# THE ECONOMICS OF LONG-TERM CARE. AN OVERVIEW

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**ARTICLE**

# The economics of long-term care. An overview[1]

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**Abstract**
With the rapid increase in long-term care (LTC) needs, it is important to assess the expected contributions of the traditional providers of LTC: the state, the market and the family. We first survey the literature devoted to the family and the market. Then, given the declining role of family caregiving and the negligible role of the market, we look at a number of studies exploring the design of public policies in support of the dependent elderly, particularly those who cannot count on the assistance from their family and those who lack basic means. Those public policies are conceived in such a way that they also rely on both the market and the family.

**KEYWORDS**
dependence, family solidarity, long-term care, social insurance, social norm

**JEL CLASSIFICATION**
I11, I12, I18, J14

## 1 | INTRODUCTION

As people age, it becomes more likely that they will need daily aid with basic activities such as washing, eating and dressing, or help with different household activities such as shopping, cooking and cleaning. This type of support is what is called long-term care (LTC). LTC deals with nursing care rather than with health care. This statement has however to be qualified as, over the last years, improving longevity and medical progress has led to an increase in chronical diseases and thus to dependence requiring both nursing and health care. Demand for LTC is expected to increase, in part due to the aging of populations and the rising prevalence of long-term conditions.

In the OECD member states[2] on average, the share of the population aged 65 and over is predicted to continue rising in the coming decades, going up from 17.3% in 2019 to 26.7% by 2050. In five countries (Portugal, Italy, Greece, Japan and Korea), the share of the population aged 65

and over is predicted to be higher than one-third by 2050. The increase among the oldest group – people aged 80 and over – is expected to be even more striking. Over the same period, the share of this population will more than double on average, from 4.6% to 9.8%. In the five countries mentioned above, more than one in eight people will be 80 and over. This is important as problems of disability and dependance mainly concern the very old.

The purpose of this paper is to present an overview of economics work on LTC. Most work is empirical or based on calibrated simulations. Here we focus on theoretical contributions. After a section providing some evidence, Sections 3 and 4 analyze the role of the family and the market in the provision of LTC. The motivations behind family caring are discussed as well as the reasons for the thinness of the LTC insurance market. Section 5 surveys a number of recent contributions that analyze the possibility of designing a sustainable public LTC scheme integrating both the market and the family. Most models are normative but there exist also a few political economy models. A last section concludes.

This is not the first survey on LTC. Compared to earlier surveys such as Norton (2016), Cremer et al. (2012), Siciliani (2013) or Klimaviciute and Pestieau (2018c), we here discuss recent contributions and focus on theoretical work. One more feature of our survey is the distinction of optimal public policy models between those studying identical and those studying heterogeneous individuals, which allows to better separate redistributive concerns from other reasons of public intervention.

## 2 | BACKGROUND

As we have just seen, LTC needs are increasing rapidly both for demographic reasons (ratio of dependence of the very old) and for medical reasons (chronical diseases). Main providers of LTC are the family, the state and the market, even though the role of the family still remains dominant and is much more important for LTC than for retirement and health care. When looking at the contribution of the state, the family and the market, it is important to distinguish between the contributions in terms of financing and those in terms of provision.

LTC systems in the OECD and EU countries are under pressure to adapt. The demand for LTC is likely to continue growing due to the rising population share of the elderly, which raises concerns about financial sustainability. Another source of increasing demand is the growth of chronical diseases that result from medical progress. A number of illnesses that before resulted in death now end up with dependence. Preferences of the elderly are also changing: they care not only about their longevity but also about the quality of life in their old age.

On the supply side, the setting is also evolving with the drastic change in family values, the increasing rate of participation of women in the labor market, the growing number of childless households and the mobility of children. These evolutions imply that the number of dependent elderly who cannot count on family aid is increasing. Further, the costs of caring are growing. Caring is labor intensive and does not benefit from much technological change. It thus suffers from the Baumol's cost disease.

It has to be noted that the economic literature on LTC is for now quite fragmented and consists of different pieces of the puzzle rather than presents a unified and comprehensive framework. A number of papers focus only on family and/or private market issues abstracting from an explicit consideration of the state. On the other hand, papers concerned with public policy typically incorporate family or market (or both) but still usually focus only on certain aspects and assumptions. In what follows, we will first discuss separately the main issues concerning the family and the

market. We will then move to the literature on public intervention in which the family and the market will be found again in different settings. As it will be seen, the different settings studied in the literature imply different conclusions about the need of public LTC policy. We will survey these conclusions in our discussion of the literature on optimal policy design.

## 3 | THE FAMILY

The vast majority of elderly people receiving assistance, including many with several functional limitations, live in private homes, not in institutions. Most of these older people with disabilities receive their care exclusively from their family caregivers, mostly wives and daughters. In other words, the number of those informal LTC workers by far exceeds that of the formal LTC workers. It is interesting to analyze what are the motives behind such informal care. The standard motive cited in the literature is altruism. Spouses or children would help their dependent family members simply out of a wish to help, not because of feeling obliged to out of duty, loyalty or religious reasons. They act out of concern for the well-being of their relatives without any expectations of reward. In some cases, these acts of altruism may result in people jeopardizing themselves to help others.

Actually, altruism is not the only possible motive for caring. There are two other motives that prevail as well. First, there is one, known as the exchange motive, that involves taking actions to help others with the expectation that they will offer help in return. Basically, children would help their parents within a kind of quid pro quo implicit arrangement, whereby parents help financially their children and/or take care of the grandchildren in exchange of assistance in case of dependence. Second, care can be motivated by family norms. Norms can be defined as the spoken and unspoken rules of cultures. They operate as invisible constraints on family members' behavior including taking care of children and dependent parents. They explain why in patriarchal societies, women, wives and daughters, are in charge of the tasks of caring.

Why are we concerned by those motives for caring? The reason is that the way informal care will react to the introduction of formal care provided by the market or the state will depend on the type of motive. For example, the introduction of a public LTC program is likely to crowd out informal care triggered by altruism. In the case of a norm, there may be also crowding out when the norm is endogenous as shown by Canta and Pestieau (2013). There exist also possibilities of some crowding out with exchange as it appears in Canta and Cremer (2019) who analyze the case of strategic bequests. In a study of informal care across European countries, Klimaviciute et al. (2017) show that the role of norms is far from being negligible.[3]

In a recent paper, Canta et al. (2021) analyze the relative contribution of children to the informal LTC of their dependent parents. They focus on the role of gender and blood (own child versus in-law) relationships as well. Their results tend to confirm the existence of gender and blood biases in the level of informal care provided. In other words, a dependent woman gets relatively more care from her daughter than from her son or from her children in-law.

Informal care has some collateral effects. First, as shown by Schulz and Sherwood (2008) as well as Van Houtven et al. (2013), family caregiving has a number of negative impacts on the health and the career of helpers. The negative effects seem to increase with the severity of the dependence particularly in case of dementia. They are expected to be more important when the motive is the family norm and not altruism. Second, the choice between staying home with family help and going to a nursing home is not trivial, particularly in case of pandemic such as COVID-19. In a recent paper covering a large number of countries and comparing the mortal impact of staying

home versus residing in a nursing home, Flawinne et al. (2022) show that all things being constant staying home is safer in some countries (Germany, France, Eastern Europe) whereas in others it is safer to move to a nursing home.

Finally, there is the issue of substitutability between formal and informal care that does not seem to be settled. It seems that this would depend on the nature of formal care and on the degree of disability. According to Bolin et al. (2008), informal care is a substitute for formal home care but not for health care. In case of weak disability, Bonsang (2009) shows that formal care is a substitute for informal care but turns to be a complement for heavy disability.

## 4 | THE MARKET

Given that, as discussed before, family availability is decreasing, alternatives to family help are needed. One of such alternatives could be private LTC insurance. In practice, there currently exist two main types of LTC insurance policies: those based on reimbursement and those based on cash indemnities.

