Low-income families are rarely in this situation. Third, there is the practical implementation of means-testing for which the precise definition of “means” is not always clear. Does this concern the income flows or the assets of the beneficiary? Is there a possibility of recouping part of what has been paid by the government at the time of death? Can children be asked to finance their parents’ LTC expenses before the government intervenes? The law is not clear on that. To take the example of France where there are two means tested programs, the PSD (*Prestation Spécifique Dépendance*) and the APA (*Allocation Personnalisée d’Autonomie*), the first can recuperate its participation on the estate of the beneficiary, whereas the second cannot. Finally, and above all, there is a political economy issue. One often has the feeling that there is a political resistance towards implementing means-tested programs when they concern dependent people. When the PSD in France or Medicaid in the US tries to get reimbursed from the estate of a person who has benefited from means-tested services for years, this makes the headlines of newspapers and is perceived as unpopular by the majority of public opinion. In these two countries, as in many others,

³⁸ In the US, there are different strategies for giving away assets to qualify for Medicaid coverage. There exists an army of attorneys who specialize in Medicaid Eligibility and/or Elder Law and can indicate the best way of being eligible and keeping some control of one’s assets. One technique is to transfer one’s assets to an irrevocable trust or to an annuity scheme. A more radical but also riskier approach is to proceed with *inter vivos* gifts to one’s children or grandchildren.

there exist estate recovery programs that are intended to enable states to recoup their expenses upon a beneficiary's death. As it appears, the rate of recovery is extremely low.

Cremer and Pestieau (2012) examine part of these issues. They take a normative viewpoint and cope with the design of a social LTC insurance that would avoid giving away benefits to those who could afford to buy them or receive them from altruistic children. The setting is one of asymmetric information since we know that with perfect information (and absent any political constraints), a first best public LTC scheme could easily be designed and implemented. They analyze two approaches that can be combined. The first relies on a process of self-selection. If private resources cannot supplement the LTC benefit and if its quantity/quality is not very high, those with enough resources or with family support will be deterred from using the means tested scheme. The second relies on explicit control of intergenerational transfers. At some cost, the government can observe *inter vivos* gifts that would be made to impoverish the dependent individual so as to make him eligible for public LTC and enrich his offspring.

They start by looking at an economy where two types of families co-exist. The first type, labeled altruistic, consists of a parent and a child who share the same welfare function. The second type, labeled selfish, consists of a parent and a child with no (financial) links (unlike the altruists, they do not pool their resources). They assume away private insurance for LTC. In a market economy, if the selfish parent is poor, he will be in very bad shape in case of dependence. The altruistic family is assumed to be relatively well off. Whether this comes from the child or from the parent does not matter as they share everything. In case of dependency, the altruistic parent will get a good level of LTC because of his own resources or because of the aid of his child. If the only objective of the government is to make sure that the dependent elderly gets taken care of, it will under perfect information only help the selfish dependent. Assume now that the government does not observe who is altruist and who is not, nor the resources of the parents. The altruistic dependent parent can claim that he is poor and helpless. That way, he gets the public LTC benefit and can either give his assets to his child or, alternatively, he does not have to be helped by his child. How can one avoid this unwanted outcome? First, one can just make sure that the overall level of LTC is

observable and provide an amount of social benefit that is such that the altruistic and wealthy dependent is deterred from mimicking the selfish dependent. The problem with this approach is that it can imply a level of public LTC that is low. An alternative or even a complementary approach is to control both the assets and the gifts of the altruistic dependent through some type of audit. The problem with this approach is that it can be costly.

The political economy of long-term care

Given the large heterogeneity in how LTC expenditures are financed across countries, De Donder and Pestieau (2012) study the determinants of the individual demand and political support for social, private and self-insurance (i.e., saving) in an environment where people differ in income, risk and availability of family help. They start with a setting where only social and self-insurance are available, with social insurance providing a uniform benefit to any dependent person, financed by a proportional payroll tax. The demand for social insurance is shown to decrease with income (because of its redistributiveness across income levels), with family help and to increase with the probability of becoming dependent, when income, risk and family support are independent from each other. Agents with a large income or a very low risk prefer self-insurance (saving) to social insurance. Assuming a positive correlation between income and disability, the relationship between income and the most-preferred social insurance level can go both ways. The correlation between income and family help is not clear. With a positive correlation, richer people unambiguously prefer less social insurance, while the relationship between income and most-preferred social insurance can go both ways with a negative correlation. They show the existence of a majority chosen social insurance level, which decreases with the availability of family help in the economy.

