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Joan Costa Font
Christophe Courbage

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Abstract

Long-term care (LTC) is the largest insurable risk that old-age individuals face in most western societies. However, the demand for LTC insurance is still ostensibly small in comparison to the financial risk, which is reflected in the formation of expectations of insurance coverage. One explanation that has received limited support is that expectations of either 'public sector funding' and 'family bailout' crowd out individual incentives to seek insurance. This paper aims to investigate further the above mentioned motivational crowding out hypothesis by developing a theoretical model and by drawing on empirical analysis of representative survey data of fifteen European countries containing records on individual expectations of LTC funding sources (including private insurance, social insurance and the family). The theoretical model shows that, when informal care is treated as exogenously determined, expectations of both state support and informal care can potentially crowd out LTC insurance expectations, while this is not necessarily the case when informal care is endogenous to insurance, as is the case when intra-family moral hazard is integrated in the insurance decision. Evidence from expectations data suggest evidence consistent with the presence of family crowding out, but no evidence of public sector crowding out, and only weak evidence for cohorts of individuals older than 55.

JEL-Code: I180, D140, G220.

Keywords: long-term care, old-age dependency, long-term care insurance, family crowding out, government crowding out.

Joan Costa Font
London School of Economics (LSE)
United Kingdom
j.costa-font@lse.ac.uk

Christophe Courbage
The Geneva Association
Switzerland
christophe_courbage@genevaassociation.org

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1. Introduction

Long-term care (LTC) is perhaps one of the clearest examples of incomplete welfare insurance. Generally, it is observed that, when available people fail to purchase insurance when it is optimal to do so (Meier, 1999). Individuals in need of care, instead of purchasing insurance, appear to rely on public support or burdening their family members with caregiving duties, if and when available, or are left to self-insure when they can afford it[1]. The literature contains several explanations for the relatively low development of LTC insurance market. A number of theoretical arguments have been put forward, and various empirical studies have been developed largely focusing on the context of the United States (Pestieau and Ponthière, 2012), but limited evidence is gathered from elsewhere, in part due to the absence of a market and, hence, revealed evidence of purchase. However, as we argue in this paper, the limited market development does not mean that individuals do not expect the private insurance market to develop as either a more efficient alternative to self-insurance, or as a complement to public insurance.

Amongst the frequent factors explaining the low development of LTC insurance are biased risk perceptions, limited knowledge and a myopic denial of the risk (Kunreuther, 1978; Costa-Font and Font Vilalta, 2009). Other more conventional explanations include the existence of moral hazard (or over-consumption of insured care) and of adverse selection (or over-representation of bad risks in the insured population) as stressed by Brown and Finkelstein (2009). Finally, the role of the state of insurer of last resort and the incentives within the family structure (Pauly, 19890) has received limited attention. We concentrate in this paper on the latter two factors namely the motivational effects of the expected availability of public support and of informal care.

Some scholars have put forward the hypothesis of a crowding-out effect of private LTC insurance by public LTC insurance. In a seminal article, Pauly (1990) argued that the non-purchase of LTC insurance by the elderly might be a perfectly rational choice in the presence of a means-tested public insurance scheme. This is confirmed by evidence suggesting that demand for private LTC insurance is undermined by the availability of public support or social assistance. Sloan and Norton (1997) observed in the United States a negative correlation between Medicaid availability and the purchase of LTC insurance. Brown and Finkelstein (2004) found that, for two-thirds of the US elderly, it is rational not

[1] This is in sharp contrast to the fact that LTC's risk characteristic makes it a paradigmatic case for insurance, with 35 to 50 percent of the elderly population using LTC in their lifetime on average in European countries, while roughly one-sixth exhibit almost catastrophic expenses (European Union, 2008).

to purchase LTC insurance because its benefits simply replace support from other sources. According to Brown and Finkelstein (2008), Medicaid's large crowding-out effect arises because of the "implicit tax" that Medicaid imposes on the purchase of private policies (Brown et al., 2007). Specifically, a large part of the premium that individuals pay for the purchase of a private policy goes to pay for benefits that end up duplicating benefits that Medicaid would have paid for in the absence of a private policy. The latter assumes individual's qualify for Medciaid.

As LTC can be provided both formally and informally, the decision to purchase LTC insurance is also known to be influenced by intergenerational interactions and, in particular expectations of informal care. More specifically, intra-family moral hazard has been pointed out in the LTC insurance market and has long been considered a cause for the sluggish development of private LTC insurance (Pauly, 1990; Zweifel and Strüwe, 1998). Intra-family moral hazard refers to the disincentives for children when the parent has LTC insurance. Anticipating this, the parent abstains from buying LTC insurance[2]. However, empirical evidence on the purchase of LTC insurance appears to indicate some complementarity between insurance and informal care[3]. The latter could happen if altruistic parents purchase LTC insurance to avoid burdening potential informal caregivers (Courbage and Roudaut, 2008).

The aim of this paper is to investigate how expectations of public support and informal care influence insurance expectations. Very few empirical work on the decision to purchase LTC insurance exist in Europe, mainly because the market for LTC insurance has not kicked off in most European countries, except for France and Germany. The purpose of this paper is to fill this gap. To that aim, we first develop a theoretical model where we consider an individual with a state-dependent utility function who decides the amount of LTC coverage purchased to protect against the financial cost of LTC needs. Theoretical predictions show that when informal care is exogenous, both state support and informal care crowds out LTC insurance. However, when informal care is endogenous to insurance, as happens if the

[2] The substitutability between LTC insurance and informal care has also given rise to the so-called "family crowding-out" hypothesis, which states that the availability of informal family arrangements hampers the development of private LTC insurance (Costa-Font, 2010).

[3] In contrast to the notion that family members serve as substitutes for LTC insurance, Mellor (2001) showed for the U.S. that the availability of informal caregivers has no statistically significant effect on LTC insurance purchase. This was confirmed by Courbage and Roudaut (2008), who found for France that the probability of owning LTC insurance increases for those who have a higher probability of receiving informal care should the need arise in the future

parent integrates intra-family moral hazard in his decision, then both more public support or the availability of informal care could increase the demand for LTC insurance. Second, the effects of state support and informal care availability on the decision to purchase insurance are tested using aggregate and individual European expectations data suggest evidence of family crowding out but no evidence of public sector crowding out.

The paper is organized as follows. In the next section, we briefly present the ways LTC is financed in Europe with a special emphasize on private insurance. Section 3 introduces the theoretical model on the optimal demand for LTC insurance. In section 4, we test for the existence of both public and family insurance (motivational) crowding-out using data on individual expectations. Finally, the last section offers a conclusion.

2. Background on LTC financing in Europe

In most European countries, publicly financed LTC is highly fragmented and offer partial coverage, even when there is an entitlement to publicly funded care. Hence, individuals are expected to pay a large share of the cost of LTC. The latter coexists with other forms of support for the access to nursing home care based on ability to pay (such as Ireland), topped up by cash allowances (as in Italy or Poland). In France, as reported by Colombo et al. (2011), a locally run 'Allocation Personalisée d'Autonomie' is available to disabled people aged 60 or older living either at home or in a nursing home, covering personal care costs borne by dependents; but co-funded by beneficiaries and their families.

LTC services have been integrated into social insurance in several countries, among them Germany, the Netherlands, and Austria. With the exception of Belgium, it is separated from health insurance, however funding is through employment contributions that may include the elderly and may be subsidised by the government to an extent, resulting in differences in the extend of governments participation in the funding of LTC. Benefits are defined in terms of a fixed reimbursement of cost as in Germany or as a percentage of cost, causing benefits to automatically increase with cost. In the region of Flanders (Belgium), social LTC insurance pays out cash benefits (Colombo et al., 2011).

Where insurance does not exist, government programs (local, regional or national) support individuals as a funder of last resort. In Nordic countries (Norway, Sweden, Denmark, and Finland), general taxation is used to fund universal comprehensive packages that include LTC services that are delivered locally or regionally as, e.g. in Denmark). A few other European countries are moving in this direction as well. For instance, Spain introduced a tax-funded scheme to be completed by 2015, with regional governments matching the national government to finance LTC services on a means-tested basis (Costa-Font and Font-

Vilalta, 2006). In Scotland, a tax-funded scheme guarantees free access to LTC subject to needs testing (in contrast to England).

As for private LTC insurance, two types of products have developed, namely partial reimbursement policies and indemnity policies. However, in most European countries less than 2% of total LTC expenditure is financed through private LTC insurance (Colombo and Mercier, 2012). Generally, the scope for private insurance depends greatly on its interdependence with public insurance on one hand and throughout intergenerational norms on the other hand. Nevertheless, it is unlikely to achieve a substantial market share without a degree of subsidization targeted at lower-income groups.

France is the largest LTC insurance market in Europe, with about 3 million policyholders in 2007. Individual policies account for 45% and group policies for 55% of the market, which is highly concentrated, with four companies having 70% market share (FFSA, 2009). Products are mainly indemnity cash benefits, which generally do not cover full cost, thus imposing a degree of cost sharing.

Germany is the second largest European private market insurance, comprising mandatory private LTC insurance, and private supplementary LTC insurance, which represented about 15% of in-force premium premiums volume in 2007. Nearly one million German people were covered by supplementary LTC insurance in 2006 (Swiss Re, 2008), which is sold as a supplement (or top-ups) to the benefit of the social LTC insurance system.

In other European countries, the private LTC insurance markets remain very small, with different trends. It is growing in countries such as Spain and Italy, but stagnating elsewhere such as in the U.K. and the Nordic countries (SCOR, 2012).

3. A theoretical model on optimal LTC insurance demand

3.1 The basic model

We consider a parent characterized by a state-dependent vNM utility function defined over wealth and conditioned on being dependent ($u(.)$) or not ($v(.)$) with $u(.) < v(.)$ for the same level of wealth. Let p be the probability of being dependent and needing LTC. In case of dependency, the parent can purchase formal LTC. Let N be the quantity of formal LTC and β the price of formal care per unity of care. The parent can also receive informal care, e, from his child. Informal care has the benefit of reducing the cost of LTC at a decreasing

rate[4]. Hence N depends on the level of informal LTC e provided by the child and $N(e)$ is such that $N'(e) < 0$ and $N''(e) < 0$. It means that we assume informal LTC and formal LTC to be substitutes[5], i.e. more informal care leads to less formal care. We also assume that public support is available in case of LTC needs. Let s be the means-tested level of public support, which is a decreasing and concave function of initial wealth w_0. The level of public support is then defined by the function $s(w_0, \alpha)$ where α represents an exogenous parameter to reflect any change in the level of public support.

We also consider that the parent is altruistic in the sense that he can be sensitive to the negative impact of providing care on the informal caregiver's quality of life, both in terms of his health and income, as stressed in van den Berg *et al.* (2005). To address parental altruism, we assume that the parent negatively values the offer of informal care from his child. We then make the utility function in case of dependency dependent on the level of informal care in the form $u(.,e)$ such as $u'_e = \frac{\delta u}{\delta e} < 0$ and $u''_{we} = \frac{\delta^2 u}{\delta w \delta e} < 0$ where the subscript e means that we differentiate with respect to the second argument i.e. e, and the subscript w means that we differentiate with respect to wealth, i.e. the first argument.[6] Therefore we assume that the more informal care is provided the lower both the utility of wealth and the marginal utility of wealth to reflect parental altruism.The individual can also purchase a LTC insurance policy which offers an indemnity I in case of dependency. The insurance contract is supposed to be in the form of a cash-benefit contract, as this is the most common form of LTC insurance contract in Europe (Kessler, 2010). Let θI be the insurance premium where θ is the premium per unity of coverage. If $\theta = p$, the premium is actuarial, if $\theta > p$, the premium is loaded.

The expected utility of the parent is given by:

$$V = pu(w_0 - \beta N(e) + I(1-\theta) + s(w_0, \alpha), e) + (1-p)v(w_0 - \theta I)$$

Let us first consider the case of an actuarial premium, i.e. such as $\theta = p$. The optimal level of insurance is given by the first-order condition (FOC):

$$V_I = p(1-p)\big(u'(.) - v'(.)\big) = 0 \qquad (1)$$

The second order condition for a maximum is verified under risk aversion, i.e. $u''(.) < 0$ and $v''(.) < 0$.

[4] We implicitly assume that elderly parents in need of assistance would first turn to informal care services and then formal care would adapt accordingly.
[5] This relation finds strong support empirically (see e.g. Bolin et al., 2007; Bonsang, 2009).
[6] When no subscript is indicated for the derivative, it means that we differentiate with respect to wealth.

From Equation (1), it is easy to show that the optimal level of insurance I^* is such that $I^* = \beta N(e) - s(w_0, \alpha))$ if $u'(.) = v'(.)$, which corresponds to full insurance, i.e. such as the indemnity covers the full financial loss (the cost of formal care minus the public subsidy). If $u'(.) < v'(.)$, then $I^* < \beta N(e) - s(w_0, \alpha))$, which corresponds to partial insurance. This latter case is the more realistic, as utility marginal of wealth in case of dependency is usually lower than utility marginal of wealth in case of good health as empirically showed (see Evans and Viscusi (1991) and Finkelstein *et al*. (2009)).

So as to investigate both state and family crowding out of LTC insurance, we wonder how the optimal level of LTC insurance reacts to an increase in the level of state support and of informal care, i.e. we develop some comparative static analysis. The second order condition being satisfied, the direction of the effect of marginal variation of exogenous parameters is given by the sign of the derivative of the FOC with respect to the exogenous parameter.

Differentiating the FOC with respect to *e*, we obtain that

$V_{Ie} = p(1-p)\big(-\beta N'(e)\big)u'' + u''_{we}) < 0$ since $u'' < 0$ and $u''_{we} < 0$.

Hence, the more the individual receives informal care, the lower he purchases LTC insurance. This means that informal care crowds out insurance under both risk aversion and parental altruism. However, even if we do not consider parental altruism, informal care would still crowd out LTC insurance as far the individual is risk averse.

Now, differentiating the FOC with respect to α makes is possible to investigate how an increase in public support ($s'_\alpha > 0$) impacts LTC insurance. This gives:

$V_{I\alpha} = p(1-p)(s'_\alpha)u'' < 0$ since $u'' < 0$.

Hence, the higher the public support, the lower insurance purchase, meaning that under risk aversion public support crowds out insurance.

Proposition 1: *When informal care is exogenous, both state support and informal care crowds out LTC insurance.*

Naturally, we can also investigate how other exogenous shocks impact the optimal level of insurance such as shocks on the cost of formal care, the probability of being dependent, and the level of initial wealth.

Differentiating the FOC with respect to the exogenous variables gives:

$V_{I\beta} = p(1-p)\big(-N(e)\big)u'' > 0$

$V_{Ip} = I(v' - u') > 0$ iif $u'(.) < v'(.)$

$V_{Iw_0} = p(1-p)\big(\big(s'_{w_0}\big)u'' + (u'' - v'') < 0$ if $u''(.) < v''(.)$

Hence, under risk aversion, an increase in the price of formal care leads to more insurance. Those more at risk purchase more insurance if and only if the marginal utility of wealth is higher in the good state of nature than in the bad one. Finally, a higher initial wealth reduces the demand for insurance if $u''(.) < v''(.)$, otherwise we cannot conclude.

3.2 Endogeneity of informal care and intrafamily moral hazard

So far we have assumed that the level of informal care is exogenous with respect to insurance. However, as indicated before the level of informal care provided by informal care givers may depend on the level of insurance purchased by the dependent elderly. This is what Pauly (1990) labeled intra-family moral hazard which refers to the disincentives for children or relatives as informal givers to provide care when the parent has LTC insurance. We then suppose now that the parent takes into account the intra-family moral hazard phenomena on the child's side, i.e. he takes into account the fact that the higher the insurance coverage, the lower the informal care supplied by his child. In order to integrate the possibility of intra-family moral hazard in our model, we simply make the level of informal depend negatively on insurance, i.e. we assume that *e* depends negatively on *I*.

The expected utility of the parent becomes:

$$U = pu(w_0 - \beta N\big(e(I)\big) + I(1-p) + s(w_0, \alpha), e(I)) + (1-p)v(w_0 - pI)$$

The optimal level of insurance is now given by:

$$U_I = p(1-p)\big(u'(.) - v'(.)\big) - p\beta e'_I N'_e u'(.) + pe'_I u'_e(.) = 0 \qquad (2)$$

We can then compare the optimal levels of insurance with and without intra-family moral hazard by evaluating eq. (2) in I^* solution of Equation (1). This gives:

$$U_I(I^*) = -pe'_I(\beta N'_e u'(.) - u'_e(.)) \qquad (3)$$

The sign of this equation depends both on the marginal utility of wealth and on the marginal utility with respect to the informal caregiver's quality of life. When the parent is not sensitive about the informal caregiver quality of life ($u'_e(.) = 0$), then Equation (3) is

always negative and the introduction of intra-family moral hazard always decreases the demand for LTC insurance as usually referred in the literature (e.g. Courbage and Zweifel, 2011).

However, if we consider that the parent can be sensitive to the informal caregiver's well-being, i.e. he is altruistic, the presence of intra-family moral hazard can lead to either an increase or a decrease in LTC insurance. There is an increase (decrease) in insurance if and only if the loss of utility from spending more on formal care is inferior (superior) to the gain of utility due to a better informal caregiver quality of life following less informal care, i.e. if and only if $\beta N'_e u'(.) < (>) u'_e(.)$. Thus, the usual negative influence intra-family moral hazard could have on LTC insurance can be compensated by the positive influence on LTC insurance of the parent being concerned by their relatives' quality of life. This means that the availability of informal care does not necessarily reduce the level of insurance. It depends on whether there is presence of intra-family moral and parental altruism, and how one phenomenon dominates the other.

Let us now investigate if the presence of intra-family moral hazard modifies the state crowding-out effect. Differentiating the FOC with respect to α gives

$$U_{I\alpha} = p(1-p)(s'_\alpha)u'' - ps'_\alpha \beta e'_I N'_e u''(.) + ps'_\alpha e'_I e u''_{we}(.)$$

The first term is negative as in the case of no intra-family hazard since higher public support increases wealth in the case of dependency and therefore reduces the benefit of insurance. The second term is positive, as higher public support reduces the loss of wealth due to spending more on formal care. The third term is also positive, as higher public support increases the gain of utility due to a better quality of life of the informal giver in providing less informal care. Hence when the effort informal care is endogenous to insurance and there exists parental altruism, a higher level of state support can actually increase the demand for LTC insurance (even if the parent is not considered as altruistic).

Proposition 2: *When informal care is endogenous to insurance, as happens if the parent integrates intra-family moral hazard in his decision, then more public support or the availability of informal care could increase the demand for LTC insurance.*

We can also look at how the optimal demand for insurance reacts to the same exogenous shocks as the ones addressed before. It is obvious that results differ from the ones obtained

in the preceding section. Finally, Propositions 1 and 2 still apply in the case of a non-actuarial premium.

In conclusion, this theoretical model has shown that when informal care is exogenous, both state support and informal care crowds LTC insurance. However, when informal care is endogenous to insurance, as happens if the parent integrates intrafamily moral hazard in his decision, then more public support or the availability of informal care could increase the demand for LTC insurance.

4. Data and Empirical Strategy

The core prediction of the crowding-out hypothesis states that expectations of both public and informal insurance arrangements tends to modify the incentives, to purchase LTC insurance.

4.1 Data

We draw from individual data on individual expectations to capture 'ex-ante preferences' which are especially relevant in the context of a weak market. Alternatively, one can rely on revealed preferences when choices of people who have been exposed to different forms of insurance are observed. To our knowledge, data on both options is imperfect. Longitudinal studies generally fail to report insurance expectations data, and market data on insurance choices when there is a market is largely affected by underwriting, and hence only imperfectly proxies real choices. Existing longitudinal evidence in Europe is unsuited to examine the effects of a hypothetical double crowding-out by public insurance and family[7]. In contrast, Eurobarometer data (Special Eurobarometer 283) which contains a number of records on a rich cross section of European countries, reporting on LTC payment expectations, as well as the role of public insurance and the family, including private insurance, social insurance, public support, family contributions, and self-insurance. This makes Eurobarometer the best currently available dataset for testing the motivational crowding-out hypothesis. That said, it is important to point out two important limitations, namely the fact that data only consider an ex-ante dimension and does not report information on individuals in institutional care. Second, the sample is only a cross section which makes causal analysis challenging.

[7] The SHARE survey imperfectly defined long term care insurance and does not contain expectations data.

The special Eurobarometer 2823 is a cross-sectional representative sample of European countries that specifically examine question on health and LTC. It includes extensive information on family characteristics, as well as information on expectations and attitudes towards LTC by individuals of different age cohorts and genders. The data was collected between the 25th of May and the 30th of June 2007, TNS Opinion & Social interviewed 28,660 Europeans aged 15 and over living in the 27 European Union Member States and the two candidate countries. From such a subsample we selected a subsample of 15,172 comprising respondents of European Union Member States prior to 1st May 2004 where the meaning and extension of long term care is precisely identified. The sample is made of stratified sampling representative of the European "administrative regional units" or EUROSTAT NUTS II[8].

4.2 Measures

Dependent Variables. Our dependent variable refers to expectations of private insurance funding. More specifically, we measure expectations as the response to the following question: "*If you were to need regular help and long-term care that would require payment, who do you think will finance this?"*[9]. Individuals can choose among a set of options including payment by themselves (self-insurance), payment by their private insurance, payment by social insurance and finally, another option included was payment by family members besides the spouse.

Explanatory Variables. The candidate variables to explain our claim of a potential double crowding out include on the one hand expectations of family funding (family insurance)[10] and on the other hand expectations of social insurance funding. Both variables are expected to pick up motivations of both family and public insurance. One potential theoretical and empirical concern that we address in the empirical strategy is that these variables can be endogenously determined, insofar as individuals can decide on their family ties

[8] In each of the selected sampling points, a starting address was drawn, at random. Further addresses (every Nth address) were selected by standard "random route "procedures, from the initial address. In each household, the respondent was drawn, at random (following the "closest birthday rule"). All interviews were conducted face-to-face in people's homes and in the appropriate national language

[9] The latter is question QA21 of the survey. The same question provides evidence that allows identifying individual responses on the basis of expectations of family bailout, expectation of self-insurance as well as expectations of private insurance.

[10] The latter is picked up by the question QA7 of the survey

simultaneously to making insurance choices. The dataset contains two questions on expectations of family insurance and expectations of family bailout alongside self-insurance. As an instrument for family insurance the potential we employ data on residential distance of children to parent as well as general attitudes towards the importance of family ties.

Individual control variables. We include a list of important controls including, risk perceptions of needing long term care later in life, life expectancy expectations (or perceived length of life), experience both personal and familial on providing long term care as well as personal risks that can proxy the individual probability of being dependent which are reported in Table 1. Other controls include the respondent's age, the number of children and migration status, income and education. All of these variables can potentially play a role in determining expectation of insurance for LTC; finally, we include state level fixed effects, given that there is some potential heterogeneity that runs from the specific Institutions of a state. The latter explains that country-specific estimates might provide a misleading picture of the interaction effects as some important institutional heterogeneity is lost in looking at country effects.

4.2 Empirical Strategy

This section is devoted to an empirical test of the crowding-out hypothesis by relating LTC insurance to public entitlement and family insurance. Given the absence of a market as such, we cannot follow the empirical methodology of Cutler (2002), who addressed the crowding out of private insurance by examining the impact of Medicaid as last resort insurance in the United States. Unlike in the United States, most European countries exhibit some level of public (non-means tested) support, and even offer some entitlement as discussed in the background section, yet coverage is partial. Low insurance uptake might be caused by consumer uncertainty examining a possible crowding out of insurance by family social norms (also refereed as family bailout), note that current patterns of behavior notably in southern Europe may have little predictive value and in contrast information about future expectations may even have more merit than data reflecting actual decisions.

Given the heterogeneity in the development of the LTC industry in Europe, our analysis relies on EU-15 which allows us to identify at least two extreme cohorts of countries, namely northern and southern European respectively that exhibit different patterns of behaviour. We exploit cohort effects given its importance on how they deal with old-age needs. Old-age dependency is generally a contingency emerging later in life, and hence individuals might arguably fail to plan ahead for it before a certain age cut-off point. Hence,

the interpretation of 'optimal behavioural responses' to the need of caregiving in old age is cohort-specific. Similarly, females are more likely to be caregivers and to survive their spouses, and hence expectations of needing LTC options arguably can be regarded as gender-specific. However, the latter are empirical questions, and hence answers are driven by the data.

To provide some empirical support of the theoretical model, we first estimate insurance expectations with informal care expectations both being exogenously determined (no presence of interfamily hazard) and later endogenously determined (by instrumenting family care expectations). We proceed then to estimate the case where insurance decisions are made assuming informal care being codetermined (potential presence of intra-family moral hazard). In the model we investigate whether we have different results of the effect of state support along with a set of above-mentioned controls.

We draw upon linear probility and probit models specifications assuming no endogeneity and independent determination of insurance and informal care decisions. Estimates reported include the following:

$$E(Insurance)_i=\beta_0 + \beta_1 E(Family)_i + \beta_2 E(Social\ Insurance)_i + \beta_3 X_i + \beta_4 X_i + \mu_i + \varepsilon_i \quad (3)$$

where E(.) refers to an individually formed expectation. All regressions report standard errors clustered to the regional level to account for the potential correlation between individuals of the same region, and we report the marginal effects. We then run instrumental variable models using residential distance to family members and self-reported family ties as an instrument to predict informal care expectations $E_i(\widehat{Family})$ *as follows:*

$$E(Insurance)_i=\alpha_0 + \alpha_1 E_i(\widehat{Family}) + \alpha_2 E(Social\ Insurance)_i + \alpha X_i + \alpha_4 X_i + \theta_i + \epsilon_i \quad (4)$$

β, α are regression parameters, μ, θ are fixed effects and ε, ϵ refer to a random error.

6. Results

This section reports the results of probit regressions with and without considering potential identification problems due to endogeneous covariates and with clustered country-specific standard errors.

5.1 Preliminary Evidence

European data is particularly suitable because of the large variability in both public and family insurance arrangements. Figure 1 contains suggestive evidence of the dramatic polarisation of preferences for LTC. 49% of Greeks, 43% of Portuguese and 39% of Spaniards think the best option for an old age dependent elderly should be taken care of by their own family members. Similarly, 40% of Greeks and 30% of Austrian think that children should be visiting their parents regularly to provide for care. In contrast, 58 % of Swedish and 59% of Danes and 52% of Finns and Dutch regard as their best option that public or private service providers should visit them at home and provide them with appropriate help and care. Finally, 22% of Swedish and 20% of Belgians and Dutch think that old-age dependents should be moved to a nursing home. Finally, the majority of Europeans expect paying into an insurance scheme that will finance care if and when care is needed should be obligatory (70%).

[Insert Figure 1 about here]

Table 1 reports the means and standard deviation of the variable included in our analysis by expectation on LTC funding. Relative to those not expecting insurance coverage to ay for care, we find that those who expect to receive insurance coverage are older, tend to be females, have a lower level of education but not less income, live closer to their families and are more likely to be already dependent and overweight. However we found no significant differences in terms of the expected life span and risk perceptions, as well as the probability of being a smoker.

[Insert Table 1 about here]

Table 2 contains evidence of the main explanatory variables, namely expectation of (private) insurance payment, public insurance payment and family bailout expectations by country. Importantly, evidence suggests that countries with lower expected insurance uptake (southern European countries) are those with highest family insurance and lowest public insurance payment expectations. The opposite is true for the Netherlands but not for other countries (like the United Kingdom). In contrast, Scandinavian countries exhibit high expectations of public insurance uptake and lower expectations of family bailout. Hence, based on preliminary evidence one can argue that there is some evidence of both public and family insurance

motivation crowding out. However, it is unclear whether such patterns are robust to the inclusion of a battery of controls and we include fixed effects to capture institutional heterogeneity.

[Insert Table 2 about here]

5.2 Regression Results

Table 3 reports evidence of a linear probability model on the effect of expectations of family insurance, public insurance expectation alongside a long list of controls. We estimate the models with both options of crowding out and only one, as well as only the basic list of controls. Evidence suggests only evidence consistent with family insurance crowding out. Regarding controls, we find that insurance expectations are more prevalent among younger to middle-age respondents, given that after a certain age, both the probability of obtaining insurance declines and other arrangements are generally formed. Women and educated respondents are more likely to be expecting insurance coverage. As expected, life expectancy expectations and income are associated with insurance expectations both proxying higher need and ability to pay resp4ctively. The latter are suggestive that those expecting to use LTC and to be able to afford LTC insurance premiums are more likely to expect insurance coverage.

[Insert Table3 about here]

Table 4 reports the same results, but assuming expectations of family to be instrumented by '(geographical) distance to children' and 'perceptions of family ties'. In both sets of regressions, we find evidence of a strong family crowding-out effect, whereby people who expect the family are less likely to expect insurance to pay for LTC. However, for the latter we were not able to find for public insurance. After instrumenting familism the effect on expected insurance uptake is of a larger magnitude[11].

[Insert Table 4 about here]

Table 5 reports evidence of a battery of robustness checks using a different measures of

[11] We reject the hypothesis of exogeneity based on the Wu-Hausman F test of 3.81616 F(1,11676).

family care availability as described above, yet in this case, the Wu-Hausman F test of 2.88656 F(1,11676) could not reject the hypothesis of exogeneity. Consistently, results reveal a negative effect of informal care but not effect of public sector crowding out.

[Insert Table 5about here]

Finally, Table 6 and 7 report the results of cohort effects. Importantly, we find comparable estimates when examining subsample of cohorts of age. More specifically, we find a manganite of family insurance crowding-out that doubles in magnitude for the age group 26 to 40, which is the group before people are argued to start thinking on funding long term care, and precisely around the age of 40 is regarded as the optimal age to purchase LTC insurance (Meier, 1999). The coefficients were also significantly higher for the cohort of 40 to 55. These are subgroups that are generally less likely to have already made arrangement for their dependency needs at old age. Importantly, for the age group 55 and over we find evidence consistent with a double crowding out. Our interpretation is that at an advanced age, individuals that have not made arrangements for private insurance to pay for long term care might only have access to public insurance to bail them out.

[Insert Table 6 and 7 about here]

5. Conclusion

We have addressed the question of potential motivation crowding out effects of family and public insurance on private insurance focusing primarily on a sample of individual expectation of respondents in a sample of European countries restricted to fifteen countries and examining cohort specific effects.

Specifically, we have attempted to examine the reasons for the limited development of a market for LTC insurance in Europe, namely the existence and nature of motivational interactions between society's responses to the need of such care, and government financing both ex-ante and ex-post. More specifically, both insurance coverage and in-kind benefits provided by the public sector are suspected to crowd out not only private LTC insurance but also social norms that encourage informal care provision by the family. They might induce intergenerational

moral hazard in the sense that children reduce their efforts on behalf of their aged parents, while parents abstain from purchasing LTC coverage, relying on their children to provide informal care. Our results on expectations data indicate that individuals that expect to be bailed out by their family are less likely to purchase insurance, but not those who expect public insurance payments. The latter is consistent with the fact that public insurance stills encompass significant cost sharing and hence, individuals could still expect insurance to contribute towards the payment of LTC.

Our results contain a few lessons for public policy. While a crowding out of private LTC insurance by its public counterpart does not appear to be a major problem at present (at least in European countries) longer-term crowding out of social norms may well occur (see for insurance Costa-Font (2010) for some evidence even when family insurance is regarded as endogenous). This calls for reforms addressing intra-family moral hazard through cost-sharing schemes and eligibility criteria that are transparent and stable over time. Private LTC insurers have experience with cost sharing; they might take on a complementary role 'topping up' basic entitlements as it is found to be the case in France. However, such complementary public private partnerships should not undermine incentives to provide informal care within the family, the sense that should be neutral on family decisions.

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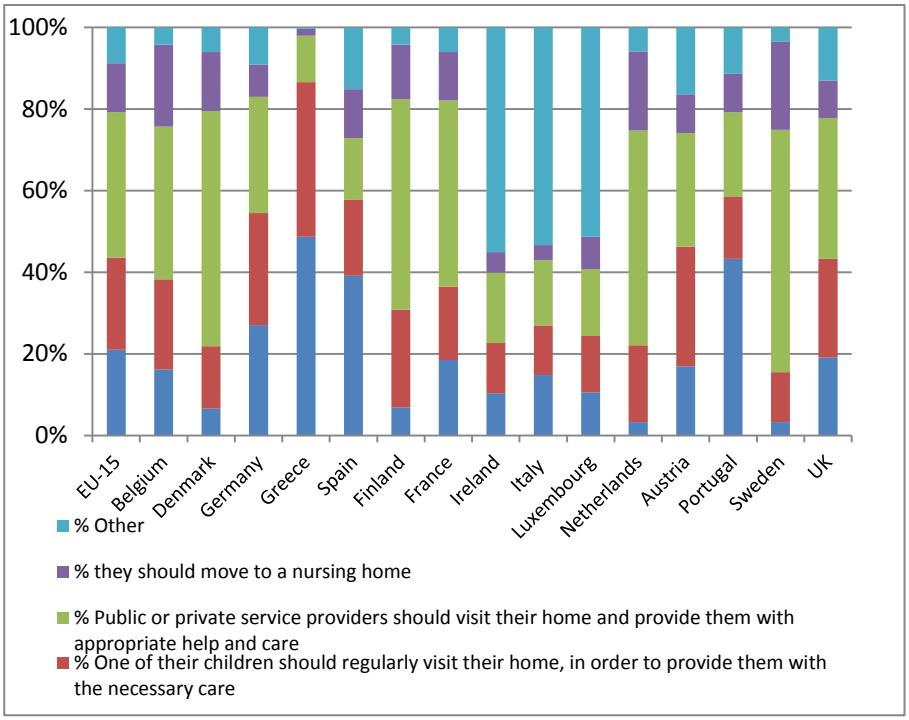
Tables and Figures

Figure 1. Best option for an elderly parent living alone and in need of a regular help



Source: Special EUROBAROMETER 283, question
Question: Imagine an elderly father or mother who lives alone and can no longer manage to live without regular help because of her or his physical or mental health condition? In your opinion, what would be the best option for people in this situation?

Table 1. Summary Statistics

	(1) LTCI EXPECTATIONS	(2) NO-LTCI EXPECTATIONS
	mean (s.e)	mean (s.e)
Age (years)	44.31 (0.31)	49.30 (0.17)
Gender (Value of '1' if Male)	0.50 (0.01)	0.42 (0.004)
Ageedu (Age at the end of Education)	20.08 (0.24)	18.99 (0.14)
Income (logs) (Income in logs)	7.59 (0.01)	7.442 (0.01)
Distance (from parents in Km)	0.093 (0.005)	0.136 (0.003)
Divorced (Value of '1' if Divorced)	0.067	0.071
Lifeexp (Life Expectancy Expectations in years)	81.24 (0.26)	80.75 (0.14)
Dependency (Activity Daily living limitation s of the individual)	1.17 (0.02)	1.340 (0.01)
Urban (Value of '1' if 'living in a urban area')	0.27	0.26
Natural (Value of '1' if 'born in the country')	0.92	0.93
Risk Perception (Value of '1' if respondent perceive their old age needs to be high')	0.49	0.50
Smoking (Value of '1' if smoking')	0.28	0.27

Source: Special EUROBAROMETER 283

Note. Column 1 contains the mean value of the sample of individuals that expect long-term care insurance (LTCI) to pay for their care. Similarly, Column 2 contains the means value of the sample of those who do not expect LTCI to pay for care. The table reports the means and standard deviations of variables employed in the study. We report means and standard error for continuous variables, and only the mean for binary variables.

Table 2. Expectations of Long Term Care Funding –
(* Highest estimates / + Lowest estimates)_

	PRIVATE INSURANCE	SELF-INSURANCE	PUBLIC INSURANCE	FAMILY INSURANCE
	(s.e)	(s.e)	(s.e)	(s.e)
Belgium	0.273 (0.014)	0.719* (0.014)	0.337 (0.015)	0.134 (0.011)
Denmark	0.278 (0.014	0.425 0.016)	0.759* (0.013)	0.054+ (0.007)
Germany	0.136 (0.015)	0.505 (0.016)	0.409 (0.016)	0.120 (0.010)
Greece	0.066+ (0.008)	0.428 (0.022)	0.155+ (0.011)	0.442* (0.016
Spain	0.029+ (0.005)	0.650* (0.015)	0.187+ (0.012)	0.202 (0.013)
Finland	0.108 (0.010)	0.570 (0.016)	0.553 (0.016)	0.058 (0.007)
France	0.322* (0.015)	0.649* (0.015)	0.466 (0.015)	0.133 (0.011)
Ireland	0.193 (0.012)	0.556* (0.015)	0.314 (0.015)	0.117 (0.010
Italy	0.045+ (0.007)	0.374+ (0.015)	0.174+ (0.012)	0.191 (0.012)
Luxembourg	0.182 (0.017)	0.458 (0.016)	0.645* (0.021)	0.067 (0.011)
Netherlands	0.427* (0.016)	0.455 (0.022)	0.514 (0.016)	0.018+ (0.004)
Austria	0.260 (0.014)	0.355+ (0.015)	0.474 (0.016)	0.216 (0.013)
Portugal	0.028+ (0.005)	0.567* (0.016)	0.213+ (0.013)	0.201 (0.013)
Sweden	0.219 (0.013)	0.437 (0.016)	0.612* (0.015)	0.043+ (0.006)
UK	0.081+ (0.009)	0.466 (0.016)	0.376 (0.015)	0.081 (0.009)
Total	**0.180* (0.003)**	**0.393 (0.015)**	**0.412 (0.039)**	**0.138 (0.020)**

Source: Special EUROBAROMETER 283
Question: QA21 If you were to need regular help and long-term care that would require payment, who do you think will finance this?
Notes: the estimates can be interpreted as frequencies.

Table 3. Crowding-Out of Private Insurance (Linear Probability Model)

	(1)	(2)	(3)	(4)
Family Insurance	**-0.0714*** **	**-0.0719*** **	**-0.0726*** **	**-0.0695*** **
	(0.00916)	**(0.00909)**	**(0.00755)**	**(0.00760)**
Public Insurance	**0.00327**			**0.0204*** **
	(0.00742)			**(0.00630)**
Age	0.00751***	0.00755***	0.00717***	0.00691***
	(0.00112)	(0.00111)	(0.000909)	(0.000912)
Age^2	-7.25e-05***	-7.27e-05***	-6.10e-05***	-5.88e-05***
	(1.13e-05)	(1.13e-05)	(8.96e-06)	(8.98e-06)
Gender	0.0384***	0.0386***	0.0373***	0.0362***
	(0.00735)	(0.00734)	(0.00621)	(0.00622)
Education	0.00122***	0.00122***	0.000779***	0.000777***
	(0.000275)	(0.000275)	(0.000209)	(0.000209)
Divorced	-0.000411	-2.47e-05		
	(0.0141)	(0.0141)		
Lifeexp	0.000873***	0.000875***		
	(0.000267)	(0.000267)		
Dependency	-0.00790***	-0.00786***		
	(0.00271)	(0.00271)		
Risk Perception	0.000671	0.000735		
	(0.00730)	(0.00730)		
Natural	-0.0303**	-0.0304**		
	(0.0145)	(0.0145)		
Smoking	-0.00886	-0.00874		
	(0.00832)	(0.00832)		
Income (logs)	0.336***	0.337***	0.379***	0.377***
	(0.0374)	(0.0374)	(0.0314)	(0.0314)
Constant	4.210***	4.215***	4.762***	4.735***
	(0.461)	(0.461)	(0.386)	(0.386)
Observations	11,691	11,691	15,172	15,172
R-squared	0.038	0.038	0.038	0.038

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Crowding-Out of Private Insurance (IV Estimates)

	(1)	(2)	(3)	(4)
VARIABLES				
Family Insurance	**-0.340****	**-0.302****	**-0.337*****	**-0.357*****
	(0.143)	**(0.129)**	**(0.105)**	**(0.118)**
Public Insurance	**-0.0236**			**-0.00909**
	(0.0162)			(0.0137)
Age	0.0072***	0.0070***	0.0061***	0.0062***
	(0.00117)	(0.00118)	(0.00103)	(0.000998)
Age^2	-7.81e-05***	-7.57e-05***	-6.09e-05***	-6.19e-05***
	(1.21e-05)	(1.17e-05)	(9.32e-06)	(9.48e-06)
Gender	0.0383***	0.0372***	0.0342***	0.0344***
	(0.00761)	(0.00758)	(0.00657)	(0.00655)
Education	0.000871**	0.000904***	0.000491**	0.000471*
	(0.000339)	(0.000332)	(0.000245)	(0.000251)
Divorced	-0.0111	-0.0121		
	(0.0157)	(0.0160)		
Lifeexp	0.000703**	0.000710**		
	(0.000291)	(0.000289)		
Dependency	-0.00889***	-0.00899***		
	(0.00285)	(0.00285)		
Risk Perception	0.00452	0.00363		
	(0.00784)	(0.00767)		
Natural	-0.0564***	-0.0527***		
	(0.0204)	(0.0194)		
Smoking	0.000337	-0.00156		
	(0.00991)	(0.00943)		
Income (logs)	0.250***	0.258***	0.291***	0.286***
	(0.0600)	(0.0581)	(0.0477)	(0.0496)
Constant	3.260***	3.348***	3.770***	3.710***
	(0.694)	(0.676)	(0.563)	(0.581)
Observations	11,691	11,691	15,172	15,172

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. Robustness checks (I): Alternative definition of family Insurance

	(1)	(2)
VARIABLES		
Family Insurance	**-0.0637*** **	**-0.0646*** **
	(0.0108)	**(0.0107)**
Public Insurance	**0.00455**	
	(0.00744)	
Age	0.00676***	0.00680***
	(0.00113)	(0.00113)
Age^2	-6.42e-05***	-6.45e-05***
	(1.14e-05)	(1.14e-05)
Gender	0.0372***	0.0374***
	(0.00736)	(0.00735)
Education	0.00126***	0.00126***
	(0.000275)	(0.000275)
Divorced	0.00242	0.00299
	(0.0141)	(0.0141)
Lifeexp	0.000906***	0.000910***
	(0.000267)	(0.000267)
Dependency	-0.00781***	-0.00775***
	(0.00271)	(0.00271)
Risk Perception	0.00138	0.00149
	(0.00731)	(0.00731)
Natural	-0.0244*	-0.0244*
	(0.0145)	(0.0145)
Smoking	-0.0109	-0.0108
	(0.00832)	(0.00832)
Income (logs)	0.352***	0.352***
	(0.0373)	(0.0373)
Constant	4.405***	4.414***
	(0.460)	(0.460)
Observations	11,691	11,691
R-squared	0.035	0.035

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Robustness checks (II): Cohort specific groups effects

	Age 15-25	Age 26-40	Age40-55	Age 55+
	(1)	(2)	(3)	(4)
VARIABLES				
Family Insurance	-0.059***	-0.105***	-0.067***	-0.049***
	(0.0223)	(0.0189)	(0.0174)	(0.0120)
Public Insurance	0.0508**	0.0458***	0.00817	-0.0396***
	(0.0222)	(0.0173)	(0.0150)	(0.0102)
Age	0.0460	-0.0331	0.0567	-0.0246***
	(0.0576)	(0.0328)	(0.0419)	(0.00943)
Age^2	-0.000798	0.000464	-0.000601	0.000184***
	(0.00145)	(0.000510)	(0.000447)	(6.84e-05)
Gender	-0.00139	0.0700***	0.0514***	0.0268**
	(0.0201)	(0.0172)	(0.0152)	(0.0106)
Education	-0.0013*	0.0031***	0.0014**	0.00026
	(0.000759)	(0.000766)	(0.00064)	(0.000365)
Divorced		0.0186	0.0137	0.0203
		(0.0478)	(0.0242)	(0.0196)
Lifeexp	0.000245	0.00210***	0.000929	0.000169
	(0.000700)	(0.000630)	(0.000584)	(0.000406)
Dependency	-0.0343	-0.0176*	-0.0104*	-0.00592*
	(0.0287)	(0.0104)	(0.00581)	(0.00347)
Risk Perception	0.000311	0.0222	-0.0200	-0.00598
	(0.0205)	(0.0169)	(0.0148)	(0.0104)
Natural	-0.0291	-0.0260	-0.0307	-0.0184
	(0.0437)	(0.0309)	(0.0297)	(0.0246)
Smoking	0.0330	-0.045***	-0.00969	0.00404
	(0.0225)	(0.0176)	(0.0162)	(0.0136)
Income (logs)	-0.105	0.237***	0.637***	0.410***
	(0.0788)	(0.0798)	(0.0842)	(0.0684)
Observations	1,429	2,751	3,245	4,263

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 Robustness Checks (III): Cohort effects and alternative family insurance definition

	(1)	(2)	(3)	(4)
	Age 15-25	Age 26-40	Age40-55	Age 55+
Family Insurance	**-0.0476****	**-0.093*****	**-0.065*****	**-0.0446*****
	(0.0215)	**(0.0216)**	**(0.0223)**	**(0.0149)**
Public Insurance	**0.0519****	**0.0508*****	**0.00881**	**-0.0392*****
	(0.0222)	(0.0173)	(0.0150)	(0.0103)
Age	0.0441	-0.0387	0.0538	-0.0239**
	(0.0576)	(0.0328)	(0.0419)	(0.00940)
Age^2	-0.000746	0.000540	-0.000568	0.000180***
	(0.00145)	(0.000510)	(0.000447)	(6.82e-05)
Gender	-0.000327	0.0669***	0.0504***	0.0253**
	(0.0201)	(0.0172)	(0.0152)	(0.0107)
Education	-0.00141*	0.00338***	0.00158**	0.000285
	(0.000768)	(0.000769)	(0.000637)	(0.000364)
Divorced		0.0151	0.0185	0.0197
		(0.0479)	(0.0244)	(0.0196)
Lifeexp	0.000312	0.00232***	0.000926	0.000153
	(0.000703)	(0.000633)	(0.000586)	(0.000405)
Dependency	-0.0333	-0.0169	-0.0104*	-0.00571
	(0.0279)	(0.0103)	(0.00581)	(0.00347)
Risk Perception	0.000736	0.0240	-0.0193	-0.00492
	(0.0205)	(0.0169)	(0.0148)	(0.0105)
Natural	-0.0251	-0.0139	-0.0213	-0.0181
	(0.0432)	(0.0303)	(0.0289)	(0.0246)
Smoking	0.0295	-0.0501***	-0.0119	0.00527
	(0.0223)	(0.0175)	(0.0161)	(0.0137)
Income (logs)	0.117	0.265***	0.654***	0.427***
	(0.0789)	(0.0796)	(0.0841)	(0.0683)
Observations	1,429	2,751	3,245	4,263

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1