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PUBLIC VS PRIVATE DEMAND FOR COVERING LONG TERM CARE EXPENDITURES

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PUBLIC VS PRIVATE DEMAND FOR COVERING LONG TERM CARE EXPENDITURES*

Abstract

This paper studies the determinants of the willingness to pay (WTP) for long term care (LTC) coverage provided through either a public or a private insurance program. Two insurance services are considered, a first one compulsory and financed out through general taxes, another one purchased on a voluntary base and paid through an insurance premium. Data are taken from a survey on a sample of households of the Italian region Emilia Romagna, and WTP is elicited through open-ended contingent valuation questions. We model individual choice as a two stage process, with respondents first establishing their interest for the service, then stating how much they are willing to pay. Auxiliary information allows us to separate zeros arising from standard corner solutions from those generated by disinterest. We test for independence of the interest" process by estimating Heckman's sample selection models both for the public and private case. We show that two sequential processes guide the observed WTP and that their separate identification is crucial for a clear understanding of individual choices. Interest and WTP are influenced by different variables, whereas the same variables influence the two choices in different ways. Moreover, we are able to investigate the differences in stated WTP between public and private provision. The kind of information provided is useful for designing reforms that more closely match collective preferences in a particularly delicate area such as elderly care financing.

Keywords: Health Insurance, Long Term Care, Willingness to Pay, Hurdle Models.
JEL classification: I11, I18, H40, C34.

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1. Introduction

The financial impact of ageing is one of the most debated issues in health economics nowadays. A large number of studies has tried to assess the impact of demographic changes on different areas of welfare expenditures, including Long Term Care (LTC, henceforth) (e.g. Jacobzone *et al.,* 1998). Fortunately, pessimistic scenarios suggested by projections that matched current dependency rates with the future demographic composition of the population have been significantly mitigated by the progressive reduction in the incidence of disability per age group (Cambois and Robine, 1997). However, even with a persistent degree of uncertainty (Hancock *et al.,* 2003), it is still agreed that ageing will increase the demand for elderly care in the future. Moreover, the rise in female job participation, together with the reduction in household's size, will presumably further limit the availability of unpaid informal care. Hence, if we consider that an increasing amount of public resources will be absorbed by the raise in acute care costs, it is likely that families will be forced to increase their expenditures for LTC services.

Despite the possibility to transfer the financial risk of age-related disabilities through insurance schemes, the market for LTC private policies is negligible in size and elderly people are often exposed to a high expenditure risk. Several theoretical arguments have been proposed as possible explanations for this phenomenon.[1] They include adverse selection and moral hazard typically affecting health insurance, as well as market failures which are peculiar of the LTC sector and are attributable to intrafamily strategic behaviour (Pauly, 1990; Zweifel and Struwe, 1998) or to the presence of undiversifiable aggregate risk (Cutler, 1993). A further justification is the availability of substitutes such as out-of-pocket payments or public programs that cover expenditures and/or directly provide elderly care which may crowd out private insurance. The decision to pay at the point of need does not determine *per se* a socially inefficient outcome. However, sub-optimal risk transfer may still occur. This

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[1] See Norton (2000) for a survey.

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happens, for instance, when myopic behaviour leads individuals at early stage of life to underestimate risk and consequences of disabilities, or when they strategically choose sub-optimal level of coverage because they rely on public intervention of last resort.

The lack of coverage for LTC expenditures is relevant not only to the US, where the risk of illness is mostly handled through private insurance, but also to countries which extensively rely on public financing of health and social care, and where an increasing pressure towards the restraint of public expenditures is progressively widening the gap between people needs and the scope for public intervention.

A large exposition to LTC expenditure risk is frequently perceived as a relevant social problem since a long period of disability affects a relatively limited number of individuals, but it may have catastrophic consequences on the assets of the families involved. Moreover, economic problems are usually only a side-effect of the heavier burden represented by physical frailty. This explains why equity reasons are considered with particular attention in this area and usually call for a substantial degree of socialisation of disability-related risk.

All these factors have contributed to bring at the forefront of the policy agenda the issue of how to find additional resources for financing LTC. Different measures have been proposed and implemented, ranging from an increase in private saving (Garber, 1996), to public-private partnerships for the diffusion of LTC insurance policies (Mc Call et al., 1998), as well as the creation of new public programs or the extension of the existing ones. The solutions proposed for the different countries are influenced, on the one hand, by the features of existing health and social care systems; on the other hand, they reflect different views on what should be the most appropriate way to split the financial burden for elderly care between individual and social responsibilities.

What is largely missing in the literature is a direct investigation of people preferences over the amount of LTC risk that they are actually willing to transfer and over their preferred institutional arrangement for achieving such result. Our paper contributes to filling this gap by means of a unique survey on a

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representative sample of families in the Italian region Emilia Romagna. Together with information on socio-economic and health status, we have collected data on stated willingness to pay (WTP) for an hypothetical program covering LTC expenditures, aimed at topping up the interventions already ensured by the public sector. We have used an open ended question format to ask each interviewed his or her maximum WTP for two alternative packages differing only in the way they are financed. The first question concerns a private insurance policy individually purchased in the market, whereas the second one is for a public fund financed out of taxation.

The complexity of implementing comprehensive interventions in this area may create problems to some community members for properly assessing the benefits they would get from new programs. Therefore, the decision not to contribute to financing LTC cover may be determined not only by the comparison between individual expected costs and benefits, but also by prior judgements that reflect non-economic motivations.[2] We control for potential distortions arising from mixing answers determined by the two different motivations (broadly speaking, economic and non-economic) by way of a two step modelling of WTP. First, the process which leads to the inclusion of LTC coverage in respondents' choice sets is identified, then the determinants of WTP on the sub-sample of interested individuals are studied.

