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Family altruism and long-term care insurance

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Abstract The aim of this paper is to analyse long-term care (LTC) insurance purchase decisions by parents who expect to receive assistance from altruistic children. We first propose a simple theoretical model in which we show that the effect of children's altruism on parents' insurance decisions is ambiguous and depends on a number of factors: the degree of substitutability between informal and formal care, the degree of parental altruism, and the curvature of the utility functions. We then run an empirical test using data from the U.S., France, Spain, Germany and Israel, and proxy altruism with assistance provided to healthy parents. We find that the effect of children's altruism is negative in Germany and Israel but not significant in the United States, France and Spain, which possibly suggests that the different forces identified in the theoretical model offset each other.

Keywords Long-term care insurance · Altruism · Informal care

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Introduction

The rise of long-term care (LTC) constitutes a major challenge for advanced economies. Due to ageing, an increasingly large proportion of the population is falling into dependence, that is, these people are unable to carry out basic daily activities such as eating, washing, etc., and hence need to receive LTC. The provision of LTC—whether formal or informal (i.e., provided by family and friends)—is extremely costly, which raises the question of LTC funding. Given the high probability of falling into dependence and the high costs of LTC, one would expect, from the perspective of rational choice theory, that individuals would purchase private LTC insurance to insure themselves and their family against the high costs of LTC. However, only a small fraction of the population at risk purchases private LTC insurance in the U.S. and in France. In other countries this fraction is negligible. This is the well-known LTC insurance puzzle that can be explained by various factors on both the supply side and the demand side of the private LTC insurance market (see Cremer et al. 2012; Pestieau and Ponthière 2012; Brown and Finkelstein 2011).

One of the factors often mentioned in the literature is the presence of family that leads to informal care.¹ The argument is that informal care crowds out LTC insurance,² but as we show, the validity of this argument impinges on the substitutability of formal and informal care, which is not well established in the existing empirical literature.³ In our model we consider formal care as a substitute for (complement to) informal care if the marginal utility of informal care decreases (increases) with the amount of formal care.

As can be seen in the literature, the motives underlying informal care can vary, ranging from pure altruism (see, e.g., Jousten et al. 2005; Pestieau and Sato 2008; Klimaviciute et al. 2017) to family norm (see, e.g., Canta and Pestieau 2013; Canta et al. 2016; Klimaviciute et al. 2017) or quid pro quo exchange (see, e.g., Bernheim et al. 1985; Norton et al. 2013; Alessie et al. 2014; Tormini et al. 2016). Children might also be motivated by the fact that their informal care helps to reduce the expense of formal care and thus protects their parents' future bequests (see, e.g., Pauly 1990; Zweifel and Strüwe 1998; Courbage and Eeckhoudt 2012; Klimaviciute 2017). For simplicity's sake, in this paper we focus exclusively on altruistic informal care and, in particular, on its influence on LTC insurance purchase.

While the empirical literature on the decision to purchase LTC insurance in the U.S. is larger (see, e.g., Sloan and Norton 1997; Mellor 2001; Brown et al. 2012), very few studies focus on LTC insurance in Europe, mainly because of the thinness of the market, except in France.⁴ Moreover, the existing literature does not analyse

¹ Informal care is defined as the time spent by relatives in caring for a dependent. It includes talking with the dependent, nursing and helping the dependent with various domestic tasks.

² See Costa-Font and Courbage (2015), who show evidence consistent with family crowding out. They do not find robust evidence of public sector crowding out.

³ Bonsang (2009) finds that formal and informal care are substitutes as long as LTC needs are low and an unskilled type of care is required.

⁴ For a study on France, see Courbage and Roudaut (2008). For a study on Spain, see Jimenez-Martin et al. (2016).



how LTC insurance purchases depend on the altruism of one's children. In this paper we test the impact of children's altruism on parents' LTC insurance both in the U.S. and in four European countries.

