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# Altruism and long-term care insurance\*

Justina Klimaviciute,<sup>†</sup> Pierre Pestieau<sup>‡</sup> and Jérôme Schoenmaeckers<sup>§</sup>

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## Abstract

The aim of this paper is to analyze long-term care (LTC) insurance purchase decisions when parents 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 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 concavity of the utility functions. We then run an empirical test using data from the US, France, Spain, Germany and Israel. We find that the effect of children's altruism is negative in the US and Israel, but not significant in France, Germany and Spain, which possibly suggests that the different forces identified in the theoretical model are offsetting each other.

**Keywords:** long-term care insurance, altruism, informal care

**JEL Classification:** D64, I13, J14

## 1 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 falls into dependence, that is, is unable to carry out basic daily activities such as eating, washing, etc., and, hence, needs to receive LTC. The provision of LTC, whatever it is formal or informal (i.e. provided by family and friends), is extremely costly, which raises the question of the funding of LTC. Given the high probability to fall into dependence and the high costs of LTC, one would expect, from the perspective of rational choice theory, that individuals purchase private LTC insurance, in such a way as 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 US and France. In other countries, this fraction is negligible. This is the well-known LTC private

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insurance puzzle that can be explained by various factors, on both the supply side and the demand side of the private LTC insurance market.<sup>1</sup>

One of the factors often mentioned in the literature is the presence of family altruism that leads to informal care. The argument being that informal care crowds out LTC insurance but as we show the validity of this argument impinges on the substitutability between formal and informal care, which is not well established in the existing empirical literature.<sup>2</sup> The aim of this paper is to investigate how altruistic informal care influences LTC insurance purchases. Very few empirical studies focus on the decision to purchase LTC insurance in Europe, mainly because of the thinness of the market except for France.<sup>3</sup>

The paper is organized as follows. In section 2, we sketch a theoretical model that implies an ambiguous sign as to the effect of altruism on the purchase of LTC insurance. In section 3, we provide an empirical test of this effect of altruism using data from five countries: US, France, Spain, Germany and Israel. The test leads to an unambiguous negative sign in the US and Israel, while the results are not significant for France, Germany and Spain, possibly confirming the presence of conflicting forces identified in the theoretical model. In section 4, we provide some concluding remarks.

## 2 Model

We consider a simple model comprising a parent that incurs the risk of dependence and a child who will only help his parent in case of dependence. The parent moves first in deciding about purchasing a LTC insurance expecting to benefit from informal care from his child in case of dependence. The extent of assistance is then chosen by the child and does depend on the degree of altruism  $\gamma$  and on the level of expected insurance compensations. As standard in this kind of problem, we move backward and first look at the child's decision.

### 2.1 Child's choice

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

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

where  $u$  and  $H$  are respectively strictly concave and quasi-concave functions,  $w$  is the child's wage rate,  $a$  the time devoted to informal care and  $m$  the amount of formal care. We maximize this utility

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<sup>1</sup>See Cremer et al. (2012), Pestieau and Ponthière (2012), Brown and Finkelstein (2011).

<sup>2</sup>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.

<sup>3</sup>For a study in the case of France, see Courbage and Roudaut (2008). For a study in Spain, see Jiménez-Martín et al. (2016).

with respect to  $a$  and obtain the following FOC:

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

Differentiating totally this FOC, we obtain the following comparative statics result:

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

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. In case of perfect substitutability, the sign is negative and we have a perfect crowding-out effect.

## 2.2 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 of a premium  $P$ :

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

where  $\pi$  is the probability of dependence and  $\lambda$  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  $y$  is the parent's income and  $\beta$  reflects the concern that parents may have regarding their children devoting too much time on their behalf. Differentiating the expected utility with respect to  $P$  we obtain:

$$\frac{\partial EU_P}{\partial P} = -[(1 - \pi)u'(d) + \pi H_m] + H_m/(1 + \lambda) + \pi H_a \frac{\partial a}{\partial m} \left( \frac{1}{(1 + \lambda)\pi} - 1 \right) - \pi \beta u'(c)w \frac{\partial a}{\partial m} \left( \frac{1}{(1 + \lambda)\pi} - 1 \right)$$

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).<sup>4</sup> Finally the last term

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<sup>4</sup>Note that  $\left( \frac{1}{(1 + \lambda)\pi} - 1 \right) > 0$ .

reflects the concern that parents may have not to burden their children informal caregivers. It will also depend on the more or less substitutability of the two types of care but in an opposite direction. In case of substitutability (complementarity), the parents 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  $\gamma$ . In particular, we can derive the following comparative statics result:

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

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

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

It can be seen that the sign of  $\frac{\partial P}{\partial \gamma}$  is generally ambiguous. To get some insights, let us analyze some special cases. For instance, if  $\beta = 0$  and the third derivatives of the utility functions are zero, (1) becomes:

$$\frac{\partial P}{\partial \gamma} = \frac{\pi H_{am} \frac{\partial a}{\partial \gamma} \left( \frac{1}{(1+\lambda)\pi} - 1 \right) \left[ 1 - \frac{\gamma H_{aa}}{[\gamma H_{aa} + w^2 u''(c)]} \right] - \pi H_a \left( \frac{1}{(1+\lambda)\pi} - 1 \right) \frac{H_{am} w^2 u''(c)}{[w^2 u''(c) + \gamma H_{aa}]^2}}{-SOC_P} \geq 0 \iff H_{am} \geq 0$$

Thus, insurance increases with the child's altruism if formal and informal care are complements but decreases if they are substitutes. Indeed, when children become more altruistic, they provide 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 his child's utility, no clear conclusions can be made because the consideration of the child's utility, as discussed above, gives opposite motivations than 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.

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

**Proposition.** *In an economy where children help their parents in case of dependence, the effect of children's altruism on the purchase of private 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.*

### 3 Empirical analysis

Our theoretical model identifies a number of conflicting forces influencing 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 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 aging 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 that flows from them are similar. People older than 50 are visited on a biannual basis and questioned about health, socio-economic status (income, assets, insurances), relationships with family (visits, care, financial transfers) and everyday activities. Both surveys follow respondents longitudinally in order to study the aging process. As part of this research, and because SHARE does not ask the question about the purchase of LTC insurance precisely before wave 5 (2013), we will not use the longitudinal side of the surveys but the international side that allows us to differentiate the results by country.

Our analyses are cross-sectional. We use the ninth wave of the HRS survey and the sixth wave of the SHARE survey. We can only study the European countries where private LTC insurance exists on the market. According to Colombo et al. (2011) and SCOR (2012), Germany, France and Spain are countries where these insurance policies are sold even if the penetration rates differ. The market is well-established in France, while the penetration of this kind of insurance is low in Spain (SCOR, 2012). Jimenez-Martin et al. (2016) studied with SHARE data 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 purchase decision of LTC insurance in France.

In SHARE, inhabitants from Israel are interviewed. Brammli-Greenberg et al. (2012) explain that in Israel, the state subsidizes 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 is increasing year after year in Israel.

The last country studied is the United States, where the LTC insurance market has existed for more than 40 years (Brown and Finkelstein (2011)).

Table 1: **Informal help from children to non-dependent parents**

<b>United States</b>	<b>France</b>	<b>Germany</b>	<b>Spain</b>	<b>Israel</b>
4.0	7.7	10.7	6.0	10.1

While HRS and SHARE provide us with a 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  $\gamma$  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 that they provide to their parents while the parents are not yet dependent<sup>5</sup>. Indeed, as it can be seen below from Table 1, non-dependent parents receive help from their children. The reported help ranges from 4% in the US to 10.7% in Germany.<sup>6</sup> We argue that the informal help provided to non-dependent parents can be considered as an exogenous measure of children’s altruism since it is obviously different from LTC and is therefore not affected by parents’ LTC insurance coverage. On the contrary, it rather 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 become dependent.<sup>7</sup>

Table 2: **LTC insurance and presence of children**

		<b>United States</b>	<b>France</b>	<b>Germany</b>	<b>Spain</b>	<b>Israel</b>
<b>LTC Insurance in <math>t</math></b>						
<b>Non-dependent Respondents with children</b>	<b>%</b>	12.7	21.3	3.9	4.1	33.2
<b>Non-dependent Respondents without children</b>	<b>%</b>	16.0	20.9	5.9	4.0	19.6

Therefore, we concentrate our analysis on non-dependent respondents and our two main variables of interest are the purchase 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 has she/he

<sup>5</sup>Dependence is defined as having 2 limitations in activities of daily living (ADL) or more. It concerns bathing, eating, dressing, walking across a room, getting in or out of bed and using the toilet.

<sup>6</sup>Examples of help to non-dependent parents can be help to manage money, help with chores, errands and transportation or financial help.

<sup>7</sup>Providing informal aid should not necessarily be equated to the presence of altruism since 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).

received help from her/his children? Table 2 summarizes information about private LTC insurance for the different countries we consider in our analysis. The insurance rates vary by country. About 13% of non-dependent respondents with children declare owning LTC insurance in the US, while they are only 4% in Germany and Spain. Israel is the country with the highest rate, 33.2%, whereas the rate in France is 21.3%. There is no clear direction in the variation in the insurance rate among respondents with and without children. While people without children seem to be more likely to have insurance in the US or Germany, in Israel, it is the opposite. There is no difference in France and 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 insurance based on their perception of the altruism of their children.