Our analysis is relevant from several viewpoints. First, by detecting the presence of unmet demand for coverage, it is attested that market failures are a relevant issue in practice. This adds an empirical rationale to public action, either in the form of public provision or through policy measures favouring the diffusion of private covers. Secondly, studying the determinants of demand for LTC coverage permits a better understanding of the welfare implications of potential reform interventions. Finally, given the existence of alternative policy options open to the policymaker, useful evidence is gained on how different institutional solutions are

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[2] Among the elements that may induce respondents not even to take into consideration the perspective of insuring against LTC risk we can include lack of adequate prior information, cognitive difficulties in evaluating the problem, but also a strong ethical commitment in favour of family caregiving.

perceived by the population. This is important both on a normative and on a positive perspective. In the former case, it helps to identify the mode of intervention which determines larger improvements in social welfare (by matching collective preferences), whereas in the latter case it provides insights on the most likely outcome of a political process in which the choice is between competing alternatives.

The paper relates to three main strands of literature. The estimation strategy draws on the literature which deals with micro-data characterised by a large share of zeros. We also provide evidence that complements, with stated preferences data and in a context of a dominant public health insurer, the studies on the determinants of demand for LTC insurance which until now mainly refer to the US (Sloan and Norton, 1997; Mellor, 2001). Besides, we contribute to the contingent valuation studies applied to health care. This literature has concentrated mainly on providing a monetary quantification of benefits derived from alternative health care interventions, so as to complement clinical indicators.[3] More recently, analyses based on hypothetical markets have also been used to study problems related to elderly care (e.g. Johannesson and Johansson, 1997; Nocera, Bonato and Telser, 2002; Shackley and Donaldson, 2002). Nonetheless, applications of this methodology to elicit collective preferences on broader health care financing issues and on insurance coverage are very limited (exceptions are Eckerlund *et al.* 1995; Johannesson, Johansson and Soderqvist, 1998) and we are not aware of any contribution dealing with long term care insurance so far.

The paper is organised as follows. The next section describes the structure of the survey, section 3 discusses the methodical framework and the estimation procedure, the results of which are presented in the section 4, and section 5 concludes.

2. Survey and data description

The analysis presented here is based on a cross-sectional survey carried out on a sample of families of the Italian region Emilia

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[3] For surveys of this literature see Diener, O'Brien and Gafni (1998), Klose (1999) and Hanley, Ryan and Wright (2003).

Romagna (around 3.5 millions inhabitants). The survey, consisting in 1415 face-to-face interviews, was conducted by a professional survey firm between October and December 2002. Households were selected according to a design aimed at ensuring geographic and socio-economic representativity of the sample. A total of 41 municipalities was surveyed, including all the 21 towns with more than 25,000 inhabitants, together with a sample of 20 smaller municipalities, which were selected by taking into account size, demographic composition and present supply of elderly care. Next, families were randomly drawn from municipal archives according to two characteristics which are *a priori* expected to influence the demand for LTC coverage, namely family size and age of the head of household.[4]

2.1. Contingent valuation scenario and individual choice

A specific section of the questionnaire is devoted to elicit the WTP for covering LTC expenditure risk. The hypothetical scenario consists of a program aimed at covering a respondent's "disability state requiring help in activities for daily living for several hours per day ". This program covers 75% of disability related expenditures, which are supposed to amount to 1033 Euros per month if the disable is cared at home and to 1550 Euros if he chooses residential care.[5]

Two different types of coverage are proposed for the same hypothetical scenario. A first one where cover is provided by the public sector to the whole population and financed through a

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[4] Three classes were considered for each feature. Family size included 1, 2, 3 or more components, whereas age classes were 25-40, 41-55 and 56-70.

[5] The health conditions described in the scenario are such that both home and institutionalised care can be considered appropriate from a medical point of view. Hypothetical monetary costs are consistent with current average out-of-pocket expenditures for this kind of LTC services in Italy. Since our study focuses on the *ex-ante* choice of insurance, it is irrelevant whether *ex-post* the disable chooses domicile or residential care. A specific analysis of WTP for acquiring the right of a free choice between different solutions in care delivery will be the object of future work.

compulsory marginal increase in personal income tax. A second one in which insurance is voluntarily purchased in the market and paid through a premium. Hence, each respondent provides two WTP declarations. More precisely, the policy issue investigated here is the "WTP for an *extension* of coverage with respect to the status quo". Therefore, respondents are asked to consider these expenditures net of the support presently ensured by the public sector, which currently takes different forms ranging from in-kind to cash subsidies, but that is considered to a large extent insufficient to meet present and future needs.

Useful indications on the factors potentially influencing respondent's decision can be derived both from economic theory on insurance choice and from the studies on long term caring arrangements. Expected utility of extending coverage depends on respondents' perceived risk of disability and on monetary and non-monetary costs generated by the provision of care, which, when no cover is available, must either be paid out of pocket or supplied through uncompensated family assistance.

Age, sex and family composition are all expected to play a role in the propensity to cover of the individual, although counteracting effects might be in place in some cases. For instance, since disabilities concentrate at final stages of life, one can expect older respondents to be more interested in extending their coverage. At the same time, uncertainty over future availability of public resources for facing increased social needs can induce younger generations to see with favour new programs aimed at channelling additional investments in these potentially critical areas. From a different perspective, the presence of a spouse and of adult children raise the possibilities to receive informal support, thus reducing expected differential utility from coverage. This effect is reinforced if children live in the household and if the spouse is female.

Conflicting effects can take place also for health related variables. In principle, poor health increases expenditure risk and consequently also the benefits from insurance. Nonetheless severely impaired people may perceive that their condition entitles them to receive free care, inducing them to support the status quo.

