

# Conducta individual, assegurament i elecció col·lectiva: una aplicació a la política sanitària

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# **Conducta individual, Assegurament i Elecció Col·lectiva : una Aplicació a la Política Sanitària**

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Doctorat en Economia  
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*"No, cal que neguis! Sense negació no hi ha crítica. I què seria de les revistes sense crítica? Sense crítica només hi hauria hosanna .Però, per viure, no n'hi ha prou amb l'hosanna; cal que aquest hosanna passi pel dressol del dubte."*

Fiodor Dostoiesvski. *Els Germans Karamàzov*.

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*Als pares, la Núria i a la Montse*



## Agraïments

Aquesta tesi doctoral tot i ser un treball acotat, és el fruit d'un procés de recerca que de segur continuarà en un futur proper. En aquest procés hi ha participat un conjunt de persones que ha permès que tot surti una mica millor. Aquestes paraules pretenen ser una mostra d'agraïment i reconeixement a tots aquells que ha participat en aquesta tasca.

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Finalment remarcar, que l'autor és l'únic responsable de les possibles errades i mancances del treball.

**Joan Costa i Font**

*Barcelona / Torrentbò, Setembre 1999*

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## **Primera Part.**

Una introducció a l'estudi de la  
racionalitat de la conducta,  
l'assegurament i l'elecció  
col·lectiva en sanitat.





*"Market economies and their institutions are different from the way they would be if everyone were completely rational. How economists react to this? Let me suggest what I think is the wrong answer: Once, after a talk I gave at a meeting of economists I was asked a question by a member of the audience, a respected macroeconomist. He said, if I take what you say seriously, what am I supposed to do? I only know now how to solve optimisation problems!"*

R.H Thaler (1991). *Quasi rational economics*. The Russel Sage Foundation.



# **Capítol I.**

## **Introducció**



Aquest capítol introductori s'atribueix a un triple objectiu. En primer lloc, pretén presentar breument els objectius i la justificació del treball, la metodologia utilitzada en què es defineixen les línies bàsiques de l'estructura de la tesi, així com les fonts estadístiques utilitzades, i el marc teòric. En segon lloc, es presenta una introducció a l'estudi de la racionalitat, i es concreta la idea de racionalitat que unifica les diferents parts d'aquesta tesi. Finalment, es realitza un resum de cada capítol en què s'inclou una breu introducció, l'objectiu, el marc teòric els instruments utilitzats, i finalment s'avancen els principals resultats del treball.

## **I.1 Objectius i justificació**

### **I.1.1 Objectius**

*L'objectiu d'aquesta tesi és investigar la concepció de racionalitat que guia algunes decisions individuals envers la conducta sanitària, les necessitats actuals i futures de prestacions sanitàries, així com les decisions col·lectives respecte a l'establiment de prioritats sobre programes sanitaris.*

Amb aquesta finalitat, en la taula I.1 s'expressa sintèticament les diferents preguntes i conceptes clau de cada capítol. Així, (1) es proposa un marc teòric a partir del qual poder analitzar la conducta sanitària, i en particular la racionalitat de la mateixa a partir de la adequació entre les percepcions de risc de les malalties associades al tabac i el consum de tabac. (2) Es planteja una explicació teòrica de la decisió d'assegurar privadament l'assistència sanitària i sociosanitària per malalties cròniques i agudes. (3) Finalment s'estudia un mecanisme d'elecció col·lectiva així com un mètode de revelació de preferències sobre els programes sanitaris en un escenari d'elecció relatiu al sistema sanitari.

Taula I.1 Objectius de la tesi

	Objectiu	Relació	Termes de referència
Segona part . Risc sanitari i conducta	Capítol II	Decisió racional i conducta davant el risc	Inversió en salut Addició Dissonància cognitiva Aprenentatge bayesià
	Capítol III	Quina és el paper dels risc i la informació sobre la decisió de fumar?	
Tercera part. Cobertura de riscos de malalties agudes i cròniques	Capítol IV	Què determina la decisió d'assegurar-se per malalties agudes quan hi ha un assegurador públic?	Decisió en presència de risc Opinió del sistema sanitari Captivitat
	Capítol V	Quin és el paper de les percepcions de risc de discapacitat en la decisió d'assegurar privatament la discapacitat (associada a malalties cròniques )?	Assegurament a llarg termini Decisió amb incertesa Percepcions de risc per discapacitat
	Capítol VI	Quina és la valoració de prestacions de l'assegurament per discapacitat?	Disposició a pagar Percepció de risc de discapacitat
Quarta part. Elecció col·lectiva i sistema sanitari	Capítol VII	Com revelar les preferències entre programes sanitaris que el sistema pot oferir?	Valoració contingent Disposició a assignar Valoracions hedòniques
	Capítol VIII	Quina és la idea de racionalitat subjacent en els mecanismes de valoració contingent?	Validesa teòrica Fiabilitat Preferència raonada

## I.1 2 Justificació

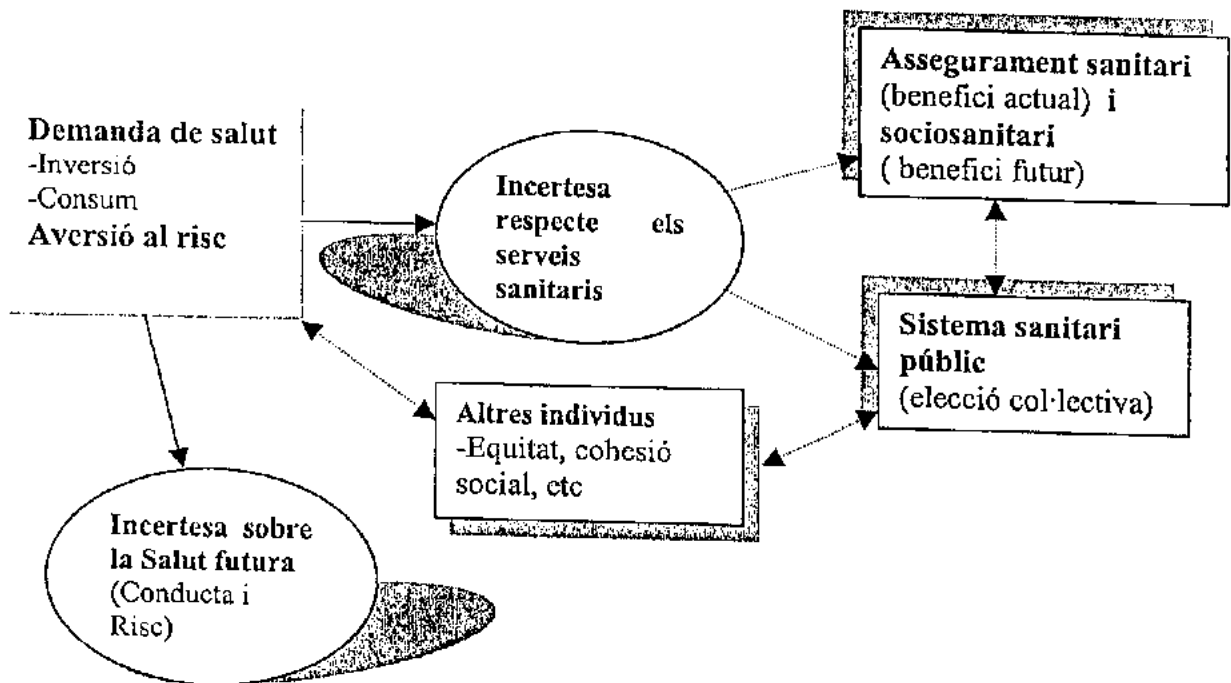
L'elecció del camp d'investigació respon tant a la seva *rellevància teòrica* com a la *oportunitat del tema*. L'economia de la salut constitueix un camp de recerca *sui generis* el qual en molts aspectes s'allunya del paradigma convencional de l'anàlisi econòmica (Blaug, 1998)<sup>i</sup>. L'investigador en aquest cas s'ha d'enfrontar amb decisions individuals de conducta en què el paper del risc o la cobertura sanitària percebuda esdevenen variables tan rellevants com el preu o la renda, d'aquí que la recerca en aquesta àrea sigui teòricament molt atractiva. No obstant això, algunes de les problemàtiques que afecten també altres sectors d'activitat, hi són presents també en l'àmbit de la sanitat (vegeu Ortún, 1984), cosa que converteix també aquesta àrea en especialment interessant des d'una perspectiva aplicada. Des d'una perspectiva teòrica, la motivació de la tesi ha estat la d'estudiar la racionalitat d'algunes decisions que estan associades a la sanitat. Les tres grans àrees sobre les que es pretén fer una aportació són els següents : a) la conducta sanitària , b) l'assegurament sanitari i c) l'elecció col·lectiva en el marc del sistema sanitari (vegeu Figura I.1) Quant a l'oportunitat dels temes objecte d'investigació, és obvi que els aspectes que es tracten són objecte actual de debat en diversos àmbits. En particular s'estudia l'intervencionisme de les autoritats sanitàries en els hàbits no saludables, l'assegurança en el cas de les malalties agudes així com l'assegurament de la dependència, i finalment, la participació de la població en la presa de decisions sanitàries.

- a) **Conducta sanitària.** En el marc de la política sanitària es plantegen sovint polítiques que afecten la conducta del ciutadans, generalment per fomentar un estil de vida "saludable" i reduir d'aquesta manera els possibles riscos que afecten la salut de la població. Si bé podem acceptar que els individus tenen com a objectiu mantenir un bon estat de salut, aquest objectiu es contraposa en general amb d'altres, com ara els beneficis percebuts pels individus, derivats de beure alcohol o fumar. Aquesta discussió es particularitza en el cas de la política de regulació del tabac<sup>ii</sup>. Dins del marc de regulació esmentada, aquest treball pretén



investigar el paper de les percepcions de risc sobre determinades conductes sobre l'eficàcia de les campanyes d'informació sanitària .

Figura I.1 Conducta, assegurament i elecció col·lectiva en sanitat



b) L'assegurament sanitari. A Catalunya, així com en la majoria d'estats de l'OCDE hi ha un sistema sanitari públic <sup>iii</sup> que garanteix l'accés als serveis sanitaris a tota o gairebé tota la població (98,1 % a Catalunya, Enquesta de Salut de Catalunya). Les implicacions d'aquesta cobertura pública són, segons López Casasnoves (1997), "que davant d'una malaltia ningú pugui quedar sense una assistència mèdica que pugui ésser considerada essencial, o es vegi abocat a la pobresa per tal de pagar-la". Paral·lelament, però, es desenvolupa un mercat assegurador sanitari privat que dona una cobertura addicional a una part important de la població -un 22,74 % a Catalunya<sup>iv</sup>-. Acceptant, com a supòsit, que els agents que compren una cobertura addicional no són irracionals, en la segona part del treball es proposa com a objectiu determinar si hi ha una relació entre el desenvolupament de la cobertura pública i la decisió d'assegurament privat.

