Public vs private demand for covering long term care expenditures

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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, one compulsory and financed out through general taxes, the other 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 from disinterest. We estimate 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 and 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.

1. Introduction

The financial consequences of ageing are among the most debated issues in health economics nowadays. A large number of studies tries 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). 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). Despite a persistent degree of uncertainty (Hancock *et al*., 2003), it is however 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 it is considered 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

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often exposed to a high expenditure risk. Several theoretical arguments have been proposed as possible explanations.[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. 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 happens, for instance, when myopic behaviour leads individuals at early stage of life to underestimate risk and consequences of disabilities, or if they strategically choose sub-optimal level of coverage because they rely on last resort public intervention.

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, in which 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 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, 1998; Mangle *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 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

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

(WTP) for a hypothetical program covering LTC expenditures, aimed at topping up those interventions already ensured by the public sector. We use 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 makes 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 (economic and non-economic) by way of a two step modelling of WTP. We first identify the process that leads to the inclusion of LTC coverage in respondents' choice sets, and then study the determinants of WTP on the sub-sample of interested individuals.

Our analysis is relevant under 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 that favour the diffusion of private covers. Secondly, studying the determinants of demand for LTC coverage ensures a better understanding of the welfare implications of potential reform interventions. Finally, given the existence of alternative policy options open to the policymaker, it is useful to acquire evidence on how different institutional solutions are 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 that 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 where the choice is between competing alternatives.

Our 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 that 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]

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[2] Among the elements that may induce respondents not even to take the perspective of insuring against LTC risk into consideration we can include lack of adequate prior information or cognitive difficulties in evaluating the problem but also a strong ethical commitment in favour of family caregiving.
[3] For surveys of this literature see Diener, O'Brien and Gafni (1998), Klose (1999) and Hanley, Ryan and Wright (2003).

More recently, analyses based on hypothetical markets have also been used to study several 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 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, selected taking into account size, demographic composition and actual supply of elderly care. Then, families were randomly drawn from municipal archives according to two characteristics that are a priori expected to influence the demand for LTC coverage such as family size and head of the household age.[4]

3.1. 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]

[4] Three classes were considered for each feature. Family size included 1, 2, 3 or more components, whereas age classes ranged from 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. Reported monetary costs are consistent with current out-of-pocket expenditures for this kind of LTC services in Italy. For our study, that focus on the ex-ante choice of insurance cover, 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.

Two different types of coverage are proposed for the same hypothetical scenario. A first one where coverage is provided by the public sector to the whole population and financed through a 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, that currently takes different forms, ranging from in-kind to cash subsidies, but is considered largely 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, if no coverage 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 confront 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 utility from coverage. This effect is reinforced if children live in the household and if the spouse is female.

Also for health related variables conflicting effects can take place. In principle, poor health increases expenditure risk and consequently also the benefits from insurance but 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 and, given the different distributive implications of the two system of provision that we consider, a different impact between the public and private solution can be expected as well. 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

roles 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.

3.2. 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.

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

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. We also include variables expression of respondent's socio-demographic conditions such as age, sex, and dummies for education and working position, while the health state is proxied by self-assessed health status and by the presence of one or more chronic diseases.[6] An additional set of

[6] Respondents could rate their health state on a scale going from 1 (excellent) to 5 (very bad). The dummy variable employed here separates individuals with condition ranging from 3 to 5 from the rest of the population.

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dummies is included to capture respondent's judgement on the perceived quality of health and social services.[7] We also introduce dummies aimed at capturing respondent's awareness of the medical and financial impact of disability, such as having a disable person in the family. Finally, we include respondent's opinion on the appropriate role of the public sector in financing LTC, considering financial interventions going from universal (the base case considers that the State should pay for the entire scope of LTC services for everyone) to 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.

Our 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.[8]

Table 2

Table 2 reports mean and median WTP for the private and public solution, including first the entire sample and then only observations displaying a strictly positive WTP. The last section of the table accounts for 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, we have 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.

[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.

[8] 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 the offer can be withdrawn also because the present level of income or of other individual variables induces the potential consumer to prefer alternative forms of consumption. Auxiliary information available in the dataset allows to identify non interested households within the group of respondents with WTP equal to zero for both options.