Economic conditions are expected to be among the most important determinants of the amount of WTP. Given the different distributive implications of the two system of provision considered, we also expect a different impact between the public and private solution. Finally, in contexts with a dominant public supplier of health care, empirical studies have highlighted the importance of political beliefs in influencing support towards additional welfare expenditures and decisions over purchasing supplementary medical insurance (Brook, Hall and Preston, 1998; Besley, Hall and Preston, 1999). In this perspective, political attitudes are a multidimensional issue which involves judgements on the actual quality of public services, as well as personal opinions about the role that the public and the private sector should play in areas such as health and social care, where equity issues are particularly critical. All these aspects are controlled for in our empirical model.

2.2. The dataset

The questionnaire contains information on family composition, socio-economic status, working and health conditions, and on respondent's general attitudes towards health and social expenditures, which in principle can be used for modelling the propensity to cover LTC risk and for identifying the determinants of WTP.

Table 1: *Definition and descriptive statistics of the variables used in the regression analysis*

Variable	Definition	Average *(share of 1)*	Std Dev
Log of Income	Log of family income (PR*+ PR spouse, if present)	7.46	0.48
Age	Age of PR in years	48.99	12.74
Male	= 1 if PR is a male, =0 if PR is a female	(0.55)	0.50
Spouse	= 1 if PR is married, 0 otherwise	(0.72)	0.45
University degree	= 1 if PR has a university degree , 0 otherwise	(0.14)	0.35
Secondary school	= 1 if PR has a secondary school degree, 0 otherwise	(0.41)	0.49
Compulsory education	= 1 if PR has a compulsory education degree, 0 otherwise	(0.43)	0.50
White Collar	= 1 if PR is a white collar employed, 0 otherwise	(0.25)	0.43
Blue Collar	= 1 if PR is a blue collar employed, 0 otherwise	(0.13)	0.34
Other	= 1 if PR is neither employed nor retired , 0 otherwise	(0.02)	0.15
Retired	= 1 if PR is retired , 0 otherwise	(0.27)	0.44
Not Working	= 1 if PR is not working , 0 otherwise	(0.12)	0.33
Not good health during last year	= 1 if PR self assessed health is rated excellent or fairly good, 0 otherwise	(0.23)	0.42
Chronic disease	= 1 if PR suffers of one or more chronic diseases, 0 otherwise	(0.20)	0.40
Negative opinion of existing LTC services	= 1 if PR declared a bad judgement of existing LTC services	(0.54)	0.50
No opinion on existing LTC services	= 1 if PR did not declared any opinion of existing LTC services	(0.23)	0.42
Private health insurance	= 1 if PR holds a supplementary health insurance, 0 otherwise	(0.20)	0.40
State should pay only basic services to all	= 1 if PR thinks that the State should pay basic LTC to everybody, 0 otherwise	(0.47)	0.50
State should pay only to those who can't afford	= 1 if PR thinks that the State should pay basic LTC services only to the poor, other citizens should provide by themselves, 0 otherwise	(0.31)	0.46
Person with LTC in the family	= 1 if there is a disabled person in the family, 0 otherwise	(0.24)	0.43

 * PR= person responding to the survey

Table 1 reports definitions and descriptive statistics for the variables used in the empirical model. We have data on net monthly family income, that sums up respondent and (when present) spouse income. Next, we have variables describing respondent's socio-demographic conditions such as age, sex, and dummies for education and working position. The health condition is proxied by self-assessed health status and by the presence of one or more chronic diseases.[6] An additional set of dummies is included to capture respondent's judgement on the perceived quality of health and social services.[7] We also have dummy indicators aimed at capturing respondent's awareness of the medical and financial impact of disability, namely having a disable person in the family. Finally, we include respondent's opinion on the appropriate role of the public sector in financing LTC. Different groups are considered, from supporters of universal intervention (the base case considers that the State should pay for the entire scope of LTC services for everyone) to supporters of progressively more selective schemes (coverage of the basic services to the entire population and coverage of the basic services only for the poor).

3. Estimation issues in evaluating WTP for long term care.

The analysis of the determinants of WTP for LTC is based on the contingent valuation questions discussed above. As outlined in the introduction, our dataset contains two WTP statements (one for the private LTC coverage and one for the publicly funded one). Together with that, a variable which registers the asserted interest (or non interest) for these kind of coverage is recorded. In fact, strictly positive WTP for at least one of the two options (public fund or private insurance) is sufficient for being classified as interested. However, recording WTP=0 in both cases does not necessarily imply that a household excludes LTC coverage from his choice set, since

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[6] Respondents could rate their health state on a scale ranging from 1 (very bad) to 5 (excellent). The dummy variable employed here separates individuals with condition ranging from 4 to 5 from the rest of the population.

[7] In the survey, judgements on the quality of health and social care vary on a ordinal scale from 1 to 5. As for health state, in both cases we group together individuals whose evaluation is between 1-2 and those between 3-5.

the offer can be withdrawn also because the present level of income or of other individual variables induces the potential consumer not to allocate any expenditure to LTC cover. The auxiliary information available in the dataset allows us to identify non interested households within the group of respondents with zero WTP for both options.

Table 2: *Mean and median willingness to pay for the private and public solution*

	Totals		**Positive WTP**		**Zero WTP**	
	Obs.	Mean WTP in Euros *(std. dev.)*	Obs.	Mean WTP in Euros *(std. dev.)*	Obs.	Interested Obs
PRIVATE POLICY	1257	290.77 *(418.12)*	724	504.10 *(442.98)*	533	282
PUBLIC PROGRAM	1257	282,67 *(371, 64)*	849	418.01 *(401.28)*	408	157

Table 2 reports mean and median WTP for the private and public solution, first including the entire sample, then only those observations displaying a strictly positive WTP. The last section on the right of the table reports the number of zero-stated WTP in each institutional arrangement, together with the number of respondents who declare to be interested in LTC coverage despite their null WTP. As can be seen, there is a large proportion of zero WTP for both the public and private solutions.