Per tant, s'investiga el paper que **exerceix l'actitud respecte al sistema nacional de salut sobre la decisió d'assegurar-se<sup>v</sup>**. Existeixen, a priori, raons per creure que la decisió d'assegurar-se està influenciada per alguns determinants associats a l'accés als serveis sanitaris públics, la qualitat de les seves prestacions, etc, els quals es reflexen en una actitud determinada respecte al SNS<sup>vi</sup>. L'actualitat del capítol rau en la discussió sobre el paper de l'assegurament privat quan hi ha un sistema sanitari públic<sup>vii</sup>. Aquesta ha estat la perspectiva a partir de la qual s'ha escrit el capítol IV.

No obstant això, mentre que el mercat assegurador de malalties agudes es troba molt desenvolupat a Catalunya (vegeu capítol IV), aquest no és el cas de l'assegurament de les prestacions derivades de malalties cròniques, que asseguren a l'individu per les prestacions generalment associades a una situació de dependència. Aquestes prestacions sanitàries són consumides normalment en edats avançades, i no semblen estar completament cobertes pels mecanismes de previsió social (IMERSO, 1995)<sup>viii</sup>. Un dels aspectes de discussió en aquest sentit es refereix a la problemàtica de determinar la manera de cobrir aquestes malalties<sup>ix</sup>. En el marc d'aquesta qüestió resulta primordial preguntar-se per què el mercat no dóna cobertura per a aquestes prestacions. Aquí, no es pretén fer una anàlisi dels possibles mecanismes de cobertura<sup>x</sup>, sinó analitzar alguns determinants que hipotèticament explicarien la manca de cobertura privada<sup>xi</sup>. Tot i així, en aquesta part de la tesi (capítols V i VI) es proposa investigar els determinants de la compra d'una assegurança per discapacitat en un context hipotètic, atès que no existeix un mercat ni la informació suficient sobre els quals realitzar una anàlisi acurada de la qüestió.

c) **Elecció col·lectiva en el marc del sistema sanitari.** Fins fa molts pocs anys, el desenvolupament de la planificació sanitària evidenciava greus mancances de participació pública en la presa de decisions relatives al sistema sanitari. Actualment, però, aquesta situació ha mostrat alguns canvis. A Catalunya hi ha alguns mecanismes de participació, tot i que sensiblement febles, regulats en la seva majoria per la Llei d'ordenació sanitària de Catalunya 15/1990 de 9 de juliol<sup>xii</sup>. No obstant això, el mateix Pla de salut de Catalunya reconeix que cal instrumentalitzar nous mecanismes de participació pública en aquest sector. Recentment, alguns economistes

de l'àmbit de la salut han estat desenvolupat instruments per tal d'obtenir preferències socials per programes sanitaris a partir dels mètodes estàndards de valoració contingent (com a ara la disponibilitat a pagar). Malgrat tot, molts d'aquests no resulten directament aplicables en un context de decisió àmplia del sistema sanitari, on s'ha de valorar conjuntament un nombre considerable de programes i/o beneficis a vegades excloents. Així doncs, la tercera part d'aquest treball té com a objectiu desenvolupar un mecanisme d'elecció col·lectiva així com un instrument de valoració que es podria enmarcar dins de les tècniques de *valoració contingent*, amb el que es simula un mercat polític per revelar preferències socials per programes sanitaris que hipotèticament cal implementar en un futur. Aquesta ha estat la motivació de la tercera part de la tesi.

## I.2 Metodologia, Fonts i Estructura

### I.2.1 Metodologia

*"Theory plays an important role in determining the areas of investigation and setting the agenda for types of evidence to collect and study, but it is the accumulation of evidence that ultimately determines which assumptions survive and achieve broad professional support".*

**Paul M. Romer (1996).**

Aquestes paraules del Paul Romer expressen d'una manera molt precisa la metodologia que vol seguir aquesta tesi<sup>xiii</sup>. No obstant això, aquestes idees sobre el paper de la teoria no són innovadores, en el sentit que són compartides per bona part d'aquelles persones que es dediquen a l'estudi conscient de l'economia. Aquestes paraules tampoc pretenen ser una apologia d'una visió "empiricista" de l'economia, sinó, al contrari, són unes paraules dirigides a refermar el paper de la teoria, sempre acceptant que la seva validesa en darrer terme, no ve determinada per elegància formal que incorporen (Leontief, 1986)<sup>xiv</sup>, sino per la seva confirmació per mitjà de mètodes quantitativs acceptats, p.e els mètodes estadístics o econòmètrics.

Sense voler estendre's excessivament, s'ha proposat seguir una metodologia basada en una interrelació d'un conjunt de fases que es resumeixen en cinc: 1) la definició i la rellevància d'un tema, 2) la posterior revisió de la literatura, 3) la identificació del problema que s'ha d'analitzar, 4) el posterior tractament teòric i finalment 5) l'anàlisi emprírica quantitativa per tal de confirmar o rebutjar les hipòtesis inicials. Amb aquesta guia s'han escrit la pràctica totalitat dels capítols d'aquesta tesi, si bé en alguns casos s'ha posat més èmfasi en l'aparell teòric, mentre que en d'altres s'ha volgut destacar uns resultats emprírics.

### 1.2.2 Mètodes empírics i fonts estadístiques

L'anàlisi empírica ha fet imprescindible trobar les fonts, l'estudi dels instruments estadístics i econòmics adequats així com els programes informàtics apropiats. Ara bé, en molts casos no han estat disponibles les bases de dades necessàries per contrastar les hipòtesis del treball. En aquests casos, s'ha hagut d'obtenir mitjançant l'elaboració d'enquestes i/o exercicis d'experimentació (o simulació controlada)<sup>xv</sup>, d'introducció relativament recent i aplicació encara poc extesa en economia. El principal avantatge dels experiments, a més de poder replicar-se, és la seva flexibilitat pel que fa a la possibilitat de variar les condicions sota les que s'han realitzat, per tal d'avaluar la consistència amb el comportament de diversos models teòrics. Un dels instruments d'investigació utilitzats ha estat el *focus group*<sup>xvi</sup> relativament extès en altres àmbits de les ciències socials. Tot plegat, ha resultat en la realització de dues enquestes i diversos experiments amb sis grups diferenciats per característiques socioeconòmiques. Les enquestes han estat dissenyades expressament, i s'han validat previament. El treball de camp ha estat realitzat, en un primer cas, per INNER Research durant el 1997, per tal d'estudiar la percepció de risc i la conducta sanitària. En un segon cas, la realització el treball de camp s'ha encarregat al grup IRC durant els mesos de juny i juliol de 1999, per tal d'estudiar els determinants de l'assegurament a llarg termini, així com per estimar la disponibilitat a pagar per la cobertura dels riscos de dependència (*Long - Term Care*). Finalment, les bases de dades utilitzades han estat l'Enquesta de Salut de Catalunya (1994) i l'Enquesta d'Entitats d'Assegurança Lliure (1997) per analitzar els determinants de l'assegurament sanitari.

Les eines estadístiques i econòmiques utilitzades per tal de contrastar les hipòtesis del model teòrics han estat fonamentalment els models de variable dependent qualitativa. L'elecció d'aquestes eines respon a la seva adequació a estudis empírics on apareixen decisions discretes, així com per la flexibilitat per adaptar-se a diferents contextos d'elecció (Maddala (1983) , Greene (1993) ). Aquests models es deriven a partir d'unes lleugeres modificacions dels supòsits que basen l'elecció entre alternatives. Es tracta senzillament de variar la fonamentació de la teoria econòmica

des de supòsits deterministes a supòsits probabilístics (McFadden, (1981), Fry et al (1993) . No obstant això, també s'han utilitzat altres models empírics alternatius quan la variable que s'havia d'explicar no s'adaptava correctament a una elecció discreta. Finalment, l'anàlisi empírica de les dades obtingudes per mitjà de l'experimentació controlada<sup>xvii</sup>, atès el reduït nombre d'observacions, ha requerit la utilització d'instruments alternatius d'estadística multivariant.

### I.2.3 Estructura

Els principals trets que defineixen aquest treball es poden resumir en tres :

- 1) A diferència d'altres treballs de tesi , *aquest no pretén ser estrictament un treball monogràfic<sup>xviii</sup>*, sinó que sobre la base d'una idea àmplia de racionalitat, s'analitzen tres tipus de decisions que es consideren rellevants des del punt de vista de la política sanitària. Aquesta opció respon al fet que sovint no és possible -sense acotar molt el camp d'estudi - donar un tractament monogràfic adequat a una qüestió tant àmplia, com és la racionalitat de la conducta humana.
- 2) En cada capítol es combinen els fonaments teòrics, generalment associats a un escenari de decisió, amb una aplicació empírica i una discussió sobre les implicacions que els seus resultats poden tenir per a la política sanitària. Les conclusions del capítol es van acumulant des de l'inici del capítol fins al final de la tesi, de manera que es plantegen sovint conclusions intermèdies.
- 3) El fet que els temes de tots el capítols hi hagi una component d'elecció - fumar , assegurar-se o l'establiment de prioritats entre programes sanitaris - no es casual. La idea latent d'aquest treball és la de l'exploració del concepte de *racionalitat<sup>xix</sup>* (vegeu l'apartat I.4). Amb aquest objectiu s'han seleccionat diverses discussions teòriques, obertes a noves aportacions, on l'eix central d'anàlisi rau en els determinants del procés d'elecció, així com en les seves implicacions d'aquest per al disseny de la política sanitària.

### 1.3 El marc teòric

#### 1.3.1 Conducta i risc

El marc teòric proposat per aquesta part de la tesi ha estat la *teoria de la decisió en presència de risc*, els trets bàsics del procés de decisió són els següents :

Es pren com a punt de referència un individu "racional" (vegeu 1.4) – segons la hipòtesi d'adequació de la conducta a les percepcions de risc – que suposadament, cada dia pren decisions que tenen associades un determinat nivell de risc, p.e decideix si fumar-se una cigarreta<sup>xx</sup>. Generalitzant, podem suposar que les diferents accions individuals (o conductes) es poden representar com  $A \in (A_1, \dots, A_n)$ , les quals presenten unes conseqüències probabilístiques conegudes  $C \in (C_1, \dots, C_n)$ . Així, podem representar  $(A_1, C_1)$  com una alternativa en la qual l'individu adopta una conducta, la qual té associada una conseqüència, p.e un augment del risc de tenir una malaltia. En el cas de fumar ( $A_1$ ), la conseqüència pot ser patir càncer de pulmó ( $C_1$ ), amb una probabilitat  $\pi$  o alternativament  $(A_1, C_2)$  mantenir-se sa ( $C_2$ ) amb una probabilitat  $(1-\pi)$ . Un supòsit obvi del model és que la utilitat d'estar sa és superior a la utilitat de patir un càncer de pulmó  $V_1(A_1, C_2) > V_2(A_1, C_1)$ , és a dir que la millora de la salut augmenta (ceteris paribus) la utilitat de l'individu.