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 for a particular good (also referred to as preference heterogeneity or abstention). Neither the first nor the second issue play a major role here.[9] On the contrary, the distinction between the last two sources of zeros is central to our analysis. Given the nature of the decision process that we analyse, we claim that statements of zero WTP arise here either from disinterest or from standard corner solutions. 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 induce them to divert available resources to different type of 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 that 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 to achieve unbiased and/or more efficient estimates for the parameters, but also because rather different economic and non-economic factors are expected to influence the two processes. The importance of this distinction mainly relies in 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 consumption patterns.

The distinction has substantial effects also in terms of policy prescriptions. For instance, subsidies which favor the diffusion of private policies 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 are currently staying out of the market because of budget considerations. Relevant implications emerge in a public choice perspective as well. Interested households with zero WTP are *de facto* asking for exemption from the

[9] 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,

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 may induce these groups to support the program, rather than opposing it as suggested by their zero WTP.

There are specific behavioural motivations that 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[10]. 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.[11]

We argue that interest is mainly driven by the awareness of the relevance of the topic achieved thanks to prior life experience, whereas the subsequent decision of how much to contribute to the private and public programs is more influenced by economic conditions, together with general attitudes about the way social services should be financed. Factors like health status, age, education or personal experience of LTC cases are expected to play a role in making household interested in the service. One also expects some of these variables that potentially influence participation to be important determinants of how much to pay for the two types of coverage. Such eventuality prevents them from being good statistical 'identification variables' for the first process. 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 better information on the consequences of disability. Nonetheless, they do not necessarily influence the amount of money individuals are willing to pay, since in our hypothetical exercise the insurance package is defined in advance and coverage does not vary with the amount of the contribution.

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since our exercise is based on open ended questions.

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

[11] 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.

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, whereas the second group includes those who, despite being interested, 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 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) $$y_i = \begin{cases} y_i^*, & \text{iff} \quad \mathbf{x}_i^{'}\boldsymbol{\beta} > u_i \\ 0, & \text{otherwise} \end{cases}.$$

In terms of observed data, a positive WTP identifies the price that 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 and respondents with WTP equal to zero fail either the first hurdle (non-interested group) or the second one (interested but not willing to contribute). In case no information is available for separating interested and non interested zeros and the only observed difference in the data is between zeros and positive values, a general specification for the likelihood would be given by the double hurdle model with dependence (e.g. Jones, 1989).

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(5)
$$L_{DHD} = \prod_0 \left[1 - p(v > -\boldsymbol{\gamma}'\mathbf{z})p(u > -\boldsymbol{\beta}'\mathbf{x} \mid v > -\boldsymbol{\gamma}'\mathbf{z})\right] \times \\ \times \prod_+ p(v > -\boldsymbol{\gamma}'\mathbf{z})p(u > -\boldsymbol{\beta}'\mathbf{x} \mid v > -\boldsymbol{\gamma}'\mathbf{z})g(y \mid u > -\boldsymbol{\beta}'\mathbf{x}, v > -\boldsymbol{\gamma}'\mathbf{z})$$

where *p* and *g* respectively are probability distribution and density functions. Such likelihood requires the estimation of bivariate normal distributions and density functions. This computational difficulty is 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 supplementary information that allows to identify non interested respondents within the group of those with zero WTP for both programs. 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 also between interested and not interested individuals. By rearranging terms within the previous expression we finally have:

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

where *0NI* and *0I r*espectively are the “zero non interested” and “and zero interested observations. In case of independence processes,sample separation allows for articulating the estimation problem in a probit estimation of the interest process, and a standard Tobit equation for positive WTP and standard corner solutions (zero WTP of interested people). In other words the estimation of model (6) is nested into a more general double hurdle framework when using sample separation information.

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 past habits of currently non smokers. 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 jointly taken decisions, since its multiplicative probabilistic structure does not identify a uniquely defined sequence of decisions (Smith 2002). On the contrary, our two-step decision process embeds a sequential structure where

[12] The independence assumption (e.g Atkinson, Gomulka and Stern, 1990) leads to what is usually referred to as Cragg’s model. Cragg (1971) two stage model of consumption was motivated by the need to overcome the

participation, determined by previous experience on LTC issues, precedes the WTP statement. More precisely, we have a common initial interest process that is followed by two separate statements one for each of the programs considered and such statements are observed only 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 has to be studied under the two different institutional arrangements. In order to simplify the overall problem, we assume independence for the processes that determine WTP for the private and public program in the sample of interested people.

To summarise, we model the decision process as a double censoring problem. The first censoring comes from the participation hurdle, so that being interested in the coverage is a prerequisite for observing at the second stage either a positive WTP or a zero value resulting from a corner solution.

i. 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. We first estimate a common interest process, and then test for independence on two different structural equations for public and private LTC insurance coverage.

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ii. The significance of the inverse Mill's ratio (IMS) is used 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, i.e.:

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

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

(8a) $$y_{i\,PR} = \max(0, \mathbf{x}'_{i\,PR} \boldsymbol{\beta}_{PR}),$$

(8b) $$y_{i\,PU} = \max(0, \mathbf{x}'_{i\,PU} \boldsymbol{\beta}_{PU}),$$

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

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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.

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. The first stage estimates are common to both models and the dependent variable equals 1 for interested and 0 for non interested respondents. 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.[13] We have first estimated a two-stage Heckman's model for each of the two proposed solutions in order 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.[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. The result would usually provide 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 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.

INSERT TABLE 3 HERE

The first part of Table 3 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

[13] 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 148 more observations were dropped, leading to a total of 1257 interviews used for estimations.

[14] 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. Heckman two-step procedure, which augments the WTP equation with a term (the inverse mills ratio) aiming to capture the correlation between unobserved heterogeneity in the interest and the WTP equations, and intuitively represent the estimation bias on the sub-sample as an omitted variable problem.

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

Our empirical 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

Conversely, an influential impact is provided by controls for a variety of aspects more directly related to health and LTC issues. 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 appropriate for our analysis 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.

Covariates affecting the interest probability include also indicators that broadly reflect political opinions The literature on demand for supplementary health insurance has pointed out that political opinions influence demand patterns (Propper, 1993; Besley, Hall and Preston, 1999) and our results confirm these findings also for LTC. In particular, we consider respondent's opinion on the appropriate role of the public sector in LTC financing. The base case is represented by individuals who think that the State should provide care free care to everybody independently from the level of income, 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 between this base case and respondents who agree with public intervention limited to means tested provision of basic services.

A particularly important role is played by the indicators that proxy the extent to which the respondent is 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. 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).

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

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 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, that has a strong influence on WTP both in private and public solution, whereas it did not have a significant impact on the probability of being interested. In addition to it, 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 emerges as a normal good. The result is consistent with the idea that public programs are perceived as intrinsically more redistributive than private ones. Taking as a benchmark the amount he 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 does, and viceversa. On the contrary, insurance premia do not vary with income

[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.

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, we record differences between the private and public programs, 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 of 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 to the public sector a central role in the provision of welfare service. Nonetheless we expect that at least part of this generational effect, if present, is captured by the dummies reflecting political opinions. 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 average health status, they are likely to get relatively better contractual conditions in the private sector with respect to older people with the consequence of reinforcing their favour for private insurance.

Educational dummies are significant only in the public case and the coefficients are very similar to each others, 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 both to the private and to the public program, similarly to what happened for interest. 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 attribute to the public sector in financing LTC services. The impact acts 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 if 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. Our analysis sheds light on some aspects which have become crucial in the political agenda of many countries, related in particular on nature of consensus that programs for extending LTC coverage may receive from 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 that 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 allows also 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 results of the inverse mills ratio allow for the possibility to present separate estimations for the participation process, that consider the whole sample, and for the amount of expenditures, that include only 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. 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, that did not influence the interest probability, is particularly interesting in this perspective and plays a relevant role for both solutions. Nonetheless, the estimated coefficients reveal a higher effect for the private scheme that emerges as luxury good, whereas the public solution is more clearly defined as a (weak) "necessity".

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	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

	***(1)* Interest (Probit)**		***(2)* WTP Private (Tobit)**			***(3)* WTP Public (Tobit)**		
	Coeff. *(std err)*	t-statistic	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

Table 3