The problem of dealing with zero-inflated data has been extensively studied in the literature both on sample selection bias and double-hurdle models (e.g. Leung and Yu, 1996) and it has found frequent applications in the health care sector (see Maddala, 1985; and Jones, 2000, for surveys). From a methodological point of view, studies on tobacco consumption (Jones, 1989; Garcia and Labeaga, 1996; Jones and Yen, 2000; Lahiri and Song 2000; Jones and Labeaga, 2003) are of particular relevance for the analysis presented here.

The literature has pointed out that a concentration of the mass probability at zero stems from four main motivations:

infrequency of purchase, rationing, standard corner solutions and aversion to a particular good (also referred to as preference heterogeneity or abstention). Neither the first nor the second issue play a major role here.[8] On the contrary, the distinction between the last two sources of zeros is central to our analysis. Given the nature of the decision process analysed, we claim that statements of zero WTP arise here either from disinterest or standard corner solutions.

In the first case, respondents may decline additional coverage because the service does not provide them benefits in any case, and consequently it is excluded from their choice set (disinterest/aversion). Alternatively, individuals may choose not to finance additional coverage simply because their actual level of income, or of other individual attributes, induces them to totally divert available resources to other expenditures (corner solution). Our distinction between interested and non-interested respondents partially recalls the idea developed by Propper (1993) for supplementary health insurance, who classifies respondents as "captive" to the National Health Service when households not holding a supplementary policy assert not to have seriously considered to purchase it. In our context, the broader concept of interest seems more appropriate than captivity, since individual attitude does not reflect a specific aversion towards either the public or the private solution, but more general considerations on the potential benefits which the consumer derives (or does not derive) from extending LTC coverage.

3.1 Economic determinants of interest and WTP

A separate identification of the determinants of interest and of stated expenditures is of primary importance not only because it allows for achieving unbiased and/or more efficient estimates of the parameters, but also because rather different economic and non-economic factors are expected to influence the two processes. The

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[8] The first one typically involves expenditures on durable goods (e.g. Deaton and Irish, 1984; Blundell and Meghir, 1987; Keen, 1986), while the second relates to supply side hurdles (e.g. prices) which are absent here, since our exercise is based on open ended questions.

importance of this distinction mainly relies on the different expected responses to financial incentives. In general, respondents whose decision not to consume results from standard corner solutions are expected to choose positive consumption levels at different income or prices. On the contrary, when the decision not to consume stems from aversion or disinterest for the service, changes in financial incentives are not expected to modify expenditure allocations.

It turns out that the distinction has substantial effects also in terms of policy prescriptions. For instance, subsidies which favor the diffusion of private policies (e.g. tax allowances on insurance premia) are not expected to influence the behaviour of non interested households, who do not intend to purchase additional coverage in any case. On the contrary, the same measures can be effective for potential consumers who currently are staying out of the market because of budget constraints. Relevant implications emerge in a public choice perspective as well. Interested households with zero WTP are *de facto* asking for exemption from the contribution but are not opposing the new program in itself, as it happens for the not interested. This kind of information provides the policymaker with new opportunities for designing programs with higher probabilities to achieve a broad political support. For instance, if interested zeros are concentrated in the left tail of the income distribution, a substantial progressivity in the contribution schedule, eventually including exemptions for individuals below some income threshold, may induce these groups to support the program, rather than opposing it as suggested by their zero WTP.

There are specific behavioural motivations which illustrate why individuals may display heterogeneous preferences for an extension of LTC coverage. Since age related disabilities affect only a small fraction of the population, respondents might have an extremely vague perception of the problem and they do not feel personally involved in the definition of strategies for financing LTC. This can happen in particular to those who have never experienced a direct contact with disable elderly people. Moreover, this is a delicate area of intervention that one might not want to delegate to somebody

outside the family.[9] If this is the case, insurance coverage provides no benefit since the only way that is considered admissible to take care of the elderly is through informal family care.[10]

This kind of considerations allow us to argue that, in principle, interest is mainly driven by the awareness of the relevance of the topic achieved thanks to prior life experience, whereas the subsequent decision on how much to contribute to the private and public programs is mostly influenced by economic conditions, together with general attitudes about the way social services should be financed. Also factors like health status, age, education or personal experience of LTC cases are expected to play a role in making households interested in the service.

Some of these variables which potentially influence participation are also likely to be important determinants of how much to pay for the two types of coverage. In a selectivity framework, such eventuality prevents them from being good statistical identification variables for the first process.[11] In particular, socio-demographic variables are more prone to enter in this category. On the contrary, indicators of a direct experience of LTC needs, and judgments on the presently available services, are likely to raise interest since they reflect more accurate information on the consequences of disability, whereas they do not necessarily influence the amount of money individuals are willing to pay. In particular, we expect that in our hypothetical exercise, where the insurance package is defined in advance and coverage does not vary with the amount of the contribution.

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[9] See Joesch and Heidemann (2002) for a similar argument applied to child care.

[10] In principle, we cannot exclude that some respondents reject the offer simply because of difficulties in understanding the scenarios submitted to them or because they judge the interview too invasive. However, the notion of preference heterogeneity that we adopt is wider than the one implied by a mere protest attitude, that is frequently analysed in the empirical studies based on hypothetical data. See Bateman *et al.* (2002), for methodological considerations, and Dalmau-Matarrodona (2001), for an application to health services.

[11] Although not strictly necessary when estimating a parametric model, in order to achieve a proper identification of the two processes, it is strongly suggested that at least one regressor enters the participation equation but not the consumption one (e.g. Maddala, 1983, Vella, 1998).