Table 3: **LTC insurance and informal help from children**

		<b>United States</b>	<b>France</b>	<b>Germany</b>	<b>Spain</b>	<b>Israel</b>
<b>LTC Insurance in <math>t</math> if Parent non-dependent in <math>t</math></b>						
<b>Informal Help from Children in <math>t</math></b>	<i>No</i>	13.0	21.4	4.1	4.2	35.4
	<i>Yes</i>	6.3	21.1	2.3	2.5	15.2

Table 3 summarizes the cross-relationships between children’s support and insurance. The table suggests a negative relationship between informal support from children and the probability of parents having LTC insurance in the US and Israel. Results could be similar in Germany and Spain but we must be cautious given the fairly low rates of private insurance in these two countries. In France, it seems that there is no difference. These descriptive results have to be confirmed by robust econometric analysis. Table 4 summarizes our regression results.

Table 4: Probit models of LTC insurance

	United States	France	Germany	Spain	Israel
<i>Children's Help</i>	-0.045 <sup>**</sup> (0.018)	-0.013 (0.030)	-0.013 (0.012)	0.001 (0.015)	-0.177 <sup>***</sup> (0.045)
<i>In couple</i>	0.048 <sup>***</sup> (0.007)	0.003 (0.021)	-0.007 (0.010)	-0.002 (0.009)	-0.088 <sup>***</sup> (0.033)
<i>Woman</i>	0.035 <sup>***</sup> (0.006)	0.035 <sup>**</sup> (0.017)	-0.001 (0.006)	0.003 (0.006)	-0.016 (0.025)
<i>Age</i>	0.016 <sup>***</sup> (0.003)	0.041 <sup>***</sup> (0.012)	0.019 <sup>***</sup> (0.006)	-0.002 (0.005)	0.004 (0.019)
<i>Age<sup>2</sup></i>	-0.000 <sup>***</sup> (0.000)	-0.000 <sup>***</sup> (0.000)	-0.000 <sup>***</sup> (0.000)	0.000 (0.000)	-0.000 (0.000)
<i>Years of Education</i>	0.018 <sup>***</sup> (0.001)	0.000 (0.001)	0.000 (0.001)	0.003 <sup>***</sup> (0.001)	0.003 <sup>**</sup> (0.001)
<i>Net Income</i>	0.007 <sup>***</sup> (0.001)	0.001 (0.003)	0.007 <sup>***</sup> (0.002)	0.004 <sup>***</sup> (0.001)	0.027 <sup>***</sup> (0.005)
<i>N</i>	14224	2581	3580	4016	1492
<i>Log likelihood</i>	-5112.2	-1327.8	-566.5	-642.4	-904.7
Standard errors in parentheses					
Notes: We use heteroscedasticity-consistent standard errors					
* $p < 0.1$ , ** $p < 0.05$ , *** $p < 0.01$					

Probit models are run to verify the negative correlation between support from children and purchase of LTC insurance. The sample still concerns non-dependent parents and the negative impact of children's help on the purchase of LTC insurance is observed (significant and robust once other explanatory variables are added) for the US and Israel. For these two countries, we observe the positive impact of education and income<sup>8</sup> on the purchase decision. Being a woman and being older is positively associated with insurance in the US 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 US but negative and significant in Israel.

As far as Germany and Spain are concerned, the negative link between help and insurance observed in the descriptive statistics does not persist once the control variables are added in the regression. Income and education seem to play a determining role in Spain, whereas only income does in Germany. 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

<sup>8</sup>Individuals have been ranked according to deciles of income created for each country separately.

help provided, and the purchase of insurance, while being a woman and being older is positively linked to insurance coverage<sup>910</sup>.

## 4 Conclusion

Using a simple model of LTC insurance wherein the buyer expects some assistance from his child in case of dependence out of altruism, we try to analyze the determinants of this purchase decision. We show that the role of altruism on 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 concavity of the utility functions. To get more insight, we have tested the effect of altruism on the purchase of LTC insurance using data on the US, France, Spain, Germany and Israel, using HRS data for the first and SHARE data for the others. We show that the effect of altruism is negative in the US and Israel, but not significant in France, Germany and Spain. The reasons for this differential impact are not clear. On the basis of our model, it would seem that in the US and Israel, there would be more substitutability between the two types of care or that the effect 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 are offsetting each other.

As final comment, note that it is generally expected that filial altruism has a negative impact on parental decision to get insured and that parent's altruism has a negative impact on 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.