Then, they introduce an actuarially fair private insurance into the picture. The main result is that if agents only differ in income, the introduction of private insurance does not affect its majority chosen level. The intuition is that private insurance induces all above-average-income agents to switch their support in favor of private (rather than social) insurance, but does not affect the preferences of below-average-income agents. With a loading factor, the demand for private insurance decreases

both at the extensive and the intensive margin, up to the point where it becomes nil and where rich agents prefer to exclusively self-insure.³⁹

5. Conclusions

There is a strong feeling that the era of LTC has arrived and represents a crucial challenge for the decades to come. Right now, the provision of LTC is not adequate and the future appears to be gloomy. The source of the problem is twofold, demographic and societal. On the one hand, one witnesses a rapid increase of people aged 80+. The issue of dependency arises precisely in that age bracket. On the other hand, with the drastic change in family values, the increasing number of childless households, the mobility of children and the increasing rate of labor market activity of women, particularly those aged 50-65, the number of dependent elderly who cannot count on the assistance of anyone is likely to increase. Those two parallel evolutions explain why there is a mounting demand on the government and on the market to provide alternatives to the family. But it is not clear that the reasons that explain why the role of the state and the market has been so small up to now will suddenly disappear.

In this paper, we have discussed the nature of these causes and the extent to which we can expect them to fade away. The solution of LTC has to be found in an integrated view of the role of the market, the state and the family. One needs public authorities that are ready to adopt policies that welcome and even foster the intervention of both the market and the family. Solutions exist but they will not bring us to the first best optimum. There are indeed problems that cannot be solved even with the best will. The fact that individuals act opportunistically and that they will then hide both characteristics and actions that can be used by private insurers and the government cannot be avoided. This being said, the tracks of reform are known. First of all, like for the annuity market, much can be done to thicken the LTC insurance market. The government can certainly help but the industry itself has its own responsibility and should in the future exhibit more imagination by offering insurance packages that better fit the

³⁹ See also Nuscheler and Roeder (2010) who study how the heterogeneity in individual income and risk affects the preferences for redistributive income taxation *versus* public financing of LTC.

needs of individuals. Regarding family solidarity, there are measures (part time, tax deduction) that can be taken to facilitate combining work and assistance. It is important to remember that family solidarity is crucial but should rest as much as possible on chosen rather than on forced altruism. Finally, the government can intervene not only indirectly by fostering private insurance and family assistance but directly by providing all sorts of services including social insurance. Above all, a real political will is needed. Even though we are all threatened by dependency, LTC remains an unattractive political issue. We hope that this will soon change.

References

- Adam, S., Bay, C., Bonsang, E., Germai, S. and Perelman, S. (2007), *Retraite, activités non professionnelles et vieillissement cognitif. Une exploration à partir des données de SHARE*, *Economie et Statistiques* No 403-404, 83-96.
- Agarwal, S., Driscoll, J., Gabaix, X. and Laibson, D. (2007), *The age of reason: Financial decisions over the lifecycle*, NBER Working Paper 13191.
- Bernheim, B., Shleifer, A. and Summers, L. (1985), *The strategic bequest motive*, *Journal of Political Economy* 93, 1045-1076.
- Bien, F., Chassagnon, A. and Plisson, M. (2012), *La demande d'assurance dépendance dans un cadre trivarié*, manuscript, PSL, Paris.
- Bisin, A. and Verdier, T. (2001), *The economics of cultural transmission and the dynamics of preferences*, *Journal of Economic Theory* 97, 298-319.
- Brown, J. (2007), *Rational and behavioural perspectives on the role of annuities in retirement planning*, NBER Working Paper 13537.
- Brown, J., Coe, N. and Finkelstein, A. (2007), *Medicaid crowd out of private LTC insurance demand: Evidence from the health and retirement survey*, in J. Poterba (ed.), *Tax Policy and the Economy* 21, MIT Press, Cambridge MA.
- Brown, J. and Finkelstein, A. (2007), *Why is the market for LTC insurance so small?*, *Journal of Public Economics* 91, 1967-1991.
- Brown, J. and Finkelstein, A. (2008), *The interaction of public and private insurance: Medicaid and the LTC insurance market*, *American Economic Review* 98, 1083-1102.
- Brown, J. and Finkelstein, A. (2009), *The private market for long term care in the U.S. A review of the evidence*, *Journal of Risk and Insurance* 76, 5-29.
- Brown, J. and Finkelstein, A. (2011), *Insuring long term care in the U.S.*, *Journal of Economic Perspectives* 25, 119-142.
- Cambois, E., Clavel, A., Romieu, I. and Robine, J-M. (2008), *Trends in disability-free life expectancy at age 65 in France: Consistent and diverging patterns according to the underlying disability measure*, *European Journal of Ageing* 5, 287-298.
- Canta, C. and Pestieau, P. (2012), *Long term care and family norm*, CORE Discussion Paper 2012/22, Université Catholique de Louvain.