3.2. Econometric specifications for health insurance demand

By moving to estimation considerations, the consequence of the problem discussed above is that empirically observed zeros can be divided in two groups. The first group collects individuals who are not interested in the extension of LTC cover. The second group includes those who, despite being interested in coverage, are not willing to pay a positive amount for it.

The main idea behind our set-up is that two hurdles, which typically receive a latent variable interpretation, must be passed in order to observe a positive stated expenditures for covering LTC risk.

i. *A "participation" hurdle,* that identifies potentially interested consumers and is described by a participation equation with a binary outcome. Namely, the net value for an individual of expressing interest in coverage is summarized through the latent variable specification:

(1) $$I_i^* = \mathbf{z}_i^{'}\boldsymbol{\gamma} + v_i\,;$$

where $\mathbf{z}_i$ includes the observable factors determining I_i^*.
What we observe is instead a dichotomous indicator I_i such that:

(2) $$I_i = \begin{cases} 1, & \text{iff} \quad \mathbf{z}_i^{'}\boldsymbol{\gamma} > v_i \\ 0, & \text{otherwise} \end{cases}$$

ii. *A "(stated) expenditures" hurdle*, which includes only the sub-sample of respondents who potentially receive a positive utility from extending LTC coverage, summarized through the following latent variable $WTP^* \equiv y_i^*$, which measures the net value obtained from the service:

(3) $$y_i^* = \mathbf{x}_i^{'}\boldsymbol{\beta} + u_i\,.$$

The corresponding stated WTP y_i is given by:

$$
(4) \qquad y_i = \begin{cases} y_i^{*}, & \text{iff} \quad \mathbf{x}_i^{'}\boldsymbol{\beta} > u_i \\ \hline 0, & \text{otherwise} \end{cases}.
$$

In terms of observed data, a positive WTP identifies the price which makes the individual indifferent between purchasing and not purchasing the service. On the contrary, a WTP equal to zero corresponds to rejecting coverage at any price level. Respondents with this stated WTP are failing either the first hurdle (non-interested group) or the second one (interested but not willing to contribute).

When no information is available for separating interested and non interested zeros, and the sole observed difference in the data is between zeros and positive values, a general specification for the likelihood is given by the "double hurdle model with dependence" (e.g. Jones, 1989).

$$
\begin{aligned}
(5) \quad L_{DHD} = &\prod_0 \big[1 - p\big(v > -\boldsymbol{\gamma}^{'}\mathbf{z}\big) p\big(u > -\boldsymbol{\beta}^{'}\mathbf{x} \,|\, v > -\boldsymbol{\gamma}^{'}\mathbf{z}\big) \big] \times \\
&\times \prod_+ p\big(v > -\boldsymbol{\gamma}^{'}\mathbf{z}\big) p\big(u > -\boldsymbol{\beta}^{'}\mathbf{x} \,|\, v > -\boldsymbol{\gamma}^{'}\mathbf{z}\big) g\big(y \,|\, u > -\boldsymbol{\beta}^{'}\mathbf{x}, v > -\boldsymbol{\gamma}^{'}\mathbf{z}\big)^{'}
\end{aligned}
$$

where p and g respectively are distribution and density functions of probability. Such likelihood requires the estimation of bivariate normal distributions and density functions. This computational difficulty has been commonly overcome by assuming independence between the two data generation processes.[12]

Differently from standard double hurdle models where different sources of zeros are usually not directly observable (e.g. Jones, 1992; Garcia and Labeaga, 1996), in our case the separation between participants and non participants is achieved by means of

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[12] The independence assumption leads to what is usually referred to as Cragg's model. Cragg's (1971) two stage model of consumption was motivated by the need to overcome the inadequacy of the univariate Tobit model to describe situations where different factors affect the decision whether or not to purchase a certain good and how much to spend for it.

supplementary information which allows us to identify non interested respondents within the group of those with zero WTP for both the public and the private program. We can therefore write a likelihood function which takes into account not only the standard distinction between zero and positive observations, but also splits the sample between interested and not interested individuals. By rearranging terms within the previous expression we have:

(6)
$$L_{DHSS} = \prod_{0NI} \left[1 - p(v > -\boldsymbol{\gamma}'\mathbf{z})\right] \times \prod_{0I} p(v > -\boldsymbol{\gamma}'\mathbf{z})\left[1 - p(u > -\boldsymbol{\beta}'\mathbf{x} \mid v > -\boldsymbol{\gamma}'\mathbf{z})\right] \times$$
$$\times \prod_{+} g(y \mid u > -\boldsymbol{\beta}'\mathbf{x}, v > -\boldsymbol{\gamma}'\mathbf{z}) p(u > -\boldsymbol{\beta}'\mathbf{x} \mid v > -\boldsymbol{\gamma}'\mathbf{z}) p(v > -\boldsymbol{\gamma}'\mathbf{z})$$

where *0NI* and *0I* respectively are the "zero non interested" and "and zero interested" observations.

Equation (6) is a new version of the full double hurdle model, that exploits supplementary information for separating zero WTP between the interested and non interested group. The expressions gets more appealing when introducing independence as in the Cragg's model. In this case the joint probabilities reduce to the marginals, so that equation (6) simplifies to:

(7)
$$L_{DHSS} = \prod_{0NI} \left[1 - p(v > -\boldsymbol{\gamma}'\mathbf{z})\right] \prod_{0I} p(v > -\boldsymbol{\gamma}'\mathbf{z})\left[1 - p(u > -\boldsymbol{\beta}'\mathbf{x})\right] \times$$
$$\times \prod_{+} p(v > -\boldsymbol{\gamma}'\mathbf{z}) p(u > -\boldsymbol{\beta}'\mathbf{x}) g(y \mid u > -\boldsymbol{\beta}'\mathbf{x})$$.