It should be noted that private LTC insurance is not the only way to finance LTC. Parents can prepare for dependency through precautionary saving (which in our theoretical model can be seen as being included in the parent's income y); they can also count on social assistance such as Medicaid in the U.S. In this paper we assume away the public sector for the sake of simplicity.

Another point to make is that children can avoid providing informal care to their parents by purchasing LTC insurance on their behalf or by financing formal care. However, here we adopt the idea developed by Pauly (1990) that parents are interested in receiving informal care from their children, and this cannot be entirely replaced by formal care. Hence the importance of the substitutability of the two types of care.

This paper is organised as follows. In the next section we sketch a theoretical model that implies an ambiguous sign as to the effect of altruism on the purchase of LTC insurance. Then we provide an empirical test of this effect of altruism using data from five countries: the U.S., France, Spain, Germany and Israel. The test leads to an unambiguous negative sign in Germany and Israel, while the results are not significant for the U.S., France and Spain, possibly confirming the presence of conflicting forces identified in the theoretical model. In the final section we provide our concluding remarks.

Model

We consider a simple model comprising a parent that incurs the risk of dependence and a child who will only help the parent in case of dependence. The parent makes the first move by deciding how much LTC insurance to buy, expecting to benefit from informal care from the child in case of dependence. The extent of assistance is then chosen by the child and depends on the degree of altruism γ and on the level of expected insurance compensation. As is the standard with this kind of problem, we move backwards and look first at the child's decision.

Child's choice

The child's utility has two components: the utility per se that depends on disposable income c and the utility of the dependent parent that is weighted by a parameter of altruism $\gamma > 0$ and depends on both informal and formal care. Formally:

$$U_C = u(w(1 - a)) + \gamma H(a, m),$$

where u and H are strictly concave and quasi-concave functions, respectively; w is the child's wage rate; a is the time devoted to informal care; and m is the amount



of formal care.⁵ We maximise this utility with respect to a and obtain the following FOC⁶:

$$\Delta = -wu'(c) + \gamma H_a = 0. \quad (1)$$

Totally differentiating this FOC, we obtain the following comparative statics result:

$$\frac{\partial a}{\partial m} = \frac{\gamma H_{am}}{-\Delta_a} \gtrless 0 \Leftrightarrow H_{am} \gtrless 0,$$

where $\Delta_a < 0$ is the second-order condition for a . In other words, the effect of formal care on informal care depends on the sign of the cross derivative of the parent's utility function, which in turn depends on whether formal and informal care are substitutes or complements. As mentioned in the introduction, we consider formal care to be a substitute for (complement to) informal care if the marginal utility of informal care decreases (increases) with the amount of formal care. This implies that the cross derivative is negative if formal and informal care are substitutes, whereas it is positive in the case of complementarity.⁷

Parent's choice

We now turn to the parent's choice of insurance. We assume that the LTC insurance supplies a compensation b in case of dependence in exchange for a premium P :

$$b = P/(1 + \lambda)\pi,$$

where π is the probability of dependence, and λ is the loading factor. In other words, the insurance is not actuarially fair.

The expected utility of the parent can now be written:

$$EU_p = (1 - \pi)u(y - P) + \pi H\left(a, y + P\left(\frac{1}{(1 + \lambda)\pi} - 1\right)\right) + \pi\beta u(w(1 - a)),$$

where u is the parent's utility when not dependent, H is the utility when dependent, and the last term reflects the altruistic concern that parents may have regarding their children devoting too much time on their behalf, with $\beta \geq 0$ being the degree of parental altruism. Moreover, y is the parent's income (which can be seen as including pension and savings for old age) and $m = y + P\left(\frac{1}{(1 + \lambda)\pi} - 1\right)$. A parent who is

⁵ Informal care is expressed in terms of time, whereas formal care and earnings $w(1 - a)$ are expressed in monetary terms. In other words, we normalise the price of formal care to 1.