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<sup>9</sup>In Appendix 1, we run the probit models using the health index of the parent. The sample decreases since there is missing information for the variables used to build the health index. This index of health is predicted from Principal Component Analysis (PCA). This is a statistical procedure that uses orthogonal transformation to convert a set of 7 different objective and subjective health measures, possibly correlated into a set of linearly uncorrelated variables called principal components. Built at each period, the higher the index, the better the health. The sign and the significance of the different explanatory variables remain the same and we observe a positive sign of the health index (in the US, Spain and Israel) which implies the potential absence of adverse selection in the LTC insurance market.

<sup>10</sup>We run also linear probability models in order to test the robustness of the results. See Appendix 2.

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# Appendixes

## Appendix 1

Table 5: Probit models of LTC insurance with health index

	United States	France	Germany	Spain	Israel
<i>Children's Help</i>	-0.045 <sup>**</sup> (0.020)	-0.012 (0.031)	-0.012 (0.012)	0.008 (0.018)	-0.194 <sup>***</sup> (0.054)
<i>In couple</i>	0.049 <sup>***</sup> (0.007)	-0.002 (0.021)	-0.007 (0.010)	-0.004 (0.010)	-0.103 <sup>***</sup> (0.036)
<i>Woman</i>	0.037 <sup>***</sup> (0.006)	0.034 <sup>**</sup> (0.017)	-0.001 (0.006)	0.006 (0.007)	-0.008 (0.027)
<i>Age</i>	0.016 <sup>***</sup> (0.004)	0.045 <sup>***</sup> (0.012)	0.019 <sup>***</sup> (0.006)	-0.002 (0.005)	0.032 (0.022)
<i>Age<sup>2</sup></i>	-0.000 <sup>***</sup> (0.000)	-0.000 <sup>***</sup> (0.000)	-0.000 <sup>***</sup> (0.000)	0.000 (0.000)	-0.000 (0.000)
<i>Years of Education</i>	0.018 <sup>***</sup> (0.001)	-0.000 (0.001)	0.000 (0.001)	0.003 <sup>***</sup> (0.001)	0.003 <sup>**</sup> (0.002)
<i>Net Income</i>	0.007 <sup>***</sup> (0.001)	0.001 (0.004)	0.007 <sup>***</sup> (0.002)	0.004 <sup>***</sup> (0.001)	0.027 <sup>***</sup> (0.005)
<i>Health Index</i>	0.011 <sup>***</sup> (0.003)	0.010 (0.008)	0.002 (0.003)	0.012 <sup>***</sup> (0.004)	0.053 <sup>***</sup> (0.013)
<i>N</i>	13450	2501	3523	3543	1311
<i>Log likelihood</i>	-4876.9	-1288.7	-564.5	-595.5	-787.3
Standard errors in parentheses					
Notes: We use heteroscedasticity-consistent standard errors					
* $p < 0.1$ , ** $p < 0.05$ , *** $p < 0.01$					

Appendix 2

Table 6: Linear probability models of LTC insurance with health index

	United States	France	Germany	Spain	Israel
<i>Children's Help</i>	-0.022* (0.012)	-0.013 (0.032)	-0.008 (0.009)	0.012 (0.013)	-0.143*** (0.036)
<i>In couple</i>	0.047*** (0.006)	-0.002 (0.021)	-0.010 (0.008)	-0.006 (0.009)	-0.108*** (0.036)
<i>Woman</i>	0.033*** (0.006)	0.034** (0.017)	-0.001 (0.007)	0.006 (0.007)	-0.006 (0.027)
<i>Age</i>	0.014*** (0.003)	0.042*** (0.011)	0.015*** (0.004)	-0.004 (0.005)	0.027 (0.021)
<i>Age<sup>2</sup></i>	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000 (0.000)	-0.000 (0.000)
<i>Years of Education</i>	0.015*** (0.001)	-0.000 (0.001)	0.000 (0.001)	0.002*** (0.000)	0.003** (0.001)
<i>Net Income</i>	0.007*** (0.001)	0.001 (0.004)	0.007*** (0.001)	0.004*** (0.002)	0.029*** (0.005)
<i>Health Index</i>	0.011*** (0.003)	0.010 (0.009)	0.002 (0.003)	0.013*** (0.003)	0.054*** (0.014)
<i>N</i>	13450	2501	3523	3543	1311
<i>R<sup>2</sup></i>	0.04	0.01	0.01	0.02	0.08
Standard errors in parentheses					
Notes: We use heteroscedasticity-consistent standard errors					
* $p < 0.1$ , ** $p < 0.05$ , *** $p < 0.01$					