By rearranging the terms within the previous expression we finally have:

(8)
$$L_{DHSS} = \prod_{NI} \left[1 - p(v > -\boldsymbol{\gamma}'\mathbf{z})\right] \prod_{I} p(v > -\boldsymbol{\gamma}'\mathbf{z}) \times$$
$$\times \left\{ \prod_{0I} \left[1 - p(u > -\boldsymbol{\beta}'\mathbf{x})\right] \prod_{+} p(u > -\boldsymbol{\beta}'\mathbf{x}) g(y \mid u > -\boldsymbol{\beta}'\mathbf{x}) \right\}$$.

The latter expression better shows how sample separation allows for articulating the estimation problem in likelihood function which composed of a probit estimation of the interest process (*NI* and *I* subscripts), and a standard Tobit equation for positive WTP and standard corner solutions (zero WTP of interested people). The estimation of model (8) is therefore nested into a more general double hurdle framework. In case of independent processes, the estimation procedure can be carried out separately: in a probit estimation of the interest process, and a standard Tobit equation for positive WTP and standard corner solutions. This is what we actually do in the next subsection.

An estimation strategy of the kind described above draws on studies such as Jones (1989) and Jones and Labeaga (2003), where the sample separation between participating and non participating zeros is derived from information on past habits of currently non smokers. Namely, current non smokers are divided between those who have never smoked (classified as non participants) and those who have smoked in the past but have already quitted at the moment of the interview (participants but non-consumers).

3.3. Estimation procedure

A major obstacle to a straightforward application of the framework described in equation (6) to our problem is that the double hurdle model is appropriate to represent situations where decisions are taken jointly, since its multiplicative probabilistic structure does not identify a uniquely defined sequence of decisions (e.g., Smith, 2002). On the contrary, the two-stage decision process of the respondents to our survey embeds a sequential structure where participation, determined by previous experience on LTC issues, preexists to the WTP statement. More precisely, we have a common initial interest process which is followed by two separate statements (one for each of the programs considered), and these statements are only observed in the sub-sample of the interested population. The way we exploit the additional information concerning interest is therefore modified with respect to standard double hurdle models and fits consistently with the nature of our CV exercise. In particular, interest for LTC coverage, represented by equation (1), is to be

related to two structural equations like (4), one for the private policy, and one for the public program. As a consequence, the nature of the relationship between participation and (stated) expenditures must be studied in two different cases. In turn, also the determinants of WTP within the subsample of interested respondents have to be studied under the two different institutional arrangements. In order to simplify the overall problem, we assume independence for the stochastic components of the processes that determine WTP for the private and public program in the sample of interested people.

We treat the interest process as a selectivity problem by means of Heckman's (1979) two-step estimation method. The use of the two-step procedure is justified on the grounds of the intrinsically sequential nature of the process under analysis: a first common interest process, then two different structural equations for public and private LTC insurance coverage. A two-stage Heckman's model for each of the two proposed solutions allows us to control for the potential selectivity imposed by the participation hurdle. If unobserved differences between the two groups are correlated with the relevant regressors, estimates run on the sub-sample of interested respondents would be biased.[13]

Heckman two-step procedure, which augments the WTP equation with a term (the inverse mills ratio (IMS)) aiming to capture the correlation between unobserved heterogeneity in the interest and the WTP equations, represents the estimation bias on the sub-sample as an omitted variable problem. This allows for using the significance of the IMS as an independence test, i.e. as a test for the possibility to separately estimate a probit participation equation for interest, and tobit-type equations for modelling the WTP in the private and public case. That is:

(9) $\text{Prob}(I_i = 1) = \Phi(\mathbf{z}_i'\boldsymbol{\gamma}),$

where $\Phi(\cdot)$ is the standard normal distribution function; and

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[13] As a consequence, it would be impossible to properly distinguish the effects of the relevant economic determinants discussed and presented in section 2 from those arising from the differences across the two groups in the sample.

(10a) $y_{iPR} = \max\left(0, \mathbf{x}'_{iPR}\boldsymbol{\beta}_{PR}\right),$

(10b) $y_{iPU} = \max\left(0, \mathbf{x}'_{iPU}\boldsymbol{\beta}_{PU}\right),$

where *PR* and *PU* refer respectively to privately provided and public insurance schemes.

4. Results

In this section we implement the analytical framework described above by estimating two selectivity models, one for the private and one for the public coverage. As already remarked, the first stage estimates are common to both models In the second stage, stated WTP in natural logs for the private and public programs respectively is regressed against the control variables listed in table 1. All specifications include also two sets of dummies controlling for the municipality of residence of the respondent and for the identity of the interviewer. This prevents unobservable systematic differences in local conditions, or in the way the interview was administered to influence the results. The empirical results are presented in Table 3.[14]

None of the estimated specifications present a significant coefficient for the inverse mills ratio and therefore we can take the participation and expenditure decisions as independent. Since lambda is never significant in the augmented specification of the consumption equation, selectivity is not an issue here. Such evidence suggests that studying the sub-sample of the interested will not lead to any bias in the determinants of stated preferences regarding WTP. This usually provides support to the idea of implementing OLS estimates on the sub-sample of the participant observations. However, in our set-up we still have to deal with corner solution observations, i.e. zero WTP declared by interested individuals. Consequently, we moved to the estimation of a probit equation for

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[14] Observations whose WTP exceeded sample average by more than four times the standard deviation were dropped in order to control for outliers. Due to missing information on family income, more 148 observations were dropped, leading to a total of 1257 interviews used for estimations.

the interest process as described in (1) and of two Tobit equations on the subsample of interested individuals for the private and public coverage. These estimates are presented and discussed in the following of the section.