Tenint en compte una formulació basada en un model d'utilitat esperada - von Neumann-Morgenstern -, es pot suposar que l'individu presenta unes preferències sobre les conseqüències de les seves accions, així com unes preferències derivades sobre les accions. Assumint que les accions responen a un procés discret, fumar o no fumar, fer esport o no, etc, i que els individus són capaços d'assignar una probabilitat subjectiva (creences) a cada conseqüència  $(\pi_c)^{xxi}$ , llavors, l'individu realitzarà aquella acció que maximitza la utilitat esperada de cada conducta  $U(A)$ , és a dir la decisió final s'obtindrà de (maximitzar):

$$U(A_i) = \sum_{C_{1,2}}^n \pi_C V_{1,2}(C_{1,2}) \quad (I.1)$$

per tant, la utilitat d' adoptar una determinada acció, d'acord amb (I.1), està determinada per la utilitat de cada conseqüència ponderada per la seva probabilitat, en relació amb la utilitat d'altres accions. En aquest cas la pregunta que cal respondre es la següent :És l'individu racional quan assumeix riscos que afecten el seu estat de salut? La racionalitat predita en aquest cas implicaria acceptar la possible racionalitat de l'habit tabacari, si l'individu valora més el benefici de fumar que la probabilitat d'enmalaltir. En conseqüència, a majors nivells de risc percebut (si l'esmentada conducta presenta conseqüències negatives per a l'estat de salut) la conducta observada envers a la salut hauria d'estar associada a una conducta més saludable.

### 1.3.2 Elecció de l'assegurament privat

El marc teòric es situa en la *teoria del risc i l'assegurança*, i en particular en el model d'utilitat esperada. Si bé, la teoria de la utilitat no esperada ha suposat un avenç en l'anàlisi de la decisió racional, no sembla haver millorat molt la teoria de l'assegurament (Machina, 1995). Suposem, per tant, que els individus són capaços de realitzar uns judicis de probabilitat sobre els possibles guanys o pèrdues derivats de les conseqüències d'assegurar-se o no, i d'aquí escullen el nivell de cobertura que maximitza el valor esperat de cada alternativa. Si designem  $L$  com el cost dels serveis sanitaris privats i  $\pi$  com la probabilitat de necessitar-los, llavors si l'individu es manté sa, el seu nivell de renda serà  $Y$ , mentre que si l'individu cau malalt la seva renda serà  $Y - L$ . Si l'individu s'assegura, llavors assumint que no hi ha costos de transacció i que el nivell de cobertura és total<sup>xvii</sup>, la prima a pagar serà igual als costos esperats dels serveis sanitaris privats  $P = \pi L$ . Així, la decisió d'assegurar-se es deriva de la comparació de la utilitat esperada d'ambdues alternatives:

$$\begin{aligned} UE_{no\ assegura} &= \pi U(Y) + (1 - \pi)U(Y - L) \\ UE_{assegura} &= U(Y - P) \end{aligned} \quad (I.2)$$



La prima, no obstant, es modificarà per la presència de selecció adversa o per l'acció del *cream skimming* (quan el risc de malaltia entre individus és diferent) o risc moral (quan el fet d'assegurar-se modifica la probabilitat de patir una malaltia). Tanmateix, en aquest treball es proposa un determinant addicional en la presència d'un sistema nacional de salut, en aquest cas la seva actitud pot determinar la decisió d'assegurar-se privatament (veure capítol IV).

Les preguntes que cal respondre són: per què la població demanda assegurament sanitari privat quan hi ha un proveïdor públic? Quin és el paper de les percepcions de risc de discapacitat per explicar la manca d'assegurament sanitari per malalties cròniques, generalment a rebre en una edat avançada? Quins són els determinants de la demanda de prestacions sociosanitàries a llarg termini?

### 1.3.3 Mecanismes d'elecció col·lectiva

El marc teòric en aquest cas és el de *l'economia del benestar i la teoria de la decisió*. Parteix del concepte de funció d'avaluació social, una representació numèrica dels judicis de benestar de diferents alternatives d'elecció en el marc del sistema sanitari (Brekke, 1996). Considerem una societat dividida en grups socials  $I = (1, \dots, n)$  i un conjunt de programes sanitaris  $Y = (Y_1, \dots, Y_n)$  que responen a diferents dimensions de benefici  $X = (X_1, \dots, X_n) \in R^n$ , de tal manera que cada programa es contempla com una transformació monòtona d'aquests beneficis  $Y(X)$ . En aquest cas, es proposa un mecanisme d'elecció col·lectiva en dues fases, una primera que pretén identificar els beneficis del SNS; i una segona fase en què s'hi assignen valoracions i s'agregen segons una regla consensuada, de tal manera que el resultat final és una ordenació dels programes i beneficis del sistema sanitari. La funció de valoració social ens informa dels judicis de bestar que fa tot individu sobre el mateix punt de referència, la col·lectivitat social. Així l'agregació de tots els judicis serà una funció com (I.3).

$$V_i(Y(X)) = W^j(v^j(X_1), \dots, v^j(X_n)) \quad (I.3)$$

Es pretén respondre a les preguntes següents: és possible un sistema d'elecció col·lectiva per tal de guiar un procés de reforma sanitària? Quin/s instrument/s ens permet/en identificar les preferències dels ciutadans sobre els beneficis del sistema sanitari? Quines són les limitacions dels mètodes de valoració contingent per tal d'identificar preferències socials?.

## I. 4 Racionalitat : noves perspectives i aplicacions

### I.4.1 Racionalitat i limitacions racionals

Els individus diàriament s'enfronten amb la necessitat de decidir. Aquestes decisions poden ser des de decisions simples de conducta – p.e fumar una cigarreta – fins a decisions complexes que requereixen una anàlisi intertemporal de les necessitats personals o familiars – com ara assegurar les necessitats futures de prestacions sanitàries-. Així mateix, els grups tenen la necessitat de prendre decisions col·lectives, les quals en el marc d'una societat democràtica, es formen per mitjà partir de la participació individual a través de mecanismes d'elecció directa o indirecta. Les decisions sovint es prenen per delegació, de manera que l'elecció és una forma de control indirecte de les decisions.

El que es predica de les decisions humanes és que, o són, o haurien de ser racionals, per tal de ser útils per a la presa de decisions. No obstant això, prèviament cal determinar allò que s'entén per una decisió racional. Aquesta no és una pregunta amb una resposta unívoca, sinó que per contra presentar molta controvèrsia, de fet és un dels eixos de la teoria de la decisió. La racionalitat, segons una concepció positiva associada a la teoria microeconòmica convencional equival a la idea de *consistència d'unes preferències revelades amb la conducta de l'individu en el mercat* (Mas Colell i Whinston, 1995). La discussió llavors es situa en l'anàlisi en l'acompliment dels requisits de consistència interna en un ambient de certesa – o dels axiomes de la teoria de la utilitat esperada quan les decisions s'han de prendre en presència d'incertesa-. En un context de certesa, l'existència d'un ordre de preferències consistent requereix que aquestes preferències siguin complertes, transitives i monòtones.

En un escenari d'incertesa, els axiomes de la utilitat esperada demanden també uns requisits de completitud, transitivitat, independència i finalment un darrer requisit de finitud de les probabilitats. Finalment, quan s'assumeix que les probabilitats d'un

fet incert no responen a quelcom objectiu, seguint a Savage (1954), aquestes llavors s'aumeix que es poden representar les creences sobre fets incerts, en termes de probabilitats subjectives. En aquest darrer cas, s'han d'acomplir els requisits de completitud, la transitivitat i s'afegeix el supòsit que no hi ha cap fet menys probable que el zero. Un cop definits els axiomes de consistència, es conceptualitzen les funcions de valor o d'utilitat, les quals descriuen el comportament de l' "*homo economicus*" com si aquest maximitzés una hipotètica funció objectiu.

La idea de racionalitat descrita, estableix que per a un consumidor racional tota decisió respón a un càlcul de beneficis i costos en tota la seva conducta (Becker, 1976). No obstant això, des d'altres àmbits teòrics de l'economia, així com des d'altres ciències socials - les quals es preocupen d'analitzar el comportament humà - s'adopta una idea de racionalitat més àmplia, la qual sembla adaptar-se més acuradament a la realitat de la conducta independentment de la capacitat predictiva que es predica dels models de teoria microeconòmica convencional. El treball de Kahneman i Tversky (1979) ofereix una clara evidència d'aquest fet. En aquest treball, es mostra alguns biaxos i/o desviacions sistemàtiques respecte a la conducta que la teoria de la utilitat esperada considera racional. En particular, s'observa que (i) els individus valoren d'una forma asimètrica els guanys d'utilitat o beneficis, i els costos, (ii) *prefereixen un resultat cert sobre un resultat incert*, malgrat que la utilitat esperada de la segona alternativa sigui superior, i finalment (iii) davant de la decisió entre dues loteries *els individus es guien per la dimensió del resultat*, i per tant no a compleixen els axiomes de la utilitat esperada [Kahneman, Slovic i Tversky (1982)].

Estudis experimentals més recents, han aportat una evidència abundant sobre el fet que els individus valoren asimètricament els beneficis i els costos associats a les seves decisions, fins al punt que es pot assumir ja com una hipòtesi generalitzada. Aquest supòsit implica que els individus vulneren clarament alguns axiomes de la teoria convencional [vegeu Tversky, Kahneman i Knetsch (1986), Loomes i Taylor (1992)]. En particular, la transitivitat de les preferències no s'acompleix. Així, o bé els supòsits de consistència interna de la teoria convencional són insuficients per tal de

descriure la racionalitat de la conducta humana, o bé tal com afirma Camús (1951) "l'home no és prou intel·ligent per ser racional".

D'aquí que es plantegi la necessitat d'ampliar la noció de racionalitat per tal de donar cabuda a tot el seguit de possibles limitacions d'una noció teòrica restrictiva quan es compara amb la realitat. Amb aquest objectiu, Sen (1993) estableix que la idea de racionalitat, entesa sense considerar els factors externs, així com els gustos o creences rellevants per a la decisió, és inapropiada, en tant que és impossible establir unes condicions de consistència interna que funcionin invariablement. Sen (1993) estableix tres decisions en què la conducta individual seria racional tot i que violen els axiomes de consistència interna, en particular es fa referència a: (i) situacions en què l'individu té la llibertat de rebutjar determinades accions a favor d'una alternativa prominent, (ii) situacions d'elecció posicional, és a dir algunes decisions varien en funció del context en què es realitzen, i finalment quan (iii) les percepcions de "desitjabilitat" determinen la decisió, com a factors que influencien les decisions, i no sempre resulten de decisions "internament consistents".

Tanmateix, l'esmentada proposta d'ampliar la idea de racionalitat, és molt anterior a Sen (1993). En la taula 1.1 es resumeixen les principals aportacions a la idea de racionalitat. Concretament, si s'introdueixen la complexitat de les decisions, el paper del context de decisió a l'existència d'interaccions amb altres individus, el paper del procés de decisió, i l'aprenentatge, la funció de les regles socials així com la possibilitat que la conducta pugui guiar la preferència. Una d'aquestes aportacions, que sembla haver tingut molt pes és l'anomenada *racionalitat limitada* (*bounded rationality*). Aquesta idea, parteix del fet que els individus presenten limitacions per fer càlculs complicats, de manera que *es guien per regles senzilles per solucionar problemes complexos*. En aquest cas, Simon (1987) proposa un concepte ampli de racionalitat, segons el qual un agent és racional si presenta unes creences certes, coherents internament i és capaç de definir les seves preferències a partir d'un raonament deductiu. Per tant, no es presumeix que els individus sempre saben allò que volen, sinó que allò que volen ho esbrinen a partir d'un raonament deductiu sobre allò que creuen i valoren.