LTC insurance policies based on reimbursement cover the actual daily or monthly expenses of care. However, such a formula usually has a ceiling in the number of benefits and also in the length of the reimbursement. On the other hand, LTC insurance based on cash indemnities pays the insured's chosen daily or monthly benefit independently of the actual cost of care as soon as he or she is qualified as eligible for benefits. The benefits may last for all the person's lifetime like an annuity, but they are generally relatively low.

Two countries in which the LTC insurance market has been the most developed so far are the US and France. In the US, the formula of reimbursement tended to be the prevailing one up to recently, but now most companies offer policies of the cash indemnity type within a limited period. In France, the common formula is that of the lifetime cash indemnity. It has to be noted that the relevance of those payment rules depends on the underlying assumptions. For instance, when family assistance is introduced, the flat lump-sum payment seems to be more relevant. See on this Cremer et al. (2016) and Klimaviciute (2017).

Probably the most discussed issue when it comes to private LTC insurance is the so-called LTC insurance puzzle, namely the lack of demand for this type of insurance. Indeed, it is widely accepted that the need of LTC is an insurable risk. It concerns the majority of individuals, it can be defined and measured. As a greater number of elderly people will be living longer and face the risk of dependence in the coming years, the benefits of insuring against this risk from a variety of perspectives, including that of the disabled individual and his or her family caregiver, should be compelling. And yet, in the US, only 3% of LTC expenditures are funded by private LTC insurance. Also, only about 7 million out of 86 million people aged 55 and over have private LTC insurance (Nordman, 2016). The thinness of the LTC insurance market is more blatant in the other OECD member countries[4].

How can we explain the lack of demand for an insurance that covers a risk to which the majority of individuals are confronted? The usual reasons for such a weak demand include adverse selection, moral hazard and the offer of public programs that may crowd out private demand for coverage. To these explanations, we could add a number of other factors: unattractive rules of reimbursement, state-dependent preferences as well as behavioral biases and lack of information.

## 4.1 | High prices and adverse selection

In a series of papers, Brown and Finkelstein (2007, 2008, 2009) provide evidence of relatively high loading factors, particularly for men. Sloan and Norton (1997) find that asymmetric information as to the probability of turning dependent leads to adverse selection and explains part of these high prices. The demand for LTC insurance depends on various observable factors associated with age, health and functional status as well as unobservable ones such as individuals' subjective probability of future nursing home use. This probability rests in part on the degree of aversion to being in a nursing home of the individuals and on their impressions about the availability of their families and friends to help them if they become severely dependent. This probability is private information. To the extent that the person's own knowledge about future use differs from the insurer's observation, there is the potential for adverse selection.

A number of authors (Brown & Warshawsky, 2013; De Donder et al., 2022; Murtaugh et al., 2001) argue in favor of integrating LTC insurance with life annuities. Such a combination of insurance against two negatively correlated risks (longevity and disability) would reduce the costs and the extent of adverse selection for both products since those in bad health are likely to face higher prices for LTC insurance but lower prices for annuities (due to their higher mortality) and vice versa. De Donder et al. (2022) show that this kind of bundling could even result in advantageous selection.[5]

## 4.2 | Moral hazard

Pauly (1990) develops a particular type of moral hazard for private LTC insurance, the so-called intra-family moral hazard. Accordingly, elderly persons fear that if they purchase private insurance, children may tend to send them in nursing homes as soon as they are unable to act on their own. Insurance may indeed induce such a move as it reduces the cost of institutionalization relative to the cost of giving personal attention. Elderly persons who prefer informal care from their children over formal care may therefore choose not to purchase insurance. See also Zweifel and Strüwe (1998) and Klimaviciute (2017, 2019).

## 4.3 | Availability of social assistance

The availability of social assistance such as Medicaid in the US may crowd out demand for private LTC insurance. Medicaid is designed to provide coverage only for the very poor. To qualify, one must have virtually no non-housing wealth. However, there is considerable evidence that to qualify for Medicaid, middle-class elderly persons become impoverished by spending all their wealth during a nursing home stay, a process called spenddown. According to Wiener et al. (2013) who analyze a population of elderly over the period 1996 to 2008, almost 10% of the previously non-Medicaid population aged 50 and over spent down to Medicaid eligibility. There is further such a thing as "artificial self-impoverishment", which involves manipulating one's income and assets so that an individual who would otherwise not qualify for Medicaid LTC benefits can slip in below the financial eligibility limits and qualify after all. One standard technique of such strategic impoverishment consists in transferring one's assets to relatives at less than fair market value for the purpose of appearing artificially poor[6]. This being said, Kim (2018) has shown that

eliminating the Medicaid program increases LTC insurance holding by only 5.3%[7], which implies that the demand for LTC insurance would remain low even without Medicaid[8].

## 4.4 | State-dependent preferences

De Donder and Leroux (2021) indicate that if dependency decreases the marginal utility of daily life consumption, then there is less need for insurance. As they show, on the one hand, dependency creates additional expenses (LTC costs), which calls for buying insurance, but, on the other hand, if daily life consumption becomes less valuable when dependent, there is less incentive to transfer resources to the bad state of nature. The individual's decision of whether to buy insurance depends on the relative size of the two effects, but even if insurance is purchased, it is then optimal to insure less than fully.

To date, the empirical literature on state-dependent preferences in the context of loss of autonomy has failed to reach a consensus. In part, this is due to specification differences. On the one hand, Lillard and Weiss (1997) and Ameriks et al. (2020) find that marginal utility is higher when dependent than when autonomous. On the other hand, Finkelstein et al. (2013) and Koijen et al. (2016) obtain that the marginal utility of consumption decreases in the case of poor health, which would explain the LTC insurance puzzle.

## 4.5 | Behavioral biases and lack of information

There is a rich literature explaining why individuals tend to under save for retirement and particularly for LTC. There are several main reasons for such short-sighted behavior. First, it can be due to misperception or misjudgments. Also, it can come from lack of information and knowledge. Empirical studies such as Zhou-Richter et al. (2010) or Boyer et al. (2019, 2020) document these effects. Finally, it can arise from present bias and self-control problems. Accordingly, individuals would have two selves, one concerned by instant gratification and another by long-term benefits and later well-being. When choosing how much to save, the first self would prevail. Clearly, those behavioral biases could be invoked to explain the low demand for LTC insurance. See on this Cremer and Roeder (2013) and De Donder and Leroux (2013).

## 4.6 | Denial of severe dependence

Another behavioral bias is the refusal to face the prospect of dependence. Kopczuk and Slemrod (2005) show that attempts to reduce death anxiety and the possibility of denial of mortality-relevant information interact with intertemporal choices and may lead to time-inconsistent behavior and other behavioral phenomena. Individuals seem to have the same denial attitude towards such an unpleasant occurrence as dementia or heavy and lasting disability in old age.

## 4.7 | Unappealing rules of reimbursement

One more factor that is often neglected in the literature seems to be the unattractive formulas of benefit payments. As mentioned above, two currently existing formulas are those of

**TABLE 1** Length of heavy dependence (USA, age 65+)

| | % With LTC need | Average length (years) | None (% of cohort) | < 2 Years (% of cohort) | [2, 5) years (% of cohort) | ≥ 5 years (% of cohort) |
|---|---|---|---|---|---|---|
| **Men** | 46.7 | 1.5 | 53.3 | 25.8 | 11.1 | 9.8 |
| **Women** | 57.5 | 2.5 | 42.5 | 27.5 | 12.3 | 17.8 |

*Source*: Nordman (2016).

reimbursement and cash indemnities. However, as it can also be understood from above, neither of the two formulas provides sufficient protection against the cost of a long and severe dependence with high care needs.

Nevertheless, Nordman (2016) indicates that 52% of individuals turning 65 will have high LTC needs over their remaining lifetimes (see Table 1). These needs are expected to last about 2 years on average, but they will last longer for 26% of individuals. This is especially relevant for women: 17.8% of them will have a period of five and more years of severe dependence. Also, there seems to be a negative correlation between income and the length of LTC need. For instance, 22% of individuals in the highest income quintile will need LTC for more than 2 years, while the proportion goes up to 31% for those belonging to the lowest income quintile.

To avoid the possibility for a fraction of dependents to spend down all their resources and to be forced to rely on their children's aid or on social assistance such as Medicaid, Drèze et al. (2016) and Klimaviciute and Pestieau (2018a,b) argue in favor of the deductible principle. Accordingly, the individuals would have to pay part of the costs of dependence incurred during a certain number of months, and beyond a certain threshold, all the costs would be covered. Inspired by the famous theorem of the deductible by Arrow (1963), these authors show that such insurance policy is efficient in the case of LTC[9]. Klimaviciute and Pestieau (2020) confirm that the deductible formula for LTC remains relevant under *ex post* moral hazard as well, while Klimaviciute et al. (2020) find that the efficiency of the deductible also holds in the presence of family solidarity, although some departures from the standard results exist in those cases.

All in all, the consequences of the ensuing thin LTC insurance market are twofold: it puts further pressure on the family and on the government and it explains why saving is still increasing in old age, which leads to unexpected bequests in case parents escape disability. See on this Ameriks et al. (2020).

## 5 | THE STATE

In most OECD countries, the government intervenes much more in the field of pensions and of health care than in that of LTC. Table 2 presents the current state of public spending for LTC and for health, pensions and LTC as well as the expected level of public spending assuming a reasonable aging evolution and unchanged policies. The figures for health and pensions do not include private spending. In the countries of Table 2, the share of the private sector is low. The figures for LTC are relatively low and are expected to be insufficient to meet the challenge of increasing dependence and of decreasing informal care.

One may distinguish two broad reasons for the need of public intervention in the context of LTC. The first is to address the failures of both the market and the family, while the second is to ensure some redistribution between individuals with different levels of income.

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**TABLE 2**  Public spending for LTC and for pensions, health and LTC (% of GDP)

|  | LTC | | Pensions, Health and LTC | |
| --- | --- | --- | --- | --- |
|  | **2019** | **2045** | **2019** | **2045** |
| **Germany** | 1.6 | 1.9 | 19.3 | 21.9 |
| **Spain** | 0.7 | 1.1 | 18.7 | 21.1 |
| **France** | 1.9 | 2.5 | 25.1 | 26.5 |

*Source*: European Commission (2021).

In this section, we survey a number of models that look at the optimal design of public LTC policy in different settings. We classify the models according to whether they consider individuals who are *ex ante* identical or those who start with different endowments. While in the former case, the rationale for public intervention comes from the market and family failures, in the latter one, redistributive concerns come into play as well. In all cases, the government behaves as a Stackelberg leader that takes into account the responses of both the market and the individuals, namely the dependent themselves and their families.

At the end of this section, we also look at some political economy models in which the LTC policy is chosen by a majority.

## 5.1 | Identical individuals

In this subsection, we focus on the settings with individuals who *ex ante* have the same level of income. We organize the discussion into the following four categories: no private insurance, rules of reimbursement, uncertain altruism and other family issues. At the end of this subsection, after having presented a number of papers belonging to these categories, we will discuss the need for public intervention implied by the results of these papers.

### 5.1.1 | No private insurance

A number of papers study optimal LTC policy in the absence of private LTC insurance. Indeed, given that the market for private LTC insurance is very thin or even inexistent in many countries, this may be a quite reasonable assumption. In such situations, the case for public intervention is particularly strong, even when all individuals are identical.

Jousten et al. (2005) study a setting with families consisting of one young person and one elderly dependent where the elderly has no resources and all the young have the same income but differ in their degree of altruism. The paper considers public LTC intervention which consists of public nursing home care and a lump-sum subsidy for children who pay for their parents' care at home. The inability of the government to observe children's altruism results in the necessity to keep a relatively low quality of public nursing homes. The paper also evaluates the welfare consequences for each category of individuals.

Brunner (2012) analyzes the potential of bequest taxes to serve as LTC insurance. In his model, a representative individual has a motive for leaving a bequest, has no private LTC insurance (or at least is not fully insured) and is unable to adapt his labor supply or consumption once he becomes dependent. In such a case, LTC costs reduce the individual's bequest on a one-to-one basis. The paper shows that in such a setting, a proportional bequest tax provides some insurance against the

risk of LTC since the tax payment is larger when LTC expenses are small (and so the bequest is large) and smaller when LTC costs are high (and so the bequest is small). For this reason, a bequest tax creates a smaller deadweight loss than a tax on income or on consumption. The optimal tax and transfer system is then also analyzed.

Cremer et al. (2016) study a setting with a two-sided altruism where both parents and children are altruistic. Parents are pure altruists, whereas children may be only partially altruistic. Parents face the risk of becoming dependent, in which case they expect to receive help from their children. Children are motivated by altruism as well as by the prospect of receiving an inheritance. Even though the paper also analyzes the case of heterogeneous families, a large part of it is devoted to the setting where the individuals are *ex ante* identical. In that setting, it is shown that the *laissez-faire* outcome is not efficient when children are not perfectly altruistic and that the first-best can be decentralized by a linear subsidy on informal care, a linear tax on bequests of dependent parents and state-specific lump-sum transfers which provide insurance. The paper then analyzes the second-best setting where the available instruments are limited to linear state-independent taxes on bequests and children's labor income as well as a transfer to the dependent elderly. Since state-specific lump-sum transfers are no longer available, labor and bequest taxes are then useful for providing (partial) insurance, in a similar spirit as Brunner (2012). Even though private LTC insurance is assumed away, the authors argue that its presence would not change their qualitative results, especially in the realistic case of positive insurance loading costs.

Canta and Cremer (2019) focus on a model inspired by the classical strategic bequest approach as, for instance, in Bernheim et al. (1985). In their framework, parents can commit to a bequest rule which conditions their transfers to children on the level of informal care they provide. All parents are assumed to be identical, whereas children differ in their cost of providing informal care. This cost can be seen as capturing different factors such as children's degree of altruism or opportunity cost. Canta and Cremer (2019) assume that parents cannot observe this cost, which constitutes a crucial difference of their model compared to the classical strategic bequest approach. Under this asymmetric information, parents are not able to extract the full surplus of the exchange. They use non-linear bequest rules to screen for their children's costs, and this results in a downward distortion of the informal care provided by high-cost children in the *laissez-faire*. Moreover, in the *laissez-faire*, parents are not insured neither against the risk of dependence nor against the risk of having a child with a high cost of care provision. The paper looks at two different types of social LTC policies. First, the authors study a uniform policy which provides a given LTC transfer to all dependent parents and finances it by a uniform lump-sum tax. This policy depends on parents' risk aversion and can result in full, more than full or less than full insurance against dependence. However, parents are never fully insured against the risk of having a high-cost child. Secondly, the paper considers general policies in which LTC benefits are conditioned on the transfers from parents to children which are assumed to be publicly observable. In this case, parents are always fully insured, and this applies even to the risk of having a child with a high cost of care provision. An important feature of the model is that under both types of policies the social welfare also takes into account the utility of the caregivers (i.e. children). Finally, while there is no private insurance in the model, the authors argue that even with a fair private insurance there may be a case for public intervention if there are differences in the parents' and the government's objectives. The case for public intervention becomes even stronger due to the presence of high loading costs in LTC insurance and the difficulties of providing private insurance against the risk of having a high-cost child.

### 5.1.2 | Rules of reimbursement

As discussed in Section 4, a number of papers show that optimal insurance contracts are the ones using the deductible formula, while private LTC insurance contracts in reality differ from that approach. Klimaviciute and Pestieau (2018a) find that optimal social LTC insurance features a deductible. While that paper focuses on heterogeneous individuals and does not establish this explicitly, it could be noted that even with identical agents, public intervention could be justified on the grounds of offering a more attractive rule of reimbursement than that proposed by private insurers. Indeed, if private insurance does not use the deductible formula, introducing social insurance based on that approach could be welfare improving.

### 5.1.3 | Uncertain altruism

Several recent papers (Cremer et al., 2013, 2017; Canta et al., 2020; Canta & Cremer, 2021) have studied the design of optimal LTC policy under uncertain altruism, i.e. in a setting where receiving informal care from one's family is uncertain.

All four papers consider a setting where parents face two types of uncertainty: the one about becoming dependent and the one about receiving help from their children in case of disability. In Cremer et al. (2013), the probability of receiving help from one's child (or, in other words, the child being altruistic) is endogenous and depends on the time parents spend raising their children, whereas in the three other papers this probability is assumed to be exogenous. Moreover, Cremer et al. (2013, 2017) assume that the child's altruism is a binary variable (i.e. the child is either altruistic or not), while Canta et al. (2020) and Canta and Cremer (2021) consider a continuous distribution. The majority of these papers focus on the case of identical individuals; only Cremer et al. (2013) also have a part with heterogeneous agents, but we will concentrate here only on the identical agent case.

In terms of LTC policies studied, Cremer et al. (2013) focus on one specific type of policy, the so-called "opting-out" (OO) where public LTC benefits cannot be combined with self-insurance or family help. Cremer et al. (2017) compare the OO policy to the so-called "topping-up" (TU) scheme which allows public benefits being supplemented by family or market care. In addition to the OO and TU schemes, Canta et al. (2020) also consider a third type of policy, which they call "opting-out-cum-transfers" (OC). This policy allows parents to choose between a public LTC (e.g. nursing home care) provided on an OO basis and a monetary transfer on a TU basis. Finally, Canta and Cremer (2021) use the most general approach: they study non-linear policies that link the public LTC benefit to the level of informal care which, differently from children's altruism, is assumed to be observable.

Both Cremer et al. (2017) and Canta et al. (2020) conclude that the TU policy can never do better than actuarially fair private insurance. Public intervention in that case is needed only if private insurance is not fair. On the other hand, the OO and OC policies can be preferable to actuarially fair private insurance under certain conditions, and this is because they provide some insurance against the default of informal care. Both papers also conclude that the comparison of the TU and OO policies is not straightforward: neither policy dominates the other under all conditions. Canta and Cremer (2021), on the other hand, find that the optimal non-linear policy corresponds to neither of the two schemes but rather implies that the LTC benefit should be increasing in the level of informal aid.

### 5.1.4 | Other family issues

In this subsection, we survey a few papers dealing with some more family related issues which were not addressed in the previous discussion.

Canta and Pestieau (2013) study a two-period overlapping generations model where LTC provision in the family is motivated by a family norm transmitted from parents to children through the demonstration effect (Cox & Stark, 1993, 2005). The family norm is modeled as an *ex ante* investment that reduces the productivity of the child but allows him to help his parent in case of dependence. While the paper considers both the case of identical and the case of heterogeneous individual productivities, we focus here only on the former. There are two types of children in the model: traditionalist (i.e. those who adopt the same norms that were chosen by their parents to help their grandparents) and modern (i.e. those who choose norms to maximize their expected utility, taking into account that their own children might be traditionalist). The individual choice of family norm made by the modern children involves an externality since they internalize only a share of the social benefit created by the norm. The decentralization of the first-best thus requires a correction for this externality in the form of a linear income tax as well as a demogrant. Public LTC insurance is needed if private insurance is not actuarially fair; otherwise, private insurance can do equally well. However, even when public insurance is not necessary, public intervention is still needed to correct for the externality. The authors also study two second-best settings with limited policy instruments, in which it is shown that the optimal public LTC insurance involves a trade-off between the correction for the externality and the insurance motive.[10]

Cremer and Roeder (2017a) analyze a setting of family interactions inspired by Becker's (1974, 1991) "rotten kid" theorem. In their setting, altruistic parents have selfish children who provide informal LTC only because it increases the parents' bequests. In the part of the paper dealing with identical families, the authors show that the *laissez-faire* level of informal care and the children's labor supply are generally inefficient, while the level of insurance is too low as long as private LTC insurance is not actuarially fair. The decentralization of the first-best requires linear subsidies on the children's labor income and informal aid as well as lump-sum transfers from the healthy to the dependent elderly. Another interesting result of the paper is that crowding out of informal care by public LTC is not a problem in the analyzed setting: when the parent's bequest motive is operative, public LTC has no impact on informal aid, while in the case when the parent initially leaves no bequest, public LTC may even encourage the child's aid.

Klimaviciute (2019) is interested in the potential for public intervention in the context of intra-family moral hazard. While Klimaviciute (2017) finds that intra-family moral hazard can be softened by using fixed instead of proportional insurance benefits, the problem still does not disappear completely, which raises a question of whether and how the situation can be improved by the government. Klimaviciute (2019) studies a model with a representative family consisting of an elderly parent and his adult child. The parent may become dependent, and in that case, he values particularly the care provided by his child. In order to focus on the inefficiencies related to intra-family moral hazard, private LTC insurance is assumed to be actuarially fair. Still, even with a fair premium, the parent buys an inefficient amount of insurance because insurance coverage decreases the child's caregiving. The child's care provision is also inefficient since the child does not internalize its positive effect on the parent. The paper studies how these inefficiencies can be corrected by public policy and concludes that intra-family moral hazard is a sufficient justification for public intervention aimed at LTC insurance: if not necessarily for introducing a mandatory social insurance, then at least for subsidizing or taxing private insurance premiums.

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Klimaviciute (2020) looks at LTC issues in the context of elderly spouses. More precisely, the paper concentrates on myopia about the negative health effects of caregiving burden and the interaction of this burden with the two spouses' LTC insurance coverage. It is shown that myopia causes an inefficiently high caregiving effort of the woman, who is the caregiver in the model. In a first-best world, this inefficiency can be corrected by introducing a linear tax on caregiving, but this requires the government to observe the informal care provided within the couple, which may be unrealistic. Therefore, the paper studies a second-best setting where the available policy instruments are limited to linear subsidies on private insurance premiums financed by a lump-sum tax. Interestingly, due to myopia about the negative health effects of caregiving, the man's insurance premium should be subsidized, while the woman's insurance premium should be taxed.

## 5.1.5 | Discussion

The papers presented in this subsection show that public intervention in the context of LTC may indeed be important even when there are no redistributive concerns. First, the rationale for this intervention may come from the issues related to the market such as the absence of private LTC insurance or its high loading costs (Jousten et al., 2005; Brunner, 2012; Cremer et al., 2016; Canta & Cremer, 2019; Canta & Pestieau, 2013; Cremer & Roeder, 2017a) as well as the difficulties of the private market to provide insurance against such risks as having a child with a high cost of providing informal care (Canta & Cremer, 2019) or the default of children's altruism (Cremer et al., 2013, 2017; Canta et al., 2020; Canta & Cremer, 2021). The government may also propose a more attractive rule of reimbursement such as insurance with a deductible (Klimaviciute & Pestieau, 2018a).

Then there are different reasons for public intervention coming from various family related problems. As mentioned above, the market is unable to provide insurance against certain risks related to one's children, but those risks can also be seen as certain "failures" of the family. We therefore have issues related to children's (insufficient or uncertain) altruism or the absence of that altruism (Jousten et al., 2005; Cremer et al., 2016; Cremer et al., 2013, 2017; Canta et al., 2020; Canta & Cremer, 2021; Cremer & Roeder, 2017a) as well as issues related to other caregiving motives such as exchange (Canta & Cremer, 2019) and family norms (Canta & Pestieau, 2013). Moreover, public intervention may be justified by the presence of intra-family moral hazard (Klimaviciute, 2019) or myopia about the negative health effects of caregiving within a couple (Klimaviciute, 2020).

Finally, one could note that a variety of potential LTC related policy measures emerge from this literature. The main instruments include social LTC insurance or public provision of care (Jousten et al., 2005; Cremer et al., 2016; Canta & Cremer, 2019; Klimaviciute & Pestieau, 2018a; Cremer et al., 2013, 2017; Canta et al., 2020; Canta & Cremer, 2021; Canta & Pestieau, 2013; Cremer & Roeder, 2017a; Klimaviciute, 2019), subsidies for children who help their parents (Jousten et al., 2005; Cremer et al., 2016; Cremer & Roeder, 2017a; Klimaviciute, 2019), taxes on children's labor supply (Cremer et al., 2016; Canta & Pestieau, 2013), bequest taxes (Brunner, 2012; Cremer et al., 2016) as well as taxes and/or subsidies on private insurance premiums (Klimaviciute, 2019, 2020). Which instruments should be used and in what precise way then depends on the circumstances under consideration.

## 5.2 | Heterogeneous individuals

We now move to the settings with heterogeneous agents, that is, those who differ *ex ante* in their income or productivities. As mentioned above, several previously discussed papers also have parts dealing with the heterogeneous individuals' case. In those papers, the presence of heterogeneous agents generally results in additional (redistributive) terms in the optimal tax formulas in the case of linear policies (Cremer et al., 2013, 2016; Canta & Pestieau, 2013) and in certain distortions coming from the incentive constraints in the non-linear policy case (Cremer & Roeder, 2017a).

In this subsection, we survey a number of papers focusing particularly on settings with heterogeneous individuals. As it will be seen below, in many of them, individuals differ not only in income or productivities but also in other dimensions.

### 5.2.1 | Models

Pestieau and Sato (2008) consider a society of parent-child families where children differ in their market productivity. In the *laissez-faire*, low productivity children provide care to their parents in time, whereas high productivity children provide financial aid. If there is private LTC insurance, there may be an intermediate range of children's productivity for which parents prefer to buy LTC insurance instead of relying on children's help. The paper studies optimal public policy including a linear income tax on children's earnings, a flat subsidy for children who help their parents, a public nursing home and an *ad valorem* subsidy on private insurance premiums. The authors concentrate on alternative pairs of these instruments. For instance, when the instruments are restricted to a linear tax on children's earnings and a flat subsidy on children's aid, it is found that the levels of both instruments are likely to be high when most children have a relatively low productivity and when parents have a low endowment. The authors also conclude that the case for public nursing is quite strong, especially when private LTC insurance is inefficient.

Cremer and Roeder (2013) analyze a setting where individuals tend to underestimate their risk of becoming dependent. In their model, individuals differ in four dimensions: productivity level, probability of survival, probability of dependence and the degree of myopia about their dependence risk. While the probability of survival is positively and the probability of dependence is negatively correlated with productivity, the paper concentrates on the case where the overall dependence probability (taking into account the survival factor) is non-decreasing in productivity. In that case, social insurance tends to be regressive. In the first-best, the social optimum can be decentralized by subsidizing private LTC insurance premiums or by introducing social insurance. Social insurance is preferable if private insurance is not actuarially fair. Due to its regressive nature, the case for social insurance is less strong in the second-best. If private insurance is actuarially fair, social insurance is not optimal, and this result does not depend on the proportion of myopic individuals and their degree of myopia. When private insurance is not fair, both private and social insurance may be needed, with only social insurance being optimal if the loading costs of private insurance are sufficiently high.

Cremer and Roeder (2017b) continue studying the case where LTC risk is positively correlated with individual productivity. They assume that individual risk cannot be observed neither by public nor by private insurers, which results in the Rothschild and Stiglitz (1976) equilibrium in the private market, meaning that low-wage/low-risk individuals are not fully insured. The paper then looks at the role of uniform and non-uniform social insurance to supplement a general income tax. It is found that social insurance provided to the poor has a negative incentive effect, but it also

increases the poor individuals' insurance coverage which is otherwise insufficient. On the other hand, social insurance to the rich has the opposite effects. Nevertheless, it is shown that some social insurance is always desirable. The authors then also introduce myopia about LTC risk and find that, quite surprisingly, it does not necessarily make the case for social insurance stronger.

Klimaviciute and Pestieau (2018a,b) analyze optimal social LTC insurance with deductibles. Klimaviciute and Pestieau (2018a) assume a society consisting of high and low productivity individuals and study a non-linear public policy scheme with income taxation and LTC insurance. The paper first shows that optimal private insurance contracts are the ones using the deductible formula and assumes that this formula is used in the private market. Then the optimal public policy is analyzed. It is shown that the optimal social insurance also features a deductible, and the design of the deductibles for high and low productivity individuals depends on absolute risk aversion and on whether they have the same or different LTC needs. The desirability of social insurance is also studied. If individuals differ only in one dimension (i.e. their productivity) and private insurers have the same loading costs as the government, it is found that insurance can be left to the private market as long as an optimal non-linear income taxation is in place. This is in line with the classical result of Atkinson and Stiglitz (1976). On the other hand, if the government has lower loading costs than private insurers, social insurance needs to be used. The case for public intervention becomes even stronger when individuals differ not only in productivity but also in their LTC needs. In that situation, private insurance can still be used if public and private loading costs are the same, but then public intervention in the form of taxes or subsidies on private insurance is required.

Klimaviciute and Pestieau (2018b) study a setting with $N$ individual types who differ both in their income and in their probabilities to become dependent, assuming that income and the risk of dependence are negatively correlated. Moreover, the paper analyzes a more restricted public policy than Klimaviciute and Pestieau (2018a) focusing on the case where the government is constrained to use linear instruments and the same deductible for all individual types. It is shown that the negative correlation between income and dependence risk makes the case for social insurance stronger and that, due to redistributive concerns, it may be optimal to have a zero or even a negative deductible despite the presence of loading costs. When private LTC insurance is present, the paper finds that at least some individuals in the society will not buy private insurance at the social optimum, but, as long as the optimal social insurance is less than full, some other individuals may still insure themselves privately.

Nishimura and Pestieau (2022) explore the question of whether social insurance for LTC or a public pension system is a more desirable public scheme. They study a society where individuals differ in their productivity and in their probabilities of survival and dependence. Productivity and survival probability are positively correlated, whereas productivity and dependence probability are negatively correlated. In this setting, the authors consider a hypothetical situation in which the government has to choose between LTC insurance and a public pension system. They show that a utilitarian government should give priority to the LTC scheme, whereas with a Rawlsian government, the relative advantage of one program over the other depends on the comparison between the ratio of the survival probability to the dependence risk of the poor and its population average.

Leroux et al. (2021) also study a setting where individual productivity is positively correlated with the probability of survival and negatively correlated with the probability of dependence. Their paper reconsiders the design of optimal LTC insurance using two egalitarian social criteria (*ex ante* and *ex post* egalitarianism) as opposed to the commonly used utilitarianism. The authors find that in the second-best, *ex ante* egalitarianism implies higher LTC and pension benefits and

higher tax rates on savings and on labor income than the utilitarian criterion, but both criteria imply the priority of LTC over pension benefit. *Ex post* egalitarianism is associated with lower LTC and pension benefits, a higher tax on savings and a lower tax rate on labor income compared to *ex ante* egalitarianism.

Again, in a setting with a positive correlation between productivity and survival and a negative correlation between productivity and dependence, Leroux and Pestieau (2022) analyze optimal taxes on bequests. In their model, the government cannot observe whether the bequests are planned or unplanned but observes the timing of bequests and the health status at death. The authors study both the utilitarian and Rawlsian policy. In the utilitarian case, they show that taxes on bequests have three terms: an equity term, an insurance term and a public revenue term. If equity concerns dominate insurance concerns, the bequests of those living long in good health should be taxed the most, while the bequests of those who die early should be taxed the least. On the other hand, if insurance concerns dominate equity concerns, it is optimal to tax early bequests the most, whereas bequests under dependence should be taxed the least.[11] In the Rawlsian case, the authors find that early bequests should be taxed the least, while the most taxed bequests should be the ones left by the healthy long-lived individuals.

### 5.2.2 | Discussion

While the papers presented in this subsection study different settings, they all have in common certain redistributive concerns coming from the heterogeneity of individuals. As mentioned above, most of these papers consider heterogeneity in terms of more than one individual characteristic, in which case the correlation between individual productivity and other characteristics plays an important role for the results about the need of public policy and the type of policy used.

A negative correlation between productivity and the risk of dependence generally plays in favor of social LTC insurance since it reinforces redistribution (Klimaviciute & Pestieau, 2018b; Nishimura & Pestieau, 2022; Leroux et al., 2021). On the other hand, if, taking into consideration the factor of survival, this correlation happens to be reversed as in Cremer and Roeder (2013, 2017b), the case for social LTC insurance becomes weaker. The survival factor, that is, a positive correlation between productivity and survival, weakens the case for public pensions against social LTC insurance (Nishimura & Pestieau, 2022; Leroux et al., 2021). Productivity being negatively correlated with dependence and positively correlated with survival implies that equity concerns in bequest taxation push for taxing the most the bequests of long-lived healthy individuals (Leroux and Pestieau, 2022). Finally, the *ex post* egalitarian point of view advocates smaller public schemes for both LTC and pensions since they favor those who are long-lived, and the fairness towards the short-lived requires to leave more resources for the young age which is lived by everyone (Leroux et al., 2021).

All in all, as in the case of identical individuals, the exact conclusions to be drawn depend on the setting in question as well as on the social welfare criterion adopted (which at the same time is also a philosophical question).

### 5.3 | **Political economy**

While in the previous subsections we focused on optimal policy, we will now look at some political economy models dealing with the issues of political support for LTC schemes.

### 5.3.1 | Models

De Donder and Leroux (2013) study the political support for social LTC insurance in the presence of behavioral biases. In their model, all individuals have the same probability of dependence and after voting over social LTC insurance can also buy private insurance and save. The authors consider three types of behavioral biases associated with the underestimation of one's risk of dependence in private decision making. Sophisticated procrastinators under-weight their risk but anticipate their mistake when voting over social LTC insurance. On the other hand, optimistic and myopic individuals are consistent across choices. Optimistic individuals underestimate their own risk of dependence but know the average risk, whereas myopic agents underestimate both their own and the average probability of dependence. The authors show that sophisticated procrastinators achieve the first-best allocation, while optimistic and myopic individuals insure too little and save too much. Moreover, at the majority-voting equilibrium, when private insurance is available, myopic and optimistic agents who are more biased than the median are worse off than when private insurance is not available, while the opposite holds for the myopics and optimists who are less biased than the median.

A number of papers (Nuscheler & Roeder, 2013; De Donder & Pestieau, 2017; De Donder & Leroux, 2017) are interested in the support for social LTC programs in the presence of help from the family.

Nuscheler and Roeder (2013) consider a society of one parent-one child families where children differ in productivity. Care for dependent parents can be informal (provided by children), privately financed formal care and public LTC. The authors highlight two conflicts: the one between families with and without disabled parents and the one between the rich and the poor. It is shown that the negative association between income inequality and public LTC spending can be supported as a political equilibrium effect. Moreover, the paper finds that a rising demand for LTC (due to demographic changes) may or may not enhance public spending on LTC. This depends on the response of informal caregiving.

De Donder and Pestieau (2017) look at the political determination of the social LTC insurance level in a setting where individuals differ in income, risk of dependence and the probability of receiving family help as well as the amount of that help. Moreover, individuals can purchase (actuarially fair) private insurance and save. It is shown that individuals' preference for social or private insurance depends on their income-to-dependence probability ratio. Family support is found to crowd out the demand for insurance, both social and, particularly, private. The authors show that the demand for social insurance is reduced by the availability of private insurance, but the majority-chosen level of social insurance is not necessarily decreased. It is also found that a ban on private insurance would always be opposed by a majority, even when private insurance crowds out social insurance at the voting equilibrium.

De Donder and Leroux (2017) analyze a framework with families consisting of one old (parent) and one young (child) member where all individuals have the same probability of dependence and children differ in productivity. Children can provide help to their parents both in time and in money, but parents have a preference for help in time. Both young and old individuals vote over a social LTC transfer scheme which is financed by a proportional tax on labor income. The results of the paper suggest several reasons to explain why there are so few social LTC transfers in many countries. It is shown that a potential explanation may be associated with the parents' preference for family help in time, with the possibility that children of autonomous parents may successfully oppose social LTC schemes or even with the possibility that a proposed social program is not sufficiently large.

In a setting without family aid, Cremer et al. (2021) study the political sustainability of means-tested social programs aimed at the poor, such as Medicaid in the US. Given that the poor do not constitute a majority, a way to ensure sufficient political support for such programs may be to allow the middle class to benefit from them in a random way.[12] The authors consider a model of two stages: in the first stage, a Rawlsian government chooses the probability with which the middle class can benefit from the social scheme, while in the second stage there is a majority vote on the level of benefits. The paper finds that the optimal probability of letting the middle class benefit from the social scheme decreases with income inequality (measured by the difference between average income and the income of the middle class) and increases with the relative risk aversion of the middle-class individuals.

## 5.3.2 | Discussion

LTC related political economy models are less numerous than those dealing with optimal policy design, but they also study different settings ranging from behavioral biases (De Donder & Leroux, 2013) to the political sustainability of social programs aimed at the poor (Cremer et al., 2021), with family aid (Nuscheler & Roeder, 2013; De Donder & Pestieau, 2017; De Donder & Leroux, 2017) and without (De Donder & Leroux, 2013; Cremer et al., 2021).

There is generally at least some political support for social LTC schemes, even though support can be compromised by various factors such as family related reasons (Nuscheler & Roeder, 2013; De Donder & Leroux, 2017), behavioral biases (De Donder & Leroux, 2013), crowding-out by private insurance (De Donder & Pestieau, 2017) or even the problem that a proposed social scheme is not large enough (De Donder & Leroux, 2017). Moreover, ensuring the support from the middle class for social LTC aimed at the poor may be challenging as well (Cremer et al., 2021). Overall, one can conclude that political sustainability of social LTC programs, just like optimal policy design, is not an obvious task.

## 6 | CONCLUSION

In the presence of the challenge that the rapidly growing LTC needs create to our societies, it is important to understand the issues that are faced by the main LTC institutions: the family, the market and the state. In this paper, we have first discussed a number of questions related to the family and the market. This analysis shows that both of them are facing certain problems, which then implies that intervention of the government may be needed to enhance social welfare. We have then surveyed a number of theoretical papers studying public policies for LTC. Most of these papers are normative dealing with optimal policy in different contexts which also include the market and the family. We have classified the models according to whether they treat identical or heterogeneous individuals, which has allowed us to better separate the issues related to market and family failures from redistributive concerns. Finally, we have also discussed a few political economy papers analyzing the political support for public LTC schemes.

As it can be seen, a lot of research has already been devoted to the topic of LTC. It is nevertheless important to draw the right lessons from the findings of this research and to come up with appropriate ways to successfully implement them in practice. This overview raises several questions that future research should address. They concern the fragmentary nature of the existing

work, a series of problems that have not yet been explored and the need to bridge the gap between empirical research and this body of theory.

The works presented in this overview each cover only one particular aspect of the issue of dependence in old age. One would like to have a more general theoretical model that encompasses all these aspects. The absence of such a model is largely due to the complexity of the problem, which involves the state, the family and the market, a multiplicity of motivations in informal care, various market imperfections and a complex political economy. Notwithstanding these remarks, one certainly needs to design a public policy for LTC that takes these different aspects into account.

There are several issues that theoretical research has not yet really addressed. Among a few examples of such issues, there is the question of the choice of residence between moving to a nursing home or staying home. This question has become acute following the COVID-19 pandemic, which revealed significant excess mortality in retirement homes. Flawinne et al. (2022) show that in most European countries nursing homes lead to excess mortality even when controlling for all characteristics of the residents.[13] There is also the industrial economy of nursing homes. Issues of understaffing and abuse in homes run by profit-seeking companies need to be addressed. In a recent paper, Gupta et al. (2021) study the disastrous effects of private equity ownership on patient welfare at nursing homes.

There is a substantial empirical literature on dependency at old age and LTC. It would be desirable to have more bridges between this literature and theoretical research. One would like to understand why in reality both the state and the market do not apply the deductible principle. The relationship between dependency and heritage should be further explored. The links between working conditions during working life and old age dependency should also be studied.

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## NOTES

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[2] OECD (2021).

[3] Barigozzi et al. (2020) study social norms and the gender gap in informal care provision.

[4] See, for example, OECD (2020).

[5] They define advantageous selection as the situation when a rise in the insurance premium induces high-cost individuals to leave the market, which decreases the average cost among those who remain.

[6] See Wiener et al. (2017) and Center for Long-Term Care Reform (https://docplayer.net/7529594-Briefing-paper-3-medicaid-planning-for-long-term-care.html).

[7] The share of individuals in the sample having LTC insurance increases from 9.5% to 10%.

[8] See also Norton (1995).

[9] See also Dilnot (2011).

[10] Canta et al. (2016) study capital accumulation in a society where caregiving is motivated by a family norm. They show that public LTC insurance may be a complement to private insurance and hence foster capital accumulation.

[11] We can find here again the spirit of Brunner (2012) and Cremer et al. (2016) discussed in the part on identical individuals in the sense of bequest taxes serving as LTC insurance.

[12] See also De Donder and Peluso (2018).

[13] A theoretical modelling of the choice between nursing home and home care is attempted by Achou et al. (2022).

# REFERENCES

Achou, B., Donder, Ph. De, Glenzer, F., Lee, M., & Leroux, M. L. (2022). Nursing home aversion post-pandemic: Implications for savings and long-term care policy. *Journal of Economic Behavior & Organization*, *201*, 1–21.

Ameriks, J., Briggs, J., Caplin, A., Shapiro, M., & Tonetti, C. (2020). Long-term-care utility and late-in-life saving. *Journal of Political Economy*, *128*, 2375–2451.

Arrow, K. (1963). Uncertainty and the welfare economics of medical care. *American Economic Review*, *53*, 941–973.

Atkinson, A. B., & Stiglitz, J. E. (1976). The design of tax structure: Direct versus indirect taxation. *Journal of Public Economics*, *6*, 55–75.

Barigozzi, F., Cremer, H., & Roeder, K. (2020). Caregivers in the family: Daughters, sons and social norms. *European Economic Review*, *130*, 103589.

Becker, G. S. (1974). A theory of social interactions. *Journal of Political Economy*, *82*, 1063–1093.

Becker, G. S. (1991). *A treatise on the family*. Harvard University Press.

Bernheim, B., Shleifer, A., & Summers, L. (1985). The strategic bequest motive. *Journal of Political Economy*, *93*, 1045–1076.

Bolin, K., Lindgren, B., & Lundborg, P. (2008). Informal and formal care among single-living elderly in Europe. *Health Economics*, *17*(3), 393–409.

Bonsang, E. (2009). Does informal care from children to their elderly parents substitute for formal care in Europe? *Journal of Health Economics*, *28*, 143–154.

Boyer, M., Donder, Ph. De, Fluet, C., Leroux, M. L., & Michaud, P. C. (2019). Long-term care risk misperceptions. *The Geneva Papers on Risk and Insurance – Issues and Practice*, *44*, 183–215.

Boyer, M., Donder, Ph. De, Fluet, C., Leroux, M. L., & Michaud, P. C. (2020). Long-term care insurance: information frictions and selection. *American Economic Journal: Economic Policy*, *12*(3), 134–169.

Brown, J., & Finkelstein, A. (2007). Why is the market for long-term care insurance so small? *Journal of Public Economics*, *91*, 1967–1991.

Brown, J., & Finkelstein, A. (2008). The interaction of public and private insurance: Medicaid and the long-term care insurance market. *American Economic Review*, *98*(3), 1083–1102.

Brown, J., & Finkelstein, A. (2009). The private market for long-term care insurance in the U.S.: A review of the evidence. *Journal of Risk and Insurance*, *76*(1), 5–29.

Brown, J., & Warshawsky, M. (2013). The life care annuity: A new empirical examination of an insurance innovation that addresses problems in the markets for life annuities and long-term care insurance. *Journal of Risk and Insurance*, *80*(3), 677–703.

Brunner, J. (2012). The bequest tax as long-term care insurance. *CESifo Discussion Paper*.

Canta, C., & Cremer, H. (2019). Long-term care policy with nonlinear strategic bequests. *European Economic Review*, *119*, 548–566.

Canta, C., & Cremer, H. (2021). Opting out and topping up reconsidered: Informal care under uncertain altruism. *Canadian Journal of Economics*, *54*(1), 259–283.

Canta, C., Cremer, H., & Gahvari, F. (2020). "Honor thy father and thy mother" or not: Uncertain family aid and the design of social long term care insurance. *Social Choice and Welfare*, *55*, 687–734.

Canta, C., & Pestieau, P. (2013). Long term care insurance and family norms. The B.E. *Journal of Economic Analysis & Policy*, *14*, 401–428.

Canta, C., Pestieau, P., & Schoenmaeckers, J. (2021). Blood and gender bias in informal care within the family? *LIDAM Discussion Paper CORE*, 2021/15.

Canta, C., Pestieau, P., & Thibault, E. (2016). Long term care and capital accumulation: the impact of the State, the market and the family. *Economic Theory*, *61*(4), 755–785.

Center for Long-Term Care Reform. *Briefing paper #3: Medicaid planning for long-term care*. Available at: https://docplayer.net/7529594-Briefing-paper-3-medicaid-planning-for-long-term-care.html

Cox, D., & Stark, O. (1993). Intergenerational transfers and demonstration effect. *Boston College Working Papers in Economics*, *244*, Boston College Department of Economics.

Cox, D., & Stark, O. (2005). On the demand for grandchildren: Tied transfers and the demonstration effect. *Journal of Public Economics*, *89*, 1665–1697.

Cremer, H., Gahvari, F., & Pestieau, P. (2013). Endogenous altruism, redistribution, and long-term care. The B.E. *Journal of Economic Analysis & Policy*, *14*(2), 499–524.

**WILEY**

Cremer, H., Gahvari, F., & Pestieau, P. (2017). Uncertain altruism and the provision of long term care. *Journal of Public Economics*, *151*, 12–24.

Cremer, H., Klimaviciute, J., & Pestieau, P. (2021). A political economy of loose means-testing in targeted social programs. *Economics Letters*, *202*, 109810.

Cremer, H., Lozachmeur, J.-M., & Pestieau, P. (2016). The design of long-term care insurance contracts. *Journal of Health Economics*, *50*, 330–339.

Cremer, H., Pestieau, P., & Ponthière, G. (2012). The economics of long-term care: A survey. *Nordic Economic Policy Review*, *2*, 107–148.

Cremer, H., Pestieau, P., & Roeder, K. (2016). Social long-term care insurance with two-sided altruism. *Research in Economics*, *70*, 101–109.

Cremer, H., & Roeder, K. (2013). Long-term care policy, myopia and redistribution. *Journal of Public Economics*, *108*, 33–43.

Cremer, H., & Roeder, K. (2017a). Long-term care policy with lazy rotten kids. *Journal of Public Economic Theory*, *19*, 583–602.

Cremer, H., & Roeder, K. (2017b). Social insurance with competitive insurance markets and risk misperception. *Journal of Public Economics*, *146*, 138–147.

De Donder, Ph., & Leroux, M. - L. (2013). Behavioral biases and long-term care insurance: A political economy approach. The B.E. *Journal of Economic Analysis & Policy*, *14*, 551–575.

De Donder, Ph., & Leroux, M. - L. (2017). The political choice of social long term care transfers when family gives time and money. *Social Choice and Welfare*, *49*, 755–786.

De Donder, Ph., & Leroux, M. - L. (2021). Long term care insurance with state-dependent preferences. *Health Economics*, *30*, 3074–3086.

De Donder, Ph., Leroux, M. - L., & Salanié, F. (2022). *Advantageous selection without moral hazard (with an application to life care annuities)*. TSE Working Paper, 1334.

De Donder, Ph., & Peluso, E. (2018). Politically sustainable targeted transfers. *Public Choice*, *174*, 301–313.

De Donder, Ph., & Pestieau, P. (2017). Private, social and self-insurance for long-term care in the presence of family help. *Journal of Public Economic Theory*, *19*(1), 18–37.

Dilnot, A. (2011). *Fairer care funding: The report of the commission on funding of care and support*. Commission on Funding of Care and Support.

Drèze, J., Pestieau, P., & Schokkaert, E. (2016). Arrow's theorem of the deductible and long-term care insurance. *Economics Letters*, *148*, 103–105.

European Commission (2021). *The 2021 ageing report. economic and budgetary projections for the eu member states (2019–2070)*. Institutional Paper 148. Publications Office of the European Union.

Finkelstein, A., Luttmer, E., & Notowidigdo, M. (2013). What good is wealth without health? The effect of health on the marginal utility of consumption. *Journal of the European Economic Association*, *11*(S1), 221–258.

Flawinne, X., Lefebvre, M., Perelman, S., Pestieau, P., & Schoenmaeckers, J. (2022). Nursing homes and mortality in europe: uncertain causality. *LIDAM Discussion Paper CORE*, 2022/06.

Gupta, A., Howell, S. T., Yannelis, C., & Gupta, A. (2021). Does private equity investment in healthcare benefit patients? Evidence from nursing homes. *NBER Working Paper*, 28474.

Jousten, A., Lipszyc, B., Marchand, M., & Pestieau, P. (2005). Long term care insurance and optimal taxation for altruistic children. *FinanzArchiv*, *61*, 1–18.

Kim, G. (2018). Medicaid crowd-out of long-term care insurance with endogenous medicaid enrollment. *Journal of Human Capital*, *12*, 431–474.

Klimaviciute, J. (2017). Long-term care insurance and intra-family moral hazard: Fixed vs proportional insurance benefits. *The Geneva Risk and Insurance Review*, *42*, 87–116.

Klimaviciute, J. (2019). Long-term care and intra-family moral hazard: Optimal public policy. *Journal of Public Economic Theory*, *21*, 1037–1055.

Klimaviciute, J. (2020). Long-term care and myopic couples. *International Tax and Public Finance*, *27*, 77–102.

Klimaviciute, J., Perelman, S., Pestieau, P., & Schoenmaeckers, J. (2017). Caring for dependent parents: Altruism, exchange or family norm? *Journal of Population Economics*, *30*, 835–873.

Klimaviciute, J., & Pestieau, P. (2018a). Long-term care social insurance: How to avoid big losses? *International Tax and Public Finance*, *25*, 99–139.

Klimaviciute, J., & Pestieau, P. (2018b). Social insurance for long-term care with deductible and linear contributions. *FinanzArchiv*, *74*, 88–108.

Klimaviciute, J., & Pestieau, P. (2018c). The public economics of long-term care. A survey of recent contributions. *Annals of Public and Cooperative Economics*, *89*(1), 49–64.

Klimaviciute, J., & Pestieau, P. (2020). Insurance with a deductible: a way out of the long term care insurance puzzle. *Journal of Economics*, *130*, 297–307.

Klimaviciute, J., Pestieau, P., & Schoenmaeckers, J. (2020). Long-term care insurance with family altruism: Theory and empirics. *Journal of Risk and Insurance*, *87*, 895–918.

Koijen, R., Van Nieuwerburgh, S., & Yogo, M. (2016). Health and mortality delta: Assessing the welfare cost of household insurance choice. *Journal of Finance*, *71*(2), 957–1010.

Kopczuk, W., & Slemrod, J. (2005). Denial of death and economic behavior. *The B.E. Journal of Theoretical Economics*, *5*, 0000102202153459631207.

Leroux, M.- L., Pestieau, P., & Ponthiere, G. (2021). Fair long-term care insurance. *Social Choice and Welfare*, *57*, 503–533.

Leroux, M - L., & estieau, P. (2022). Age-related taxation of bequests in the presence of a dependency risk. *Journal of Public Economic Theory*, *24*, 92–119.

Lillard, L., & Weiss, Y. (1997). Uncertain health and survival: Effects on end-of-life consumption. *Journal of Business & Economic Statistics*, *15*(2), 254–268.

Murtaugh, C., Spillman, B., & Warshawsky, M. (2001). In sickness and in health: An annuity approach to financing long-term care and retirement income. *Journal of Risk and Insurance*, *68*(2), 225–254.

Nishimura, Y., & Pestieau, P. (2022). Old age or dependence: Which social insurance? *Journal of Public Economic Theory*, https://doi.org/10.1111/jpet.12571

Nordman, E. (2016). *The state of long-term care insurance: The market, challenges and future innovations*. NAIC and Center for Insurance Policy and Research.

Norton, E. (1995). Elderly assets, Medicaid policy, and spend-down in nursing homes. *Review of Income and Wealth*, *41*(3), 309–329.

Norton, E. (2016). Health and long-term care. *Handbook of the Economics of Population Aging*, *1*, chapter 16, 951–989.

Nuscheler, R., & Roeder, K. (2013). The political economy of long-term care. *European Economic Review*, *62*, 154–173.

OECD (2020). Long-term Care and Health Care Insurance in OECD and Other Countries, www.oecd.org/fin/insurance/Long-Term-Care-Health-Care-Insurance-in-OECD-and-Other-Countries.htm

OECD (2021). *Health at a glance 2021: OECD indicators*. OECD Publishing.

Pauly, M. V. (1990). The rational non-purchase of long term care insurance. *Journal of Political Economy*, *98*, 153–168.

Pestieau, P., & Sato, M. (2008). Long term care: the State, the market and the family. *Economica*, *75*, 435–454.

Rothschild, M., & Stiglitz, J. (1976). Equilibrium in competitive insurance markets: An essay on the economics of imperfect information. *The Quarterly Journal of Economics*, *90*, 629–649.

Schulz, R., & Sherwood, P. R. (2008). Physical and mental health effects of family caregiving. *American Journal of Nursing*, *108*, 23–27.

Siciliani, L. (2013). The economics of long-term care. *The B.E. Journal of Economic Analysis & Policy*, *14*(2), 343–375.

Sloan, F., & Norton, E. (1997). Adverse selection, bequests, crowding out, and private demand for insurance: evidence from the long-term care insurance market. *Journal of Risk and Uncertainty*, *15*, 201–219.

Van Houtven, C., Coe, N., & Skira, M. (2013). The effect of informal care on work and wages. *Journal of Health Economics*, *32*, 240–252.

Wiener, J., Anderson, W., Khatutsky, G., Kaganova, Y., & O'Keeffe, J. (2013). *Medicaid spend down: New estimates and implications for long-term services and supports financing reform*. The SCAN Foundation.

Wiener, J., Romaire, M., Thach, N., Collins, A., Kim, K., Pan, H., Chiri, G., Sommers, A., Haber, S., Musumeci, M., & Paradise, J. (2017). Strategies to Reduce Medicaid Spending: Findings from a Literature Review. Available at: https://www.kff.org/medicaid/issue-brief/strategies-to-reduce-medicaid-spending-findings-from-a-literature-review/view/print/

Zhou-Richter, T., Browne, M., & Gründl, H. (2010). Don't they care? Or, are they just unaware? Risk perception and the demand for long-term care insurance. *Journal of Risk and Insurance*, *77*(4), 715–747.

Zweifel, P., & Strüwe, W. (1998). Long-term care insurance in a two-generation model. *Journal of Risk and Insurance*, *65*(1), 13–32.