The first part of Table 3 below presents the coefficients and t-statistics for the decision of whether or not to participate in the demand for LTC coverage estimated on the whole sample. The second and the fourth part present Tobit estimates for private and public WTP estimated on the subsample of the interested, and in this case also the marginal effects for each equations are reported.

The participation stage

The reported results suggest that interest in coverage is mostly induced by variables related to LTC conditions rather than to standard demographic and economic characteristics. In particular, neither respondent's age nor family income significantly influence the probability of being interested in the service. The coefficients for educational dummies display the expected increasing pattern, although differences with respect to the not educated class, chosen as base group, are significant only for respondents that have reached a university degree. Other variables controlling for family composition and for type of occupation do not show any significant effect.

Table 3: *Econometric results*

	(1) Interest (Probit)		(2) WTP Private (Tobit)			(3) WTP Public (Tobit)		
	Coeff. (std err)	t-stat	Coeff. (std err)	t-stat	Marg Eff (dy/dx)	Coeff. (std err)	t-stat	Marg Eff (dy/dx)
Age	-.002 (.006)	-0.28	-.028** (.012)	-2.24	-.025	.011 (.009)	1.23	.011
Male	.020 (.112)	0.18	.173 (.230)	0.75	.153	.464*** (.166)	2.80	.454
University degree	.848** (.401)	2.11	1.321 (.956)	1.38	1.205	1.438** (.680)	2.11	1.418
Secondary school	.520 (.372)	1.40	1.471 (.926)	1.59	1.312	1.377** (.658)	2.09	1.350
Compulsory education	.404 (.359)	1.13	1.321 (.914)	1.44	1.179	1.371** (.650)	2.11	1.343
Log of Income	-.156 (.122)	-1.28	1.352*** (.249)	5.44	1.199	.897*** (.179)	5.02	.879
Blue Collar	-.163 (.179)	-0.91	-.474 (.374)	-1.27	-.418	-.303 (.273)	-1.11	-.296
White Collar	-.115 (.163)	-0.71	-.410 (.316)	-1.30	-.361	.091 (.230)	0.39	.089
Other	-.025 (.372)	-0.07	-.288 (.750)	-0.38	-.253	210 (.551)	0.38	.206
Retired	-.306* (.181)	-1.69	-.296 (.378)	-0.78	-.261	-.0995 (.272)	-0.37	-.097
Not Working	-.073 (.202)	-0.36	-.632 (.400)	-1.58	-.550	-.423 (.291)	-1.46	-.413
Not good health	-.241** (.126)	-1.91	-.227 (.288)	-0.79	-.200	-.383* (.207)	-1.85	-.374
Chronic disease	-.149 (.134)	-1.11	-.625** (.297)	-2.11	-.546	-.612*** (.212)	-2.88	-.597
Subscriber of a private health insurance	.313** (.147)	2.13	.670*** (.262)	2.56	.602	-.077 (.192)	-0.40	-.075
State should pay basic LTC services to all	.374*** (.131)	2.86	.935*** (.292)	3.20	.828	-.020 (.209)	-0.10	-.020
State should pay basic LTC services only to the poor	.219 (.139)	1.57	.650** (.320)	2.03	.581	-.421* (.228)	-1.85	-.412
Negative opinion of existing LTC services	.359*** (.139)	2.58						
Presence of a disable in the family	.232* (.126)	1.84						
Constant	3.756** (1.596)	2.35	-5.566 (2.442)	-2.28		-2.928* (1.765)	-1.66	
Observations	1257		1006 (849 uncensored)			1006 (849 uncensored)		

*** 1% significance level
** 5% significance level
    * 10% significance level

Conversely, an influential impact are provided by variables indicating some aspects more directly related to LTC and health issues. For the latter, remark how self assessed bad health conditions in the year preceding the survey are associated with a significantly lower probability of being interested. The result may appear somewhat counterintuitive, since poor health status increases the expected utility of insurance. Nonetheless the evidence is consistent with the empirical literature on the demand for private LTC and private health insurance policies based on revealed preferences. In those cases, the result is usually attributed to the presence of (unobservable) supply-side constraints that limit the possibility for people in a health state to contract with insurers. This conjecture is not maintainable for our analysis – being based on stated preferences – and this suggest that also demand side explanations should be considered. For instance, one can think that ill-health individuals are interested more in health care rather than in LTC services; or that, in the *status quo*, they consider themselves entitled to free care.

A particularly important role is also played by the indicators that proxy the extent to which respondents are aware of the consequences of disability. We have argued in the previous section that these variables are expected to influence interest in coverage but not necessarily the WTP for a predefined program, whose degree of coverage does not change with the contribution. The respondent's judgements on the quality of existing social care services does influence interest but not WTP, neither in the public nor in the private solution. In particular, households who give a negative evaluation of existing LTC services are more interested in channelling additional resources in this area. In this perspective, we can conclude that the proposed programs are seen as instruments to improve the quality of existing LTC services, especially by citizens who perceive it as currently inadequate.[15] Variables capturing direct exposure to LTC issues such as having a disable person in the family are additional candidates to play the role of identifiers. Our results suggest that such indicator never proved to be significant in the WTP equation,

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[15] It is worth noting that neither the perceived quality of health care services nor considering health care as the first priority for new public expenditures significantly influence the probability of being interested.

whereas it is positively associated with the interest probability, although only at 10% of significance level. In light of the discussion in the previous section, we use both controls as identification variable, and we include them only in the first stage equation.

We finally observe that also indicators which broadly reflect political opinions affect the interest probability. That political opinions influence demand patterns has pointed out in the literature on demand for supplementary health insurance (Propper, 1993; Besley, Hall and Preston, 1999), and our results confirm these findings also for LTC. In particular, we consider respondent's opinion about the appropriate role of the public sector in LTC financing. The base case is represented by individuals who think that the state should provide free care to everybody independently of the income level, whilst the other categories include respondents whose favour progressively moves from universal to selective financing schemes. The results indicate that individuals who support a public intervention which ensures free care only for the basic services to everybody are more interested than those favouring universal provision for the entire scope of treatments. On the contrary, interest probability does not differ from this base case for respondents who agree with public intervention limited to means tested provision of basic services.

The willingness to pay stage

Interesting insights on the attitude towards LTC coverage can be derived from Tobit estimates for participating households. In particular, it is useful to check whether there are differences between the private and public case as well as to compare these results with the determinants of the interest process.

The most relevant difference between the decisions taken in the first and in the second stage comes from the income variable which, differently from the impact on the probability of being interested, has a strong influence on WTP both in private and public solution. More in detail, as can be noted by inspection of the marginal effects, private coverage emerges as a luxury (income elasticity above 1) while the public program is a normal good. In addition to a generic interpretation in terms of Engel curves, the result is consistent with

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the idea that public programs are perceived as intrinsically more redistributive than private ones. By taking as a benchmark the amount the respondent is willing to contribute, it is reasonable that a wealthy respondent expects citizens in the lower tail of the income distribution to be asked to contribute less than he or she does, and viceversa. On the contrary, private insurance premiums do not vary with income but only with (observable) risk factors, and therefore they seems to be relatively more attractive for high income groups because they do not impose a cross subsidisation in favour of the poor.

Demographic indicators such as age and sex affect in some cases the amount of the contribution whilst they had no role in determining interest. Again, differences between the private and public programs can be observed, with age being significant only in the former, and sex only in the latter case. The role of age deserves a particular attention since it signals a propensity by the younger generation to go private. The result can be rationalised in different ways. One can think of a general attitude that sees young people less oriented to attribute a central role to the public sector in the provision of welfare service.[16] Alternative explanations more specific to the problem analysed here are that young households may perceive the sustainability of a public program more uncertain than older people do, given the longer time horizon over which they are likely to need coverage. Moreover, thanks to their better than average health status, they would be likely to get relatively better contractual conditions in the private sector with respect to older people, by this way reinforcing their favour for private insurance.

Educational dummies are significant only in the public case and the coefficients are very similar to each other, suggesting that the only relevant difference is between people with no education (base case) and the rest of the population. Working status never influences the WTP, similarly to what happened in the first stage. Health conditions, measured either by self assessed health status or by the presence of chronic conditions, reduce willingness to contribute to

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[16] However, we expect that at least part of this generational effect, if present, is captured by the dummies reflecting political opinions.

both the private and the public program, similarly to what happened for interest probability. Coefficients in the two equations are pretty similar and chronic conditions reduce the contribution to a larger extent than what happens for poor self rated health. Since the former indicator better captures more serious conditions, the result supports the idea that the lower propensity for coverage derives from the belief of ill-health respondents of being entitled to free coverage in the status quo. It is also interesting to note that the presence of a health insurance policy increases the contribution for the private solution but not for the public one. The result indicates that the variable can be better interpreted as an indicator of preference for privately oriented solutions rather than as an indicator of a general propensity to cover health risks through insurance mechanisms.

Finally, we observe a significant effect of the dummies reflecting the role the respondents do attribute to the public sector in financing LTC services. The impact works in different directions for the private and public case. As far as the public solution is concerned, no significant difference emerges between those who would like the public sector to make the entire range of service freely available to everybody (base case) and those supporting free provision only of basic services. Consistently with expectations, respondents who support free care only for those who cannot afford to pay, want to contribute significantly less with respect to the base case when coverage is provided by the public sector. On the contrary, a significantly higher WTP with respect to the hypothesis of free care for everybody emerges in case of private coverage.

5. Conclusions

In this paper we have studied WTP for LTC coverage on the base of a survey carried out on a representative sample of the population of the Italian region Emilia Romagna. This analysis sheds light on some aspects which have become crucial in the political agenda of many countries, related in particular on the nature of consensus which programs for extending LTC coverage may receive by public opinions. Our descriptive results confirm that there are substantial shares of the population (around one third) that are not willing to contribute to such programs, either because they are not

interested in the service or because they think they cannot afford it. At the same time, the remaining part of the population seems to be ready to increase expenditures to an extent which could ensure a substantial increase of the present level of coverage.

The econometric analysis focuses on the determinants of WTP and consider two different coverage programs, one organised through private policies and one publicly financed. The availability of auxiliary information also allows us to split the sample of respondents between those who reject the proposal because they are not interested and the rest of the population. We estimates first two Heckman's selectivity models, one for the private and one for the public solution, in order to control for the potential selection induced by the interest. The independence results obtained allow for the possibility to present separate estimations for the participation process, which consider the whole sample, and for the amount of expenditures, which only include interested respondents.

The empirical results confirm the importance to separate the choice leading to the stated WTP in two steps since the variables that influence the probability of being interested in the service differ substantially from those that determine the amount of the contribution. The participation decision is mainly determined by indicators related to previous experience with LTC, whereas socio-economic variables are more influential on the decision of how much to spend in coverage. This challenges the possibility to foster the subscription to voluntary programs simply by means of financial subsidies.

A second relevant issue highlighted in the paper is the difference between the public and the private solution in the second stage decision. The income variable, which did not influence the interest probability, is particularly interesting in this perspective and plays a relevant role for both solutions, but with different patterns. The estimated coefficients reveal a higher effect for the private scheme, which emerges as luxury good, whereas the public solution is more clearly defined as a (weak) "necessity". The likely presence of an "aversion to redistribution" effect is a challenging aspect for future theoretical and empirical investigations. Also the higher WTP by

youngest respondents for private programs is an interesting result which advocates for future better comprehension.

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