**Taula I.2 . Aportacions a la racionalitat de la conducta humana**

TEORIA	OBJECTIU	REFERÈNCIA
Racionalitat perfecta (models de teoria del consum)	Els individus es comporten com si seguissin un procés d'optimització, és a dir d'acord amb una conducta calculada amb informació perfecta.	Becker, (1976) Stigler i Becker (1977)
Racionalitat Limitada (bounded rationality)	Com els grups simplifiquen els problemes de decisió complexos o que requereixen molta informació	March i Simon (1958) Limbdom (1959)
Racionalitat contextual	Emfatitza la dependència de les decisions de l'ambient social i les relacions cognitives	Long(1958) Schelling (1971)
Racionalitat de la teoria de jocs	Es basa en l'estudi de com les individus com a membres d'una organització actuen per tal d'assolir objectius individuals basats en el seu interès.	Farquharson, (1969) Harsanyi i Selten (1972)
Racionalitat del procés	Estudia com les decisions s'expliquen pels atributs del procés més que no pas pels resultats.	Eldman (1969) Cohen i March (1974)
Racionalitat adaptativa	Investiguen el paper de l'aprenentatge en les decisions individuals o col·lectives	Cyert i March (1963) Day i Groves (1975)
Racionalitat selectiva	Proposen que la conducta està dirigida per les regles i regulacions dels rols socials	Winter, (1971) Nelson i Winter (1975)
Racionalitat posterior	La conducta racional es produeix abans que la valoració de la decisió.	Hirschman (1967) March (1973)

Font: Síntesi de la lectura de Bell et al. (1995) i Arrow et al (1996).

Des de l'àmbit de la psicologia social, s'han extès a l'anàlisi econòmica un altre seguit d'aportacions . En primer lloc, Bell (1992) defensa l'anomenada *regret theory*, segons la qual les decisions responen a les diferències entre les conseqüències potencials dels resultats no desitjats. Altrament, Akerlof i Dickens (1982) extenen a l'àmbit de la decisió econòmica algunes aplicacions de les hipòtesis de l'anomenada *cognitive dissonance* . L'aportació rau en el fet que la conducta individual es pot veure determinada per les creences que l'individu té en cada moment del temps. De manera que la decisió individual és el resultat d'una creença seguida per l'individu en la seva conducta. Quan les creences canvien, llavors canvia també la seva conducta.

Al darrere de tota decisió hi ha unes preferències – concrecions d'una valors, d'unes creences etc. – les quals determinen la conducta, però que com s'ha exposat en la taula 1.2, poden estar afectades pel context, per la complexitat de la decisió, i fins i tot per la mateixa decisió. D'acord amb Bowles (1998), “les preferències són raons per a la conducta, atributs dels individus que (juntament amb les seves creences i capacitats) determinen l'acció en una situació determinada”. No obstant això, les preferències, tal com s'ha definit fan referència a quelcom més àmpli que les preferències “convencionals” de la teoria del consum. En essència, es refereixen als valors dels individus, els quals a diferència de les preferències “convencionals”, si que es poden adaptar a multitud de situacions heterogènies. A diferència de les preferències convencionals, els valors es poden entendre com a endògens, en tant que depenen de l'evolució cultural, de l'organització social així com d'altres factors de l'entorn, de tal manera que les preferències amb aquesta “nova” noció s'entenen com una manifestació dels valors, els quals es veuen afectats pel contexte (Bowles, 1998).

#### 1.4.2 Una concepció “nova” de racionalitat

D'acord amb Rabin (1998), els agents econòmics poden ser racionals tot i que a vegades no actuen racionalment. Aquesta és, segons Rabin, una concepció que comença a ser extesa en economia<sup>xxiii</sup>. La hipòtesi última rau, en el fet que els individus tenen unes preferències i uns valors articulats els quals determinen la seva conducta així com la seva acció (vegeu Plott, 1996), *la racionalitat respon per tant a l'adequació d'aquests valors amb l'acció*. De tal manera, atès que l'home no es comporta com autòmat, al decidir en un ambient d'informació perfecta, es pot entendre la racionalitat d'una decisió com una qüestió de grau. Hom serà més o menys racional d'acord amb la capacitat d'articular decisions que no es vegin afectades per altres determinants que desvien la decisió d'on s'ha de dirigir, d'acord amb les creences, els valors i les preferències.

Des de la perspectiva de l'objectiu perseguit, l'anàlisi de la racionalitat pot entendre's de diverses formes. En primer lloc, com una *hipòtesi descriptiva* de la conducta, llavors es determinen els elements que condicionen les decisions individuals i s'analitza com els agents prenen decisions. En segon lloc, com un

conducta, llavors es determinen els elements que condicionen les decisions individuals i s'analitza com els agents prenen decisions. En segon lloc, com un concepte *normatiu*, en aquest cas es pregunta com i quines decisions haurien de prendre els agents per tal de ser racionals. Finalment, val a considerar també la racionalitat com una *aspiració*, llavors es parla d'utilitat prescriptiva, es pren la racionalitat com un objectiu per tal d'ajudar a prendre decisions informades i racionals <sup>xxiv</sup>.

Des d'un punt de vista descriptiu, la racionalitat difícilment es pot entendre separada del context de decisió al qual s'aplica. Per exemple, en un context d'incertesa es distingeixen les accions de les conseqüències, és a dir, una acció pot tenir diverses conseqüències, p.e fumar no vol dir preferir morir abans, mentre que, per contra en un context de certesa l'elecció és inseparable de la conseqüència. Per tant, en el primer cas la racionalitat no només està determinada per les conseqüències sino que a més també resulta rellevant l'acció o la decisió individual. Alhora, atès que el context determina l'acció, aquesta és afectada per la informació, que acaba reflectint en creences i judicis, els quals es representen per probabilitats condicionades, p.e indicant percepcions de risc d'una determinada conducta.

Erròniament, hom podria pensar que l'estudi de la racionalitat queda limitat a la decisió individual (en les creences, valors etc). No obstant això, la idea de racionalitat es pot estendre més enllà. Així, s'estudia si els col·lectius (els grups) han de ser racionals quan han d'assolir uns beneficis comuns. En aquest cas sorgeix l'anomenada *racionalitat interactiva* (Arrow, 1996). La necessitat d'interacció es fa evident quan la societat ha de prendre decisions transcendents que determinaran el seu futur - com ara determinar què vol millorar del SNS -. Així, quan l'objecte de decisió és una acció col·lectiva, el benestar d'uns individus pot venir determinat per les decisions d'altres. No obstant això, el que distingeix la racionalitat en l'esfera social de l'esfera individual, és que tot i que els individus actuïn racionalment, això no implica que les decisions que se'n derivin socialment siguin lògicament consistents (Arrow, 1951). En concret, els dos problemes principals que hi apareixen són:



A. *La subrepresentació de preferències.* Les preferències expresades poden estar subjectes a, biaixos o desviacions, que es produeixen en la seva identificació. Així, perquè les preferències siguin les "reals" haurien d'acomplir els requisits següents (vegeu Tversky, 1996) : (i) invariància procedimental, és a dir dos mètodes equivalents han de revelar preferències equivalents, (ii) invariància descriptiva, les preferències revelades han de ser independents de com es presentin les alternatives d'elecció, (iii) les preferències revelades han de ser internament consistents amb els valors revelats per l'individu, (iv) les preferències han de ser teòricament vàlides i (v) temporalment estables<sup>xxv</sup>.

B. Els problemes d' *inconsistència lògica* derivats de la regla d'elecció col·lectiva deriven del fet que davant d'una ordenació amb més de tres alternatives ( i sota el supòsit de no comparabilitat) no es pot garantir que una única regla d'elecció col·lectiva compleixi les condicions de consistència Arrow (1951) - domini universal, optimalitat de Pareto, independència d'alternatives irrellevants i no dictatorialitat -. La principal implicació de cara a l'estudi de les preferències socials es que les preferències socials són molt més complicades que les preferències. Quan hi ha diverses dimensions que influeixen en una decisió, llavors a més de les limitacions pròpies de la subrepresentació de preferències, apareixen problemes d'agregació col·lectiva individuals (vegeu Kavka, 1991). Atès que no és possible una regla d'elecció col·lectiva perfectament consistent - com probablement tampoc ho és per les preferències individuals, segons Kanheman, Slovic i Tversky (1982) - la racionalitat social es pot entendre com un ideal al que aproximar-se. Altrament, des de l'àmbit de l'economia del benestar, es planteja sovint la necessitat de prendre decisions col·lectives a partir d'una agregació de les preferències. En aquest cas, la idea que hi ha al darrera és que cal adoptar una forma de realitzar comparacions interpersonals de benestar, les quals impliquen la necessitat de fer explícits els judicis de benestar social. Així, en el cas de la sanitat Williams (1996) proposa que la societat hauria de fer explícits uns judicis de benestar sobre els quals poder agregar preferències i prendre decisions col·lectives.

### **I.4.3 Una aplicació de la idea de racionalitat en l'àmbit de la sanitat**

En aquest treball, es pretén abordar l'estudi de la racionalitat descriptiva d'algunes decisions en l'àmbit de la sanitat. En particular, es pretén investigar alguns criteris que guien les decisions de conducta, d'assegurament i d'elecció col·lectiva en sanitat. Se suposa, per tant, que la informació que els agents compten per prendre decisions no és completa, però es planteja com a hipòtesi que les seves creences o judicis de benestar es poden expressar en termes d'unes percepcions de risc d'una conducta o de discapacitat, així com en termes d'una valoració dels beneficis que li ofereix el SNS. Per tant, en aquest context, la racionalitat mena de l'adequació de la conducta expressada - p.e fuma o no fuma, s'assegura o no, qué valora del que li ofereix el SNS -, amb aquestes creences i judicis de benestar.

En aquest treball, es defensa una concepció de la racionalitat que no pretén ser exclusivament fidel a la idea de consistència lògica associada a contextos hipotètics de decisió amb informació perfecta, sinó que la racionalitat s'entén com un concepte dependent de les creences i/o percepcions de benefici o cost (risc) de determinades alternatives. A nivell de conducta individual, s'investiga com els agents econòmics presenten dificultats per assimilar els riscos davant d'informació imperfecta, així com si la seva percepció de risc reacciona davant d'una informació abundant. Altrament, davant de les transaccions en el mercat s'analitza la hipòtesi de consistència temporal de la percepció de risc. En particular, es proposa una explicació del perquè els individus s'asseguren davant de malalties agudes, quan no ho fan davant d'enfermetats cròniques<sup>xvii</sup>. Des d'una perspectiva social, s'argumenta que els agents prenen decisions a partir de judicis de benestar sobre "allò que creuen que és millor per a la societat", i per tant la racionalitat social s'entén com el resultat d'un consens sobre determinants judicis de benestar.