⁶ To keep the model as simple as possible, we only focus on the child's assistance in time, a . More generally, we could have allowed the child to choose between providing informal care and paying for the parent's formal care as in Pestieau and Sato (2008). In that case, the relative importance of informal versus formal care depends on the substitutability of the two types of care and on the opportunity cost of providing informal care, measured by w .

⁷ This can also be thought of in terms of "q-substitutes" and "q-complements" as in Seidman (1989).



not dependent simply derives utility from their consumption equal to $y - P$ (which we further denote by d). We assume that a dependent parent spends all financial resources, $y + P\left(\frac{1}{(1+\lambda)\pi} - 1\right)$, on formal care m . In other words, we do not consider

separately the consumption of a dependent parent but rather suppose that consumption is limited and in some sense dictated by dependency and therefore provides no particular utility to the parent. We thus assume that all the parent's consumption is included in the amount of formal care m .

Differentiating the expected utility with respect to P , we obtain⁸:

$$\begin{aligned} \frac{\partial EU_P}{\partial P} = & -[(1 - \pi)u'(d) + \pi H_m] + \frac{H_m}{(1 + \lambda)} + \pi H_a \frac{\partial a}{\partial m} \left(\frac{1}{(1 + \lambda)\pi} - 1 \right) \\ & - \pi \beta u'(c) w \frac{\partial a}{\partial m} \left(\frac{1}{(1 + \lambda)\pi} - 1 \right). \end{aligned} \quad (2)$$

Assume that $\frac{\partial a}{\partial m} = 0$. Then we only have the traditional optimal insurance formula that says that with zero loading cost one gets full insurance with $u'(d) = H_m$. The loading cost implies a less than 100% insurance. Turning to the third term in the above equation, it says that the premium will be lower (higher) than otherwise if the two types of care are substitutes (complements). Note that $\left(\frac{1}{(1+\lambda)\pi} - 1\right) > 0$. Finally,

the last term reflects the parent's concern to avoid burdening their child with the role of informal caregiver. It will also depend on the more or less substitutability of the two types of care but in the opposite direction. In case of substitutability (complementarity), the parent will be induced to purchase more (less) insurance than otherwise.

We now investigate how the parent's insurance decision depends on the child's degree of altruism γ . In Appendix 1 we derive the following comparative statics result:

$$\begin{aligned} \frac{\partial P}{\partial \gamma} = & \frac{\pi H_{am} \frac{\partial a}{\partial \gamma} \left(\frac{1}{(1+\lambda)\pi} - 1 \right) \left[1 - \frac{\gamma H_{aa}}{[\gamma H_{aa} + w^2 u''(c)]} \right] + \pi H_a \left(\frac{1}{(1+\lambda)\pi} - 1 \right) \frac{\partial \left(\frac{\partial a}{\partial m} \right)}{\partial \gamma}}{-SOC_P} \\ & + \frac{\pi \beta u''(c) w^2 \frac{\partial a}{\partial m} \left(\frac{1}{(1+\lambda)\pi} - 1 \right) \frac{\partial a}{\partial \gamma} - \pi \beta u'(c) w \frac{\partial \left(\frac{\partial a}{\partial m} \right)}{\partial \gamma} \left(\frac{1}{(1+\lambda)\pi} - 1 \right)}{-SOC_P}, \end{aligned} \quad (3)$$

where $SOC_P < 0$ is the second-order condition for P , $\frac{\partial a}{\partial \gamma} = \frac{H_a}{-\Delta_a} > 0$ and

⁸ Alternatively, the problem could be solved in terms of insurance compensation b . This would not impact the results.



$$\frac{\partial\left(\frac{\partial a}{\partial m}\right)}{\partial \gamma} = \frac{\gamma H_{am}\left[-w^3 u'''(c)\frac{\partial a}{\partial \gamma} + H_{aa} + \gamma H_{aaa}\frac{\partial a}{\partial \gamma}\right] - \left[H_{am} + \gamma H_{ama}\frac{\partial a}{\partial \gamma}\right]\left[w^2 u''(c) + \gamma H_{aa}\right]}{\left[w^2 u''(c) + \gamma H_{aa}\right]^2}.$$