- Cawley, J., Grabowski, D. and Hirth, R. (2004), Factor substitution and unobserved factor quality in nursing homes, NBER Working Paper 10465.
- Courbage, C. and Roudaut, N. (2008), Empirical evidence on LTC insurance purchase in France, *Geneva Papers on Risk and Insurance* 33, 645-658.
- Cremer, H., De Donder, P. and Pestieau, P. (2009), Providing sustainable long term care: A looming challenge, TSE Note 3.
- Cremer, H., Gahvari, F. and Pestieau, P. (2012), Uncertain altruism and long term care, manuscript, Toulouse School of Economics.
- Cremer, H., Lozachmeur, J.M. and Pestieau, P. (2012), LTC insurance contract: Lump-sum or cost-sharing?, manuscript, Toulouse School of Economics.
- Cremer, H. and Pestieau, P. (2010), Securing long-term care in the EU: Some key issues, CESifo DICE Report 7(4), 8-11.
- Cremer, H. and Pestieau, P. (2011), Long term care social insurance and redistribution, CORE Discussion Paper 2011/24, Université Catholique de Louvain.
- Cremer, H. and Pestieau, P. (2012), Means-tested LTC and family transfers, manuscript, Université Catholique de Louvain.
- Cremer, H. and Roeder, K. (2012), Long term care policy, myopia and redistribution, manuscript, Université Catholique de Louvain.
- Cutler, D. (1993), Why doesn't the market fully insure long term care?, NBER Working Paper 4301.
- De Donder, P. and Pestieau, P. (2011), Private, social and self-insurance for LTC. A political economy approach, CORE Discussion Paper 2011/53, Université Catholique de Louvain.
- Duée, M., Rebillard, C. and Penneç, S. (2005), Les personnes dépendantes en France: Evolution et prise en charge, XXVème Congrès de l'UIESP.
- EC (2009), The 2009 ageing report, Joint Report prepared by the European Commission (DGECFIN) and the Economic Policy Committee (AWG).
- Eeckhoudt, L., Mahul, O. and Moran, J. (2003), Fixed reimbursement insurance: Basic properties and comparative statics, *Journal of Risk and Insurance* 70, 207-218.
- Finkelstein, A., Luttmer, E. and Notowidigdo, M. (2008), What good is wealth without health? The effect of health on the marginal utility of consumption, NBER Working Paper 14089.
- Finkelstein, A. and McGarry, K. (2006), Multiple dimensions of private information: Evidence from the long-term care insurance market, *American Economic Review* 96, 938-958.
- Finkelstein, A., McGarry, K. and Sufi, A. (2005), Dynamic inefficiencies in insurance markets: Evidence from LTC insurance, *American Economic Review, Papers and Proceedings* 95, 224-228.
- Grabowski, D. and Gruber, J. (2007), Moral hazard in nursing home use, *Journal of Health Economics* 26, 560-577.
- Hiedemann, B., Savinsky, M. and Stern, S. (2012), Will you still want me tomorrow? The dynamics of families long term-care arrangements, manuscript, Université Catholique de Louvain.
- Hiedemann, B. and Stern, S. (1999), Strategic play among family members when making long term care decisions, *Journal of Economic Behaviors and Organization* 40, 29-57.

- Hoerger, T.J., Picone, G. and Sloan, F. (1996), Public subsidies, private provision of care and living arrangements, *Review of Economics and Statistics* 78, 428-440.
- Jousten, A., Lipszyc, B., Marchand, M. and Pestieau, P. (2005), Long-term care insurance and optimal taxation for altruistic children, *FinanzArchiv – Public Finance Analysis* 61, 1-18.
- Kemper, P. and Murtaugh, C.M. (1991), Lifetime use of nursing home care, *New England Journal of Medicine* 324, 595-600.
- Kessler, D. (2007), The long-term care insurance market, *The Geneva Papers on Risk and Insurance – Issues and Practice* 33, 33-40.
- Kopczuk, W. and Slemrod, J. (2005), Denial of death and economic behaviour, *B.E. Journal of Theoretical Economics* 5(1), article 5.
- Lakdawalla, D. and Philipson, T. (2002), The rise in old age longevity and the market for long term care, *American Economic Review* 92, 295-306.
- Meier, V. (1999), Why the young do not buy long term care insurance?, *Journal of Risk and Uncertainty* 8, 83-98.
- Murtaugh, C.M., Kemper, P., Spillman, B.C. and Carlson, B.L. (1997), The amount, distribution and timing of lifetime nursing home use, *Medical Care* 35, 204-218.
- Newhouse, J. (2002), *Pricing the Priceless: A Health Care Conundrum*, MIT Press, Cambridge MA.
- Norton, E. (2000), Long term care, in A. Cuyler and J. Newhouse (eds.), *Handbook of Health Economics* 1b, Elsevier, Amsterdam.
- Nuscheler, R. and Roeder, K. (2010), The political economy of long-term care, manuscript, University of Augsburg.
- OECD (2006), *Projecting OECD health care and long-term care expenditures*, OECD Economics Department Working Paper 477, Paris.
- Pauly, M.V. (1990), The rational non-purchase of long term care insurance, *Journal of Political Economy* 98, 153-168.
- Pauly, M.V. (1996), Almost optimal social insurance of LTC, in R. Eisen and P. Sloan (eds.), *Long Term Care: Economic Issues and Policy Solutions*, Kluwer, London.
- Pèrès, K., Jagger, C., Lièvre, A., and Barberger-Gateau, P. (2005), Disability-free life expectancy of older French people: Gender and education differentials from the PAQUID cohort, *European Journal of Ageing* 2, 225-233.
- Pestieau, P. and Ponthiere, G. (2011), The long term care insurance puzzle, in J. Costa-Font and C. Courbage (eds.), *Financing Long term Care in Europe: Institutions, Markets and Models*, Palgrave Macmillan, Basingstoke.
- Pestieau, P. and Sato, M. (2006), Long term care: The state and the family, *Annales d'Economie et de Statistique* 83/84, 123-150.
- Pestieau, P. and Sato, M. (2008), Long term care: The state, the market and the family, *Economica* 75, 435-454.
- Pezzin, L., Pollak, R. and Schone, B. (2007), Efficiency in family bargaining: Living arrangements and caregiving decisions of adult children and disabled elderly parents, *CESifo Economic Studies* 53, 69-96.
- Pezzin, L., Pollak, R. and Schone, B. (2009), Long term care of the disabled elderly: Do children increase caregiving by spouses?, *Review of Economics of the Household* 7, 323-339.
- Ponthiere, G. (2011), Long term care, altruism and socialization, PSE Discussion paper hal-00622385, Paris.

- Rivlin, A., Weiner, J., Hanley, R. and Spence, D. (1988), *Caring for the Disabled Elderly: Who will Pay?*, The Brookings Institution, Washington DC.
- Rochet, J.C. (1991), Incentives, redistribution and social insurance, *The Geneva Risk and Insurance Review*, Palgrave MacMillan 16, 143-165.
- Sloan, F., Hoerger, T. and Picone, G. (1996), Effects of strategic behaviour and public subsidies on families' savings and long-term care decisions, in R. Eisen and F. Sloan (eds.), *Long-Term Care: Economic Issues and Policy Solutions*, Kluwer Academic Publishers, Boston.
- Sloan, F. and Norton, E. (1997), Adverse selection, bequests, crowding out, and private demand for insurance: Evidence from the LTC insurance market, *Journal of Risk and Uncertainty* 15, 201-219.
- Stern, S. and Engers, M. (2002), LTC and family bargaining, *International Economic Review* 43, 73-114.
- Taleyson, L. (2003): *L'assurance dépendance privée: Comparaisons internationales*, Newsletters techniques SCOR.