## I. 5 Resum i principals aportacions

Aquest treball es proposa contrastar la versemblança d'una idea de racionalitat basada en el fet que l'individu en la seva conducta i en la interrelació amb altres agents actua guiats per les percepcions de benefici o de risc ( en aquelles conductes que involucren un benefici social o un risc percebut). Així, quan l'individu ha de prendre decisions sobre el seu futur (consumir productes que tenen efectes sobre l'estat de salut futur, la necessitat de prestacions futures i el futur desenvolupament del sistema sanitari) l'individu actua d'acord amb les percepcions de benefici o de risc de determinades alternatives, seguint un procés similar al descrit per Kahneman i Tversky (1979). En aquesta investigació s'intenta realitzar una aportació d'aquesta idea de racionalitat aplicada a l'àmbit de la sanitat. En els epígrafs següents es resumeixen les diferents parts d'aquest treball i s'avança algunes de les seves aportacions.

### I.5.1 Segona part : racionalitat individual i conducta envers el risc sanitari

La primera part de la tesi consta de dos capítols. L'objectiu dels quals és el de fonamentar l'idea de racionalitat de la conducta sanitària en termes d'anàlisi del risc.

En el capítol II s'integren les diferents concepcions teòriques relacionades amb l'estudi dels estils de vida de la població. Es defineixen els estils de vida com un seguit de conductes sanitàries particulars (com ara beure, fumar seguir una dieta, etc.) i es distingeixen els riscos sanitaris en termes de la seva exposició temporal en riscos a curt i a llarg termini, seguint Viscusi i Moore (1990). En un segon apartat es planteja un model de decisió sota un marc teòric d'inversió pura en salut . En particular es proposa una extensió al model de Selden (1993) on s'inclou un concepte ampli d'incertesa i es considera dintre de la funció d'utilitat del consumidor un producte que se suposa té un efectes -positius o negatius- sobre la salut. Seguint un procés simple de maximització s'obtenen dos resultats : (i) un primer que estableix que l'òptim de consum d'un producte que presenta unes conseqüències negatives sobre la salut es situa en aquell punt on els beneficis del seu consum s'igualen amb

les necessitats de serveis mèdics. (ii) El consum de substàncies nocives respon al grau d'aversió al risc del individu. No obstant això, aquest marc teòric no té en compte molts dels efectes derivats del consum de productes on hi ha un component d'addicció. Seguidament, en l'apartat tercer s'analitza la conducta sanitària des de la perspectiva de les teories de l'addicció, així comparen els tres models més rellevants per a l'anàlisi del consum de substàncies nocives (l'addicció racional Becker i Murphy (1988), les preferències miops (Pollack (1976), la racionalitat parcial d' Elster (1979), i finalment, els models d'informació de risc de Viscusi (1992)). Els resultats d'aquesta comparació evidencien que els individus no semblen adequar-se a cap d'aquests models, sino que la conducta individual, d'acord amb l'evidència empírica revisada en el capítol, es pot explicar per la manca d'informació. Finalment, s'analitza el paper de la informació com a determinant del risc sanitari. Els principals estudis de Hersh i Viscusi (1990) així com Benjamin i Dougan (1997) demostren que les diferències en les actituds davant el risc prediuen la conducta sanitària, no obstant això, es produeix un biaix degut a la informació, definit per una sobreestimació dels riscos reduïts, mentre que es subestimen els riscos elevats. Aleshores, aquesta conducta es podria explicar a través d'un procés d'informació bayesià. Segint aquest procés explicaria com la conducta sanitària reacciona a la nova informació. Finalment el capítol, acaba revisant una teoria addicional proposada per Akerlof i Dickens (1992), però que prové dels treballs d'Aronson (1975). L'aplicació d'aquesta teoria en el marc de la conducta incorpora la creença individual entorn als efectes d'una conducta no saludable, tot i així presenta una greu dificultat de verificació emprírica.

En el capítol III s'investiguen algunes hipòtesis de racionalitat derivades del capítol II en una aplicació al cas del tabac a Espanya. Es proposa un model descriptiu de decisió individual on se suposa que els agents són capaços de formar probabilitats subjectives sobre els riscos de fumar - particularment, l'aparició d'un càncer de pulmó, d'un atac de cor o d'un enfisema pulmonar -. Se suposa que els individus actuen guiats segons la maximització de la utilitat esperada atenent als supòsits del *prospect theory* Kahneman i Tversky (1979). La idea és que els individus presenten unes preferències i/o creences sobre l'espai de conseqüències contingents de les seves decisions. Tanmateix, la decisió individual és afectada per la informació que cada

agent té sobre el risc de les seves decisions, per tant, s'introdueix i es contrasta l'adequació de la conducta a un model bayesià seguint Viscusi(1990). D'acord amb Viscusi (1990), els individus actualitzen la seva percepció de risc a partir de les diferents fonts d'informació al seu abast, i especialment les fons d'informació pública. El treball empíric parteix d'una estimació de les percepcions de risc per una mostra de 2550 individus representativa de la població espanyola. L'objectiu ha estat verificar la capacitat predictiva del model bayesià aplicat a la conducta sanitària, així com obtenir una evidència empririca sobre la idea de racionalitat proposada com a explicativa de la conducta sanitària de la població. En aquesta enquesta es demanava informació sobre la percepció de riscos de fumar sobre tres malalties relacionades amb el fumar : el càncer de pulmó, l'atac de cor i l'enfisema pulmonar. Les percepcions de risc es demanaven de la següent manera: " de cada 100 individus que fumen quants creu que adquiriran cancer de pulmó?" . A més es demanava tot un conjunt de variables relacionades amb l'habit del tabac. Els resultats més importants, indiquen que la conducta de la població sembla que és molt sensible a la informació sobre el risc, de tal manera que sembla acomplir les hipòtesis del model bayesià. En en segon lloc, es confirmen les hipòtesis dels treballs de Viscusi (1990,1992,1995) que defensen que els individus sobrestimen els riscos en els quals hi ha informació abundant, en aquest cas proveïda per les polítiques d'informació sanitària. Finalment, es confirma la capacitat predictiva de les percepcions de risc com a determinants de la decisió de fumar.

### **I.5.2 Tercera part : la racionalitat de l'assegurament sanitari privat : aplicació a malalties cròniques i agudes**

Aquesta segona part de la tesi consta de tres capítols (IV, V i VI) on s'investiga la racionalitat de la decisió de compra (demanda) d'assegurament sanitari per cobrir prestacions que sorgeixen en estats de salut aguts i crònics.

En el capítol IV, s'investiga el paper de les actituds respecte del sistema sanitari públic (judici valoratiu del sistema sanitari públic) com a determinant previ de la decisió d'assegurar-se. En altres paraules, es pretén investigar si la demanda

benefici del sistema públicament finançat, i un segon procés en el qual l'individu decideix assegurar-se. En una segona secció es planteja un model teòric senzill en el que la decisió d'assegurar-se ve determinada per la comparació de tres alternatives (assegurase, no assegurar-se i consumir serveis sanitaris privadament, i no assegurar-se i no consumir serveis sanitaris privats). La decisió resultant és determinada pel consum esperat de serveis sanitaris privats, per l'edat i la riquesa així com per la qualitat diferencial que els individus perceben respecte serveis sanitaris públics en relació amb els privats, la qual cosa suposa en darrer terme determinar l'actitut respecte el SNS.

En una tercera secció, s'analitza l'evidència empírica al voltant de l'assegurament sanitària a Catalunya, es descriu la mostra utilitzada i el model economètric. En quant a l'evidència empírica, s'observa una tendència bastant estable en termes de nombre d'assegurats des de 1991, un percentatge d'assegurament més elevat que en altres sistemes sanitaris, en particular comparant amb el d'Espanya i el d'Anglaterra, concentrat especialment en edats entre 15 i 44 anys. Pel que fa a l'oferta, s'observa un elevat grau de concentració en la provisió d'assegurament sanitari així com una elevada concentració de les primes a Barcelona 78.6%, tot i que en termes relatius el percentatge d'assegurats és lleugerament superior que a la resta de províncies. La base de dades utilitzada ha estat l'Enquesta de Salut de Catalunya. Aquesta és una enquesta que consta de 15000 observacions i és representativa de totes les regions sanitàries. L'especificació econometrica utilitzada ha estat un model doble tanca a partir de dos probits depenents (Propper (1993) estimats per maxima versemblança. En una primera estimació es determina l'actitut respecte el sistema sanitari, i en una segona es determina la decisió d'asegurar-se trucada per la primera estimació. El resultat del model economètric especificat ens porta a la conclusió de que no podem rebutjar que la decisió d'assegurar-se sigui independent de l'actitut respecte el sistema sanitari. Altres resultats de l'estimació evidencien que no existeix selecció adversa en el mercat assegurador català, ni tampoc existeix evidència d'atzar moral.

En el capítol V, s'analitza un segon tipus d'assegurament, el de prestacions relacionades amb malalties cròniques que porten a un estat de discapacitat. Així en aquest capítol s'investigen els determinants de la decisió de compra d'assegurament sanitari privat per cobrir les prestacions a llarg termini. En una primer secció, es planteja el problema de la dependència a Catalunya, en concret es mostra l'evidència empírica basada en dades d'esperança de vida i esperança de vida sense discapacitat. De l'anàlisi d'aquesta evidència s'observa que aproximadament, una setena part de la vida dels catalans es viu sota condicions de discapacitat. Malgrat tot, no existeix un mercat assegurador privat que doni cobertura a les necessitats de serveis derivats d'aquestes malalties (tan sols existeixen algunes entitats que ofereixen assegurances reduïdes de reemborsament), alhora que la cobertura pública és molt reduïda. S'analitza l'evidència comparada amb altres països, i es revisen algunes de les raons que permeten explicar la manca d'assegurament. En particular, algunes de les raons que es proposen com a possibles determinants són: (i) l'existència d'interaccions familiars, cosa que explicaria que aquest servei es cobriren per la via de serveis informals, (ii) la manca de definició de la cobertura pública, (iii) l'existència de limitacions cognitives per tal d'identificar les necessitats futures de cobertura, (iv) la inconsciència respecte dels riscos i els costos associats a aquests serveis, (v) l'existència de selecció adversa i risc moral i especialment les percepcions de discapacitat.

En una segona secció, es proposa un model teòric que relaciona les percepcions de risc de discapacitat en una edat avançada amb la demanda de assegurament sanitari per discapacitat. L'objectiu és estudiar quina és comprovar que la idea de racionalitat sobre la qual es fonamenta aquest treball, s'acompleix també en el cas de l'assegurament sanitari.