It can be seen that the sign of $\frac{\partial P}{\partial \gamma}$ is generally ambiguous. To get some insights, let us analyse some special cases. For instance, if $\beta=0$ and the third derivatives of the utility functions are zero, (3) becomes:

$$\frac{\partial P}{\partial \gamma} = \frac{\pi H_{am}\frac{\partial a}{\partial \gamma}\left(\frac{1}{(1+\lambda)\pi} - 1\right)\left[1 - \frac{\gamma H_{aa}}{[\gamma H_{aa} + w^2 u''(c)]}\right] - \pi H_a\left(\frac{1}{(1+\lambda)\pi} - 1\right)\frac{H_{am}w^2 u''(c)}{[w^2 u''(c) + \gamma H_{aa}]^2}}{-SOC_P}$$

$$\geq 0 \Leftrightarrow H_{am} \geq 0.$$

Thus, insurance increases with the child's altruism if formal and informal care are complements but decreases if they are substitutes. Indeed, a child who becomes more altruistic provides more informal care. Since insurance increases the resources available to pay for formal care, the parent then buys more (less) insurance if formal and informal care are complements (substitutes).

On the other hand, if $\beta > 0$ (i.e., the parent cares about the child's utility), no clear conclusions can be reached because the consideration of the child's utility, as discussed above, gives motivations opposite to the purely selfish ones, and the total effect is thus ambiguous. If, in addition, the third derivatives of the utility functions are not zero, the effect becomes even less obvious. However, this shows that the curvature of the utility function, and in particular the degree of prudence (as we are talking about the third derivatives), play a role as well.

To sum up our findings, we make the following proposition.

Proposition In an economy where children help their parents in case of dependence, the effect of children's altruism on their parents' LTC insurance will depend on the substitutability/complementarity between formal and informal care, on the degree of the parents' altruism and on the utility functions of parents and children.

Empirical analysis

Our theoretical model identifies a number of conflicting forces influencing the parents' choice of LTC insurance and shows that the effect of children's altruism on this choice is generally ambiguous. In this section we resort to empirical tests to explore the direction of the relationship between the parents' LTC insurance and the extent of altruism of their children.

To this end, we use data from the Health and Retirement Study (HRS) and from the Survey of Health, Ageing and Retirement in Europe (SHARE). Both surveys are public resources for data on ageing in America (HRS) since 1990 and in different countries of Europe (SHARE) since 2004. As SHARE is inspired by the HRS



survey, the questionnaires and the information from the two are similar. People older than 50 are visited on a biannual basis and questioned about their health, socioeconomic status (income, assets, insurances), relationships with family (visits, care, financial transfers) and everyday activities. Both surveys follow respondents longitudinally in order to study the ageing process. As part of this research, and because SHARE did not ask the question about the ownership of LTC insurance precisely before wave 5 (2013), we will not use the longitudinal side of the surveys but the international side, which allows us to differentiate the results by country.

Our analyses are cross-sectional. We use the tenth wave of the HRS survey (2010) and the sixth wave of the SHARE survey (2015). We can only study the European countries where private LTC insurance exists. According to Colombo et al. (2011) and SCOR (2012), Germany, France and Spain are countries where these insurance policies are sold, although the penetration rates between them differ. The market is well established in France, while the penetration of this kind of insurance is low in Spain (SCOR 2012). Using SHARE data, Jimenez-Martin et al. (2016) studied the reasons for the scarce development of the private LTC insurance market in Spain and its relationship with health insurance. Courbage and Roudaut (2008) highlighted the role of parental altruism in the decision to purchase LTC insurance in France.

In SHARE, inhabitants of Israel are interviewed. Brammli-Greenberg et al. (2012) explain that in Israel the state subsidises care for poor people with disabilities and provides services for them, but the fundamental responsibility for funding these services lies with the individuals themselves. Private LTC insurance, which insures against the need for LTC in the community or in an institution, is one of the policy alternatives currently being discussed by policymakers (Brammli-Greenberg et al. 2012). The size of the LTC insurance market in Israel is increasing year after year.

The last country studied is the U.S., where the LTC insurance market has been in existence for more than 40 years (Brown and Finkelstein 2011).

While HRS and SHARE provide us with direct information about parents' LTC insurance ownership, the measurement of children's altruism is a more complicated question in both surveys. Ideally, we would like to have an exogenous measure of altruism (as reflected by the exogenous parameter γ in our theoretical model). Such a measure is not available in the two databases. We can only approach this parameter of the children's altruism by a proxy: the informal help they provide to their parents while their parents are not yet dependent.⁹

Indeed, as can be seen from Table 1 above, non-dependent parents receive help from their children. The reported help ranges from 2.6% in the U.S. to 10.0% in Germany.¹⁰ We posit that the informal help provided to non-dependent parents can

⁹ Dependence is widely defined as having two or more limitations in activities of daily living (ADL). It concerns bathing, eating, dressing, walking across a room, getting in or out of bed and using the toilet. To qualify for LTC insurance benefits in the U.S., one must be recognised as unable to perform two or more ADLs. A nurse employed by a third-party administrator conducts the evaluations of ADL limitations (Frank 2012) just as for Medicaid. The same thresholds exist in Europe (see SCOR 2012; Zuchandke et al. 2012). However, a person having a limitation with one ADL still depends on the help of others, particularly on their children's help, even if they are not eligible for private LTC insurance benefits. This is why we use the threshold of zero ADL limitations to define a non-dependent parent.

¹⁰ Examples of help to non-dependent parents can be help in managing money, help with chores, errands and transportation.



Table 1 Informal help of children to non-dependent parents (%)

U.S.	France	Germany	Spain	Israel
2.6	6.3	10.0	5.1	9.4

Table 2 LTC insurance ownership rates for respondents with and without children

	U.S.	France	Germany	Spain	Israel
Non-dependent respondents with children (1)	12.6	19.9	4.0	4.3	32.2
Non-dependent respondents without children (2)	14.6	21.9	5.6	4.0	20.8
Difference & <i>t</i> test: (1)–(2)	–2.0* (1.0)	–2.0 (2.5)	–1.6* (1.0)	0.3 (0.9)	11.4** (6.5)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

be considered as an exogenous measure of children's altruism since LTC insurance benefits are not paid to non-dependent parents, and therefore their children's aid is not affected by insurance coverage. On the contrary, it seems reasonable to believe that parents base their insurance decisions on the presence of help they receive from their children when they are still healthy, hoping to infer from it the degree of their children's altruism and thus the amount of help on which they can count if they start experiencing problems of autonomy.¹¹

Therefore, we concentrate our analysis on non-dependent respondents, and our two main variables of interest are the ownership of LTC insurance and the informal help received by the parent from children as a proxy for altruism. These two variables are binary: does the respondent have insurance and have they received help from their children? Table 2 summarises information about private LTC insurance for the different countries we consider in our analysis, namely the difference in coverage rates between non-dependent respondents (zero ADL) with and without children. The insurance rates vary by country. 12.6% of non-dependent respondents with children declare that they own LTC insurance in the U.S., while only 4.0% and 4.3% do so in Germany and Spain, respectively. Israel is the country with the highest rate (32.2%), whereas the rate in France is 19.9%. There is no clear direction in the variation in insurance rate among respondents with and without children. While people without children seem to be more likely to have insurance in the U.S. or in Germany, it is the opposite in Israel. There is no difference in France or in Spain. Moreover, the link between our two variables of interest is not yet explained by these raw numbers. In the rest of our analysis we focus on non-dependent respondents with children (the parents) to test the decision of taking out insurance based on their perception of the altruism of their children.

¹¹ Providing informal aid should not necessarily be equated with the presence of altruism since, as discussed in the introduction, caregiving can also be driven by other motives such as exchange or family norms. However, it seems that altruism is the prevailing motivation in many countries (see Klimaviciute et al. 2017).



Table 3 LTC insurance ownership rates for respondents with and without help from children

		U.S.	France	Germany	Spain	Israel
Informal help from children in <i>t</i>	Yes (1)	10.1	19.5	2.1	2.8	15.9
	No (2)	12.7	19.9	4.3	4.4	33.9
Difference & t-test: (1)–(2)		–2.6* (1.7)	–0.4 (2.9)	–2.2** (1.1)	–1.6 (1.3)	–18.0*** (3.9)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3 summarises the cross-relationships between children's support and insurance, namely the difference in coverage rates between non-dependent parents (zero ADL) receiving help from their children or not. The table suggests a negative relationship between informal support from children and the probability of parents having LTC insurance in the U.S., Germany and Israel, potentially in Spain. While out of 100 people who do not receive help from their children, 12.7 own an LTC insurance policy in the U.S., only 10.1 have this kind of policy for every 100 people who do receive help from their children. The difference is even greater in Israel (33.9% vs 15.9%). We must be cautious with figures for Germany and Spain, given the fairly low rates of private insurance in these two countries. It seems that there is no difference in France and in Spain.

These descriptive results have to be confirmed by robust econometric analysis. Table 4 summarises our regression results.

Probit models are run to verify the negative correlation between support from children and ownership of LTC insurance. The sample still concerns non-dependent parents, and the negative impact of children's help on the ownership of LTC insurance is observed—significant and robust once other explanatory variables are added for Germany and Israel. For the other countries the effect is not significant. The reasons for this differential impact are not obvious. According to our theoretical model, it would seem that there is more substitutability between the two types of care in Germany and Israel, or the effect linked to parental altruism would be negative. As to the other countries, the lack of effect seems to imply that the different forces discussed in the theoretical model compensate each other. Moreover, for all countries except France we observe the positive impact of income¹² on the ownership decision. Education is positively correlated in the U.S., Spain and Israel.

Being a woman and being older is positively associated with insurance in the U.S., while no clear relationship can be made in Israel. Another difference in the profiling of people with insurance between these two countries lies in being in a relationship. The link is positive and significant in the U.S. but negative and significant in Israel.

As far as Spain is concerned, the negative link between help and insurance observed in the descriptive statistics does not persist once the control variables are added to the regression. The younger one is, the more likely one is to be insured.

¹² Individuals have been ranked according to quartiles of income created for each country separately.



Table 4 Probit models of LTC insurance

	U.S.	France	Germany	Spain	Israel
Children's help	-0.014 (0.018)	-0.021 (0.031)	-0.031** (0.014)	0.006 (0.016)	-0.132*** (0.047)
In couple	0.030*** (0.006)	0.000 (0.020)	0.001 (0.011)	0.005 (0.010)	-0.068** (0.034)
Woman	0.034*** (0.006)	0.027* (0.015)	0.001 (0.007)	0.009 (0.007)	-0.012 (0.025)
Age					
50/64	-0.096*** (0.008)	-0.058** (0.026)	0.021 (0.020)	0.024* (0.013)	0.064 (0.043)
65/79	-0.009 (0.008)	0.024 (0.025)	0.038* (0.020)	0.023* (0.013)	0.065 (0.041)
80+	Ref.	Ref.	Ref.	Ref.	Ref.
Years of education	0.014 (0.001)	-0.002 (0.002)	0.002 (0.001)	0.005*** (0.001)	0.015*** (0.003)
Income					
1st quartile	-0.067*** (0.008)	-0.005 (0.027)	-0.034*** (0.012)	-0.004 (0.009)	-0.169*** (0.037)
2nd quartile	-0.062*** (0.008)	0.012 (0.023)	-0.051*** (0.011)	-0.034*** (0.010)	-0.175*** (0.033)
3rd quartile	-0.048*** (0.007)	0.002 (0.021)	-0.013 (0.008)	-0.027** (0.009)	-0.097*** (0.032)
4th quartile	Ref.	Ref.	Ref.	Ref.	Ref.
N	15,231	2792	3357	3927	1439
Pseudo-R ²	0.055	0.012	0.047	0.080	0.052

Heteroscedasticity-consistent standard errors in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$



In France, what we observed in Table 3 seems to be confirmed, and with our data it is difficult to profile insurance holders. There is no clear relationship between the altruism of children, approximated by the help provided, and the ownership of insurance, while being a woman and being older (comparing 80+ to 50/64) is positively linked to insurance coverage.^{13,14}

Conclusion

Using a simple model of LTC insurance wherein the buyer expects some assistance from the child out of altruism in case of dependence, we try to analyse the determinants of this purchase decision. On the basis of a simple theoretical model, we show that the role of altruism in this decision is ambiguous and depends on a number of factors: the degree of substitutability between informal and formal care, the degree of parental altruism and the curvature of the utility functions. To get more insight, we tested the effect of altruism on the purchase of LTC insurance using data for the U.S., France, Spain, Germany and Israel (HRS data for the U.S. and SHARE data for the other countries). We show that the effect of altruism is negative in Germany and Israel but not significant in the U.S., France and Spain. The reasons for this differential impact are not clear. On the basis of our model, it would seem that in Germany and Israel there would be more substitutability between the two types of care or that the term linked to parental altruism has a negative effect. As to the other countries, the lack of effect seems to imply that the different forces at play offset each other.¹⁵

Note that it is generally expected that filial altruism has a negative impact on the parental decision to take out insurance and that the parent's altruism has a negative impact on the child's assistance, which in turn would induce more insurance. We already have two conflicting forces. Further, such intuitive expectation implicitly assumes substitutability between informal and formal care. With complementarity, things get more complicated, and this explains the contrasting empirical results.

Our paper sheds some light on the ongoing debate on the LTC insurance puzzle. Among the factors explaining the thinness of the LTC insurance market, family altruism is often cited, along with causes such as myopia, ignorance, crowding out

¹³ In order to control for the quid pro quo motive of aid, in Appendix 2 we added to our regressions the fact that during the same period the parents made a financial transfer to at least one of their children. We observe that the relationship between children's altruism and insurance is still negative in Germany and in Israel. In these two countries we do not observe any effect from downward transfer from the parent to a child. This variable has a negative and significant effect on private LTC insurance in the U.S. It is statistically significant and positive in Spain. The absence of effect of a child's help on owning an LTC insurance is still observed in the other countries. However, if we pool data from different waves of HRS (2004, 2006, 2008 and 2010), we also obtain a negative and significant link between children's altruism and insurance in the U.S.

¹⁴ We also run linear probability models in order to test the robustness of the results. The results are similar but not presented.

¹⁵ Our result for the U.S. is similar to Mellor (2001), who found no statistically significant effect of informal caregiving on private insurance.



of public assistance and adverse selection (Pestieau and Ponthière 2012). Our paper indicates that in some countries, particularly in the U.S. and in France, family altruism does not play such a big role.

As a final comment, it should be noted that we have attempted to keep our model as simple as possible, which is why we have abstracted from a number of aspects. First of all, we focus exclusively on altruistic informal care and thus exclude from our model other possible motivations such as exchange or social norms. Moreover, we concentrate only on children's assistance in time, and we do not consider the possibility of them paying for their parents' formal LTC. In a more sophisticated model, different caregiving motives and different types of assistance could coexist. Finally, we also assume away the possibility of social assistance and/or social insurance.

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Appendix 1

In this appendix we derive the comparative statics result $\frac{\partial P}{\partial \gamma}$. We have

$$\frac{\partial P}{\partial \gamma} = \frac{\frac{\partial EU_P}{\partial P \partial \gamma}}{-SOC_P}, \quad (4)$$

where $SOC_P < 0$ is the second-order condition for P and $\frac{\partial EU_P}{\partial P \partial \gamma}$ is obtained by deriving

the FOC (2) with respect to γ . In particular, we have

$$\begin{aligned} \frac{\partial EU_P}{\partial P \partial \gamma} = & -\pi H_{ma} \frac{\partial a}{\partial \gamma} + \frac{H_{ma} \frac{\partial a}{\partial \gamma}}{1 + \lambda} + \pi H_{aa} \frac{\partial a}{\partial \gamma} \frac{\partial a}{\partial m} \left(\frac{1}{(1 + \lambda)\pi} - 1 \right) \\ & + \pi H_a \frac{\partial \left(\frac{\partial a}{\partial m} \right)}{\partial \gamma} \left(\frac{1}{(1 + \lambda)\pi} - 1 \right) + \pi \beta u''(c) w^2 \frac{\partial a}{\partial \gamma} \frac{\partial a}{\partial m} \left(\frac{1}{(1 + \lambda)\pi} - 1 \right) \\ & - \pi \beta u'(c) w \frac{\partial \left(\frac{\partial a}{\partial m} \right)}{\partial \gamma} \left(\frac{1}{(1 + \lambda)\pi} - 1 \right). \end{aligned}$$

Using the fact that $\frac{\partial a}{\partial m} = \frac{\gamma H_{am}}{-\Delta_a}$ with $\Delta_a = \gamma H_{aa} + w^2 u''(c)$ and that $H_{am} = H_{ma}$ and rearranging the first three terms, together with (4), we get the result in Eq. (3).

The expression for $\frac{\partial a}{\partial \gamma}$ is derived using (1), while $\frac{\partial \left(\frac{\partial a}{\partial m} \right)}{\partial \gamma}$ is obtained by deriving

$$\frac{\partial a}{\partial m} = \frac{-\gamma H_{am}}{\gamma H_{aa} + w^2 u''(c)} \text{ with respect to } \gamma.$$





Appendix 2

Probit models of LTC insurance with dependence (quid pro quo motive)

	U.S.	France	Germany	Spain	Israel
Children's help	-0.015 (0.019)	-0.021 (0.031)	-0.033** (0.013)	0.002 (0.017)	-0.132*** (0.047)
In couple	0.029*** (0.006)	0.000 (0.020)	0.001 (0.011)	0.003 (0.010)	-0.069** (0.034)
Woman	0.034*** (0.006)	0.027* (0.016)	0.002 (0.007)	0.009 (0.007)	-0.013 (0.025)
Age					
50/64	-0.096*** (0.009)	-0.058*** (0.026)	0.020 (0.020)	0.023* (0.013)	0.064 (0.043)
65/79	-0.009 (0.008)	0.024 (0.025)	0.037* (0.020)	0.021* (0.013)	0.066 (0.041)
80+	Ref.	Ref.	Ref.	Ref.	Ref.
Years of education	0.014*** (0.001)	-0.002 (0.002)	0.002 (0.001)	0.005*** (0.001)	0.015*** (0.003)
Income					
1st quartile	-0.065*** (0.008)	-0.005 (0.027)	-0.034*** (0.012)	-0.004 (0.003)	-0.169*** (0.037)
2nd quartile	-0.060*** (0.008)	0.012 (0.023)	-0.051*** (0.011)	-0.033*** (0.010)	-0.176*** (0.033)
3rd quartile	-0.046*** (0.007)	0.002 (0.021)	-0.014 (0.008)	-0.027*** (0.009)	-0.098*** (0.032)
4th quartile	Ref.	Ref.	Ref.	Ref.	Ref.
Financial transfer	-0.024* (0.014)	0.003 (0.026)	0.013 (0.009)	0.049** (0.021)	-0.021 (0.076)
N	14,946	2792	3357	3927	1439
Pseudo-R ²	0.055	0.012	0.048	0.083	0.052

Heteroscedasticity-consistent standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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