En una quarta secció es proposa estimar les percepcions de risc, els determinants de les percepcions de risc i els determinants de la demanda d'assegurament sanitari de dependència a partir de les dades obtingudes a través d'una enquesta de 400 individus representativa de la població de Catalunya. En aquest cas, a diferència del

que succeïa en el capítol III, les estimacions de l'esperança de vida són prou acurades. En particular, s'observa una lleugera sobre valoració de l'esperança de vida per aquells individus entre 25-45 anys, mentre que es produeix una subvaloració de l'esperança de vida en aquells col·lectius d'edat més avançada. Les estimacions de les percepcions de risc de discapacitat a l'edat de 80 anys, situen aquest risc en un 0.48 el que indica que de cada 100 individus que arriben a l'edat de 80 anys, la percepció de la població és que un 48% estaran en una situació de discapacitat. Quant als determinants de les percepcions de risc de discapacitat, s'observa que l'edat està positivament associada amb un major risc percebut, així com l'estat de salut i el sexe, en particular les dones tenen una major percepció de discapacitat. Finalment, els determinants de la decisió de compra d'una hipotètica assegurança sanitària privada, són la residència a Barcelona, el risc percebut de la pròpia discapacitat, l'edat, que en aquest cas està negativament associada a la compra d'una assegurança de discapacitat, així com el fet d'estar assegurat per malalties agudes.

Finalment, en el capítol VI s'analitza la disponibilitat a pagar per les prestacions associades amb l'assegurament per discapacitat. Atès que no hi ha un mercat real, llavors la perspectiva de la valoració contingent es mostra com una alternativa adequada. Aquesta és la primera vegada que s'aplica el mètode de la disponibilitat a pagar per valorar les prestacions ofertes per l'assegurament sanitari per discapacitat (serveis sociosanitaris). En la segona secció es planteja el model teòric que guia els determinants de la disponibilitat a pagar. En la tercera secció es proposa un model empíric aplicat per tal d'estimar la disponibilitat a pagar. En aquest cas s'ha optat per un model dicotòmic on es demana l'individu si està disposat a pagar una quantitat determinada prèviament a través de dos *focus groups*. La novetat del mètode rau en que les ofertes s'han determinat a partir de dos grups focals mitjançant l'instrument de la disponibilitat a pagar com a pregunta oberta. A més, en aquest qüestionari es demanava també la disponibilitat a pagar per altres serveis sanitaris aguts i crònics que no estan coberts per l'assegurament sanitari estàndard (com ara les prestacions de podologia i odontologia). A través, d'un contrast de chi-quadrat s'observa que no es pot garantir que hi hagin diferències d'edat en la valoració de les diferents prestacions. A més, els resultats obtinguts en aquest estudi previs s'ha validat a través d'una



estimació tobit, atesos el nombre de zeros en la mostra. Finalment d'aquest estudi s'han determinat les primes oferides (ofertes) en l'enquesta on es demana la disponibilitat a pagar. En particular s'han dissenyat 40 primes diferents que van de les 700 pts a les 17.000. Els resultats de l'enquesta s'han estimat amb una regressió logística, a partir de la qual s'obté la disponibilitat a pagar que ha estat d'unes 3390 pts al mes. La validació teòrica, s'ha relitzat estimant un model tobit sobre els respostes respecte de la disposició a pagar marginal (*follow-up*) associada a la pregunta dicotòmica "fins a quant està disposat a pagar". De l'estudi dels determinants de la disponibilitat a pagar, s'observa que està negativament associada amb l'edat, mentre que existeix evidència de biaixos derivats de l'instrument de pagament utilitzat, per la qual cosa fa pensar que si bé el mecanisme assegurador és conegut hi ha una actitud social que pot influenciar els resultats, si aquests es volen prendre com a determinants de una hipotètica valoració de les prestacions ofertes. Alhora, s'ha identificat un biaix de preu de sortida, associat als mètodes dicotòmics.

### 1.5.3 Quarta part : racionalitat social i els mecanismes d'elecció col·lectiva

En el capítol VII es desenvolupa un nou mètode de valoració contingent<sup>xxvii</sup> per tal d'obtenir preferències relatives sobre programes sanitaris, per tal de ser aplicat a la presa de decisions relatives al sistema sanitari. A diferència del que és comú quan s'apliquen aquestes tècniques de simulació en un mercat hipotètic, en aquest capítol es planteja un mercat polític (un referèndum hipotètic) on hi ha deu programes a valorar (o prioritzar). Es planteja un nou instrument de valoració, dissenyat per aquest context, anomenat *disposició a assignar* i es compara amb l'aplicació de la disponibilitat a pagar. La idea del nou mètode consisteix en demanar la màxima disposició a assignar uns recursos destinats a finançar una hipotètica ampliació de l'oferta de programes del Sistema Nacional de Salut. Seguidament s'analitza la seva validesa teòrica així com la seva consistència teòrica. Aquesta s'ha dut a terme a través de l'estimació dels coeficients de correlació de Spearman, els quals donen uns resultats agregats elevats (0.73) en total, mentre que els resultats pel cas de la disponibilitat a pagar són aproximadament de 0.34.

Atès que les valoracions dels programes sanitaris reflecteixen els beneficis associats al sistema, s'estima a través d'un sistema similar als preus hedònics, les valoracions del benefici de cada programa. Els resultats mostren que els beneficis percebuts dels diferents programes sanitaris, responen a més d'una dimensió de benefici tot i que hi ha una dimensió de benefici dominant. No obstant, atesa la dimensió reduïda de la mostra obtinguda en l'experimentació, aquests resultats tenen un caràcter essencialment descriptiu. Per al cas de la identificació de preferències col·lectives l'elevada consistència del mètode aplicat, ens mostra que els judicis de benestar individual poden catalogar-se per presentar un elevat "grau de racionalitat".

Els resultats, a l'hora s'han comparat amb els que resultarien d'un anàlisi cost benefici convencional, d'aquesta comparació s'evidencien grans diferències que resulten d'aquells programes en els quals el cost associat és molt elevat.

En el capítol VIII, es discuteixen els supòsits de racionalitat implícits així com els possibles mètodes aplicats per analitzar la racionalitat en el marc dels estudis de valoració contingent. Es proposa discutir quin és el paper de la naturalesa de les preferències alhora de condicionar els resultats i la seva consistència, així com la necessitat d'estimar el que s'anomenen *preferències raonades* seguint l'enfocament de Harsanyi (1997). A partir dels resultats de l'exercici d'experimentació descrit en l'apartat anterior, s'analitza la consistència de les respostes individuals, i es troba un percentatge d'incositència diferent segons el grup considerat, el que suggereix que no tots els grups són igualment racionals, i per tant posa de relleu el pes de la consideració dels grups alhora de determinar les preferències col·lectives. A més, s'estudien els fenòmens d'inversió de preferències anomenats *preference reversals*<sup>xxviii</sup> (Tversky i Thaler, 1990) pel cas de l'elecció col·lectiva de programes sanitaris. En particular es compara l'existència de inversió de preferències entre el mètode proposat i la disponibilitat a pagar. Els resultats, confirmen que en ambdós mètodes es produeix aquest fenomen, tot i que en el cas de la disponibilitat a pagar aquest és superior. S'estudis també la sensibilitat al cost dels participants, com un est addicional sobre la racionalitat en l'elecció col·lectiva. Es troba evidència de que per aquells programes els beneficis dels quals s'associen amb un guany d'equitat, atès

que el seu cost és elevat, els individus tot i que es prioritzen per sobre d'altres, els participants no estan disposats a assignar-los el seu cost. S'analitza la racionalitat econòmica, també en termes de sensibilitat a la informació de cost, i es troba que la reacció individual a la informació de cost és sensiblement significativa. Es confirmen pel cas de l'elecció col·lectiva que els fenòmens de inversió de preferències estan associats a l'existència de pagaments, en aquests cas a la necessitat d'atribuir una preferència monetària, així com també es confirma la sobrevaloració d'aquelles alternatives que comporten un menor cost.

## I.6 Comentaris finals

En aquest capítol introductori s'ha presentat una visió sintètica sense entrar en detalls de la present tesi doctoral. Amb aquesta idea, s'han exposat els objectius, l'estructura, i la metodologia emprada. Els objectius responen a unes preguntes les quals totes es plantegen un problema de decisió on la racionalitat hi és present tant sigui a nivell individual o social. L'estructura adoptada s'ha construït en un ordre creixent de decisió, des de la decisió individual a la decisió social. La metodologia, pretén combinar teoria amb evidència empírica, i per tant es fonamenta en la realitat econòmica observada, bé sigui de Catalunya o d'Espanya. Finalment, atès que la tesi s'ha escrit en anglès el resum d'aquesta introducció és més àmpli del que potser seria necessari, i tot i que es planteja com un complement de l que propiament correspon a una introducció per tal de guiar al lector.

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- <sup>i</sup> Podem trobar clars exemples per fonamentar aquesta afirmació en els debats teòrics sobre com mesurar la salut, què determina la demanda de serveis sanitaris, etc.
- <sup>ii</sup> D'una banda ens trobem les autoritats sanitàries - estatals i internacionals - i els col·lectius mèdics els quals defensen la necessitat de regulació de la conducta a qualsevol cost - tot i ser dubtosa l'efectivitat i racionalitat econòmica d'alguns instruments - mentre que, els col·lectius de fumadors, i els representants de la indústria del tabac defensen el dret de fumar "conscientment" i denuncien un excés d'intervencionisme públic en les decisions individuals de conducta
- <sup>iii</sup> Bé sigui un servei nacional de salut o un sistema de seguretat social.
- <sup>iv</sup> Vegeu *Enquestes d'Assegurances Lliures*, Direcció General de Recursos Sanitaris, 1997.
- <sup>v</sup> L'explicació que es dona està fonamentada en la hipòtesis de "captivitat" desenvolupada per Propper (1993)
- <sup>vi</sup> En aquest sentit es proposa en aquest treball que el grau d'extensió de l'assegurament sanitari privat (demanda d'assegurament sanitari privat) no és quelcom irracional, sinó que es troba inversament relacionat amb l'accés "adequat" a les prestacions ofertes pel sistema públic.
- <sup>vii</sup> Abans de la reforma fiscal de 1998, es subvencionava directament el comprador d'una assegurança privada per mitjà d'una desgravació d'un 15% en l'IRPF. Actualment però, la subvenció s'ha traslladat directament a l'assegurador. En aquest debat, determinar els factors que expliquen la compra d'una assegurança privada constitueix un objecte clau de recerca en el marc d'aquest debat
- <sup>viii</sup> En l'actualitat, aproximadament 1.6 milions de persones són "depenents" en tot Espanya, mentre que la cobertura pública és aproximadament d'unes 6000 places. A més, ateses les previsions demogràfiques, aquestes insuficiències és probable que generin en un futur un veritable problema social que cal resoldre (IMSERO, 1995).
- <sup>ix</sup> Una alternativa proposada és un augment de les contribucions socials per tal de garantir les prestacions públiques a tota la població, l'altra és el mercat assegurador privat tot i que entre les dues possibilitats hi ha moltes combinacions
- <sup>x</sup> Durant aquest any 1999 s'ha previst aprovar el Pla "Nacional" d'Acció per a les Persones Grans del IMSERO, en què es recomana la creació d'una assegurança de dependència a l'estil d'altres països europeus com una branca addicional de la Seguretat Social
- <sup>xi</sup> Aquest tema és objecte debat en el marc de la UE, actualment tan sols Alemanya, Holanda i Àustria presenten una regulació adequada d'aquest mercat. A Catalunya el Decret 47/1999 regula la creació d'assegurances de dependència si bé es limita a fer una senzilla definició sense plantejar-se un objectiu més ambiciós. Amb aquesta idea s'ha escrit la segona part de la tesi.
- <sup>xii</sup> Es planteja en el Títol VI el principi de participació comunitària que impregna la totalitat de les estructures del Servei Català de la Salut i s'instrumentalitza per mitjà de les corporacions locals, els òrgans de participació establerts en els seus nivells i les entitats que en l'àmbit de la sanitat són representatives del teixit social de Catalunya.
- <sup>xiii</sup> Per a una visió més àmplia veure Barceló (1992).
- <sup>xiv</sup> En paraules de Leontief (*Ensayos sobre economía*, pag 10): "en una peça teòrica, el que és important és que sigui còmode i caigui bé, i no l'elegància del seu tall a la moda".
- <sup>xv</sup> Aquests exercicis pretenen simular en petita escala un procés d'elecció similar al que es donaria en la realitat si es demanés un consell (*advisory group*) a un comitè d'experts. L'objectiu és el de comprovar que un conjunt de supòsits teòrics són efectivament viables. Aquest tipus d'experiments responen al grup classificatori de "parlar a l'oïde del príncep" (Rivas i Magadan, (1999)), és a dir els experiments que pretenen obrir un diàleg entre els experimentadors i els responsables de la presa de decisions, i per tant l'ambient que es pretén arribar a assolir és el propi d'una decisió política.
- <sup>xvi</sup> El "focus group" fa referència a un grup de discussió format per un conjunt reduït de persones en què el focus de discussió és un tema del que es pretén obtenir la màxima quantitat d'informació qualitativa i cuantitativa. Presenta gran similitut amb els "citizens juries"

utilitzats tan sovint en ciència política com a mecanisme per incentivar la participació pública en la presa de decisions.

<sup>xvii</sup> També anomenades "simulacions socials" per alguns investigadors segons el Dr Barceló.

<sup>xviii</sup> Per tant, no es planteja una evolució històrica de la qüestió objecte d'estudi ni tampoc analitzar evidència empririca descriptiva si aquesta no suposa una aportació considerable a l'objectiu del treball. Tampoc es realitza un resum molt extens dels estudis previs, si nó que després d'una breu revisió de la literatura es posen de manifest les seves principals implicacions de cara el present treball. Com es pot comprovar, després d'una introducció moderada a cada decisió (de conducta, d'assegurament o d'elecció col·lectiva) es planteja tot seguit l'objecte del capítol i es proposa un marc teòric de decisió.

<sup>xix</sup> Tanmateix, el concepte de racionalitat és potser un d'aquells conceptes que tot i fonamentar l'anàlisi econòmica no sembla tenir una única definició, sinó que pot presentar diferents acepcions – tractades en l'apartat I.3 -. Ara bé, ningú dubta que és quelcom relacionat amb l'elecció.

<sup>xx</sup> La idea de risc fa referència a la possibilitat de traduir en termes de probabilitat les conseqüències negatives de determinades conductes.

<sup>xxi</sup>  $\sum_c \pi_c = 1$

<sup>xxii</sup> La qual cosa implica que la idemnització és igual al cost del servei.

<sup>xxiii</sup> Certament, les aportacions fins ara citades són totes aportacions molt novedoses en comparació amb la literatura de la teoria del consum

<sup>xxiv</sup> Vegeu Arrow (1996), Bell, Raiffa i Tversky (1995).

<sup>xxv</sup> Tal com es mostra en els capítols VII i VIII els instruments adequats per revelar preferències varien substancialment segons el context de decisió en el que s'han d'aplicar, per tant, la racionalitat social depèn en bona mesura depenent dels instruments d'elecció col·lectiva utilitzats

<sup>xxvi</sup> Aquest resultat és consistent amb els resultat experimentals realitzats en altres contextos (Kirby i Herrnstein, 1995) on es mostra que les preferències no són consistents o invariants en el temps.

<sup>xxvii</sup> La valoració contingent consisteix en un conjunt de tècniques que a partir de la utilització d'enquestes tenen per objectiu estimar monetàriament el valor de béns per als quals no existeix un mercat. Normalment les tècniques pretenen captar la variació compensadora o la variació equivalent com a mesures aproximatives de l'excedent del consumidor i per tant del benestar.

<sup>xxviii</sup> Tversky i Thaler expliquen en un context molt similar a aquest de la següent manera: si s'enfronta la població amb una decisió entre un programa A que redueix els accidents en carretera a 570 amb un cost de 12 mil \$, i un altre programa B que redueix els accidents a 500 amb un cost de 55\$, els individus preferixen B a A. Ara bé, quan es demana el que s'elimina el cost del programa B es demana el cost que els deixaria indiferent entre un i l'altre, la seva resposta és un cost inferior a 55 mil, i per tant segons això el programa A seria preferit al programa B. Aquest fenomen s'anomena inversió de preferències.

**Segona Part.**  
Health related behaviour and risk  
bearing



*"The only way to keep your health is to eat what you don't want....  
Drink what you don't like..... And do what you'd rather not".*

Mark Twain (The Adventures of Huckleberry Finn)



## **Capítol II.**

### **Health Risks and Health Related Behaviour**





## ABSTRACT

This chapter examines different perspectives of the health related decision making framework on the grounds of some descriptive rationality assumptions. The question that we ask is which model may fit with observed health behaviour? Furthermore, provides an integrative approach for an economic analysis of lifestyles, analysing health behaviour based on the frequently used concept of health risks and role of information undertaken. First, examines an extension of a simplified health investment model under uncertainty in order to show the possible implications and limitations of this framework as to base health related behaviour (HRB). Second, since HRB has a clear paradigm in the smoking behaviour and other addictive behaviours, we undertake an analysis of the limitations of different rationality frameworks for smoking behaviour (rational addiction, myopic preferences and imperfect rationality models) for this purpose. Finally, the chapter end up with examining the rationality assumptions of some alternative explanatory models applicable to HRB. Following this aim, two alternative frameworks have been analysed, the theory of cognitive dissonance and the role of the bayesian framework capturing both risk and informational determinants. Results suggest that the health investment framework may show a limited descriptive power for the analysis of HRB, while traditional addition models may not be easily extended to other health related behaviours when there are other explanations for HRB rather than addiction. However, if we accept a rationality criteria based on the grounds of informational constraints as explaining health related behaviour, then a bayesian approach would lead to a plausible framework for this purpose .

*Key words:* rationality, risk bearing , health related behaviour.

*JEL classification:* I12; D81; I18; D13



## **I.1 Introduction**

A common shared normative judgement in modern societies is the "prominence of health" as a primary objective guiding individual's life's<sup>i</sup>. Since its widely recognised that by adopting a healthy lifestyle people may actively contribute to their state of health [Gochman, 1988], health related behaviour (HRB)<sup>ii</sup> is a major field where to investigate the assumptions of rational behaviour. Under a strict "healthist" approach individuals may be seen as following a stable health demanding process [Grossman, 1972]. That means, health risks are an aspect that people life they would like to eliminate [Viscusi, 1993]. Therefore, the individual consumption behaviour should be guided by the awareness about health risks some commodities prompt on health status. However, people may hold limited information about risks involving their life's or, alternatively, even being aware of them, health risks may be taken in order to lead to other alternative aims. Therefore, a purposive risk bearing behaviour may not be an adequate representation of individual health behaviour as far as people at some point of their life's accept trading-off healths risks by other aims. As a result, individuals may smoke, drink alcoholic beverages and take other risks concerning health, contradicting the conception of the individual as a stable health demander under perfect information and stable preferences. In order to provide an explanation to this feature, Becker and Murphy (1988) launched a theory for rational decision making when addiction plays a relevant role as influencing health-related behaviour. Under this approach individuals are assumed to hold stable preferences over time so that differences in terms of time preference emerge as an explanatory variable for health behaviour<sup>iii</sup>. That is, those people holding a higher time preferences are more likely to consume hazardous goods, and therefore to become addicts.

Furthermore, experimental evidence suggests that individuals may not show stable preferences over time according to prior evidence [Breteville, 1999]. Hence, an alternative approach would be to consider the individual as showing an imperfectly rational behaviour, usually incorporated under the form of endogenous preferences [see

Grossman, 1993]. From this mind, experimental evidence confirms that *individuals may share other goals in their life's rather than being healthy*, as far as within their consumption or production behaviour health risks are taken in order to achieve other goals, therefore preserving health may be seen as a competing with other values as knowledge, wealth or social acceptance. Individuals may have to make choices under an uncertain world with imperfect information and imperfect ability to choose. Health information is acquired through the mass media and life changes, and therefore the ability to choose is to increase with age and information. Since *choices in real world are always made before uncertainty is solved, and information constraints are rather far from being perfect*.

Therefore, since there are other individual goals relevant to explain HRB – i.e preventing the symptoms of illness – rather than health maintenance , research should focus on investigating the rationality of the trade-off people reveal when health risks are taken, given a degree of information. The relevance of this research relies on the fact that public policy aims to reduce health risks. In a democratic society, priorities among this risks should be set by individual values and perceptions concerning risks to being valued. However, health beliefs and perceptions are to vary from person to person such as from disease to disease (see Chapter III). Accordingly, Viscusi (1992) undertakes an analysis of the health-risk trade-offs for the smoking decision. Although individuals face choices, this does not make the individual irrational per se, under an economic perspective. The underlying idea, is for the smoking decision case, that the individual rationality is clearly linked with the cognisance of the potential hazardous effects of its decision. That is, if individuals are aware of the consequences of their decision over their health status and over time, then they cannot be catalogued as irrational. Psychological studies during the 70-80's have found that individuals seem to be aware of relative changes in mortality from a particular health hazard [Pidgeon et al (1999)]. Hence, although the role of addiction may explain consumption of some hazardous goods, health decision making should be made before fundamental uncertainty has been solved, characterising the individual risk-taking decision.

The main concern of this chapter is the analysis of "health risks" as determining how individuals approach health decision making. However, some previous clarification on the what we understand by health risks should be previously provided . In order to define this concept we follow the classification proposed by Moore and Viscusi (1990). They distinguish between *short-term risks* as those that are perceived to threaten an immediate change in health status in response to a current period decision, from *long-term risks*, where the exposure of the risks temporarily differs from the appearance of its effects in health, sometimes leading to the so-called "fatal risks". In this paper we focus on the latter risks, that is on analysing the consistency assumptions of individual decision when time is involved and where decisions are influenced by risk information as explaining decision risk trade-offs. Under a context of limited information about the effects of individual actions, individuals may be seen as acting according to the beliefs about the livelihood of hazards. However, evidence form cognitive psychology studies show how some paradoxes emerge as constraining the previous decision process, i.e individuals are less responsive to high risks hazards rather than small risks hazards (i.e ultraviolet radiation vs side effects of contraceptives).

The relevance of this research relies on the fact that public policy is assumed to encourage healthy lifestyles i.e using informational campaigns to communicate information about risks. However, risk communication is not as simple as explained by a sender-receiver model, but at the individual level it hinges on some form of negotiation or accommodation [Anand,1999].

According to McKeown (1976) the major health improvements in the last 200 years were closely explained by improvements in dietary practices and sanitary reforms, that is in healthy lifestyles. Therefore, government decisions aiming to restrict smoking and alcohol drinking such as policies regulating risky activities would be clear examples of this purpose, since they may result in shifting individual health related behaviour (HRB) towards a reduction of risks. Most health policy research is conducted to this purpose by

analysing how individuals and society shifts their HRB to improve health status. That is, investigating the rationality of health behaviour, such as identifying the underlying limitations of public policy instruments to achieve these goals<sup>iv</sup> [Rovira (1989), O'Connor and Blomquist, (1997)].

This chapter attempts to review HRB approaches from the standpoint of the rationality assumptions, the underlying HRB approaches by means of a descriptive/theoretical framework sustained by empirical evidence. We carry out an integrative research setting the different perspectives of health related behaviour when individuals are assuming health risks. In particular, we set an extension of the health investment approach for studying HRB. Focusing on the addiction framework, we compare the three main different approaches from the perspective of the type of preferences underlying its assumptions: the myopic preferences, the rational addiction and the consumption of hazardous goods approach. Finally, we set up the application of two alternative perspectives for the analysis of the risk bearing behaviour when information is assumed to be imperfect and therefore cognitive determinants arise as explanatory variables : the theory of the cognitive dissonance and the bayesian framework.

The chapter is organised as follows. Section two investigates the role of HRB from the perspective an investment model. Section three compares the three main alternative addiction frameworks, shedding some light with the underling assumptions of "rational behaviour", the role of information and risk perceptions such its empirical validity . Section four focuses on the HRB stressing some alternative determinants for the other frameworks analysed, those linked with the cognisance of risks involving the individual decision. In particular, two main applicable frameworks have been identified : the theory of cognitive dissonance and the Bayesian approach are analysed according to their possible application to the analysis of HRB.

## **II.2 Explaining Health Related Behaviour under an investment approach**

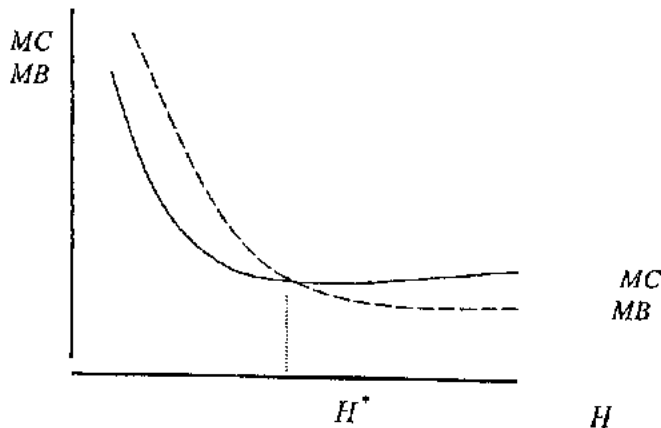
### **II. 2.1 Health and Lifestyles**

Lifestyles refer to ways of living. Therefore, theoretically are the result of an individual choice (Abel-Smith, 1999). Accordingly, the decision to follow a "healthy lifestyle" may be seen as a preventive way of securing health improvements or maintaining a definite level of health. Since health decisions are to be determined by knowledge about the consequences of actions, people decide whether to adopt a lifestyle regardless of leading to an increase in health or not. However, the lack of knowledge does not explain why people smoke, i.e people in modern societies still smoke despite a large share of population does belief that smoking is bad for health - a 94% in Spain (Enquesta Nacional de Salud, 1994) and 93% in the UK (Abel-Smith, 1999)- . Therefore, a first question to ask is what do we know from theoretical models of health behaviour?

The tradition initiated by Grossman (1972) comes up with HRB in terms of health investment. In essence the demand for health models postulate that optimal investment is achieved when the marginal utility of investing in health equals its marginal cost - opportunity costs and depreciation. Recent literature such as Zwiefel and Breyer (1996) and Liljas (1999) have successfully applied the demand for health framework as to explain some relevant features of HRB. In particular, Liljas (1999) introduces a clear advance in the demand for health model considering the endogenous nature of health depreciation (see figure II.1). However, as we suggest, HRB is a complex issue to explain just as an investment process from the production of health perspective, in this section we set out some of the main improvements and limitations of this approach".



Figure II. 1. Optimal health when depreciation is endogenous



(The optimal health is achieved when marginal benefits (MB) equal marginal costs (MC)).

Under a health investment approach, health can be partially produced by means of individual investments. Even though medical care and health technologies as health inputs play a relevant role<sup>vi</sup> - both preventing illness or curing when illness occurs -, according to Liljas (1999) and Fuchs (1986), health investment is clearly associated with “healthy “ activities (i.e practising sports, non smoking, etc). From a health investment approach, health can be viewed as a stock virtually dependent on previous investments and reducing by illness and depreciation. In particular, being ill (or alternatively unhealthy) shows, additionally to the tangible cost of buying medical care and other health inputs. An opportunity cost defined in terms of other goods not being produced (or consumed) as a consequence of the time lost by illness (Grossman (1972), Muurien, (1982) and Wagstaff, (1986)). Moreover, illness can induce to higher costs when a chronic disease appear as a consequence of HRB i.e a lung cancer or a heart attack, including the possibility of death.

Health gains may be obtained from investing in health, despite health investment resulting profit is to be uncertain (Arrow, 1963). That is, we can conceptualise health risks in a double nature, that part to some extent dependent on the individual behaviour, and another part that not influenced by preventive behaviour under the form of health investment. It seems to some extent unrealistic to treat health risks as being under the control of the individual<sup>vii</sup> - regardless of the individual efforts for increasing the probability of being healthy -. It's feasible to assert that people act in a world of incomplete information, allocating time and resources according to the perception of the consequences over different sets of activities<sup>viii</sup>. Therefore, uncertainty becomes a key feature to be taken into account when explaining health behaviour, in section II. 2.2 we deal with this issue

However, differently from other investments, health is externally untradable (Arrow, 1963). Whereas for some risks (associated with monetary losses), the individual risk aversion enhance to risk shifting - usually exchanging their risks by means of the insurance mechanisms<sup>ix</sup>-, several health risks are unpredictable and impossible to prevent completely. Thus, no markets would protect completely against them, i.e bearing the risks of a heart attack, and therefore individuals should by themselves bear their perceived risks according to their HRB.

Yet, as far as health is an important behavioural feature, being healthy is a benefit for the individual rather than a cost - it can be conceptualised as a flow in terms an increase of quality adjusted life years (QALYs)-. Health ( $H$ ), is seen as an argument in the individual utility function  $U(C, H)$ , in addition to consumption ( $C$ ). Whenever health is negatively affected by consumption a trade-off appear between health and other goods ( $C$ ), including other household production goods. That is, *health is internally tradable with other goods*. Examples of this trade off mechanisms are founded in daily life, i.e think on eating heavy meals vs following a diet, etc. This trade-off emerge as particularly relevant under certain behaviours which its consequences are well known as affecting health, and therefore risk - bearing plays a major role. However, risk -bearing behaviour is

determined by the nature of the uncertainty of future health state, such as the particular goals reflected in the personal lifestyle :

- a) As far as uncertainty is present in the risk bearing behaviour, *information and knowledge* about the possible risks becomes a relevant issue to study. Risk communication about possible hazards is provided from a wide variety of sources such as familiar interactions, own experience, physicians, but also from health authorities i.e anti-smoking campaigns.
- b) *Lifestyles may influence the probability of illness and death.* Currently the study of the economic influences of lifestyles is being broadly being carried out by health economists (Evans et al, 1994). However, health economists usually define lifestyles in terms of a narrow concept of *health related behaviour* (Burgess and Proper, 1998; Contoyannis and Jones, 1999), since life styles would refer to the whole set of voluntary behaviours influencing health, and this is less tractable for modelling rather than dividing the concept of life style into a set of particular behaviours<sup>\*</sup>. However an integrative approach could be the result of the following statement:

Let us assume a set of different actions or health related behaviours (*Smoke, Sports, Diet, etc*), state the probability of death without any of this activities ( $\pi^*$ ). The effect of this HRB on the probability of death and/or illness can be reproduced in terms of an updating process of prior risks ( $\pi^{smoke}, \pi^{sports}, \pi^{diet}, \dots$ ). Therefore, following for simplicity an additive weighed updating the resulting risk would be  $\pi^d = \pi^* + \alpha_1 \pi^{smoke} + \alpha_2 \pi^{sports} + \alpha_3 \pi^{diet} + \dots$ , where  $\frac{\partial \pi}{\partial smoke} \geq 0, \frac{\partial \pi}{\partial sports} \leq 0$ . That is the overall individual health risk is the result of the set of particular health related behaviours.

Table II.1 displays some basic indicators of the Catalan lifestyles , most of then referring to a particular sort of behaviours such as smoking, drinking, being on a diet or sleeping,

that influence health state to some extent. Although Catalan lifestyles cannot be exclusively inferred exclusively by means of these simple indicators<sup>4</sup>, they provide an idea of the current Catalan HRB, just for descriptive purposes. 45% of the population have smoke at any time, despite men are to smoke more than women. 60% regularly drink alcohol, although significant differences appear between men and women. Regarding the physical activity, 60% show a "healthy behaviour", as they practice sports. From a correlation analysis, some general rationality is evidenced. Results suggest a positive significant association between smoking (Smoke) and alcohol drinking (Alcohol Bev), despite is not very sharp but significant. Moreover, there is a clear significant negative association between practising physical activity and following a voluntary diet with smoking and alcohol drinking, as we could expect. However, despite correlation coefficients do follow the expected signs, they are not large enough to assert that there is a global lifestyle. That is, results suggest that each health related behaviour should be treated separately from the others.

**Table II. 1.**  
**Healthy Lifestyles indicators for the Catalan population.**

	%Total	%Male	%Female	
Never a smoker	54.69	33.83	72.51	
Never drinks alcohol	39.76	25.6	51.87	
Active physical activity	60.8	67.6	54.8	
On a diet	18.9	15.8	21.5	
Correlation coefficient	Smoke	Phys Actv	Vol. Diet	Alcohol Bev.
Smoke	1.0000			
PhysActv	-.103**	1.0000		
Vol.Diet	-.014*	-.0114	1.0000	
Alch. Bev	-.197**	-.0711**	-.0377**	1.000

Source: Enquesta de Salut de Catalunya, 1994.

\*Significant at a 5% level

\*\* Significant at a 1% level

**Conclusion I.1** Lifestyles can be seen as the result of a composite of individual health behaviours, increasing or reducing an overall health risk. However, the rationality of a global lifestyle differs from the rationality of a HRB. Moreover, the rationality of the individual decision depends on informational parameters restricting the awareness of health risks.

## II.2.2 An investment approach to Heath Related Behaviour

Following the statements of section 2.1 in this section we investigate by means of a simple model the rationality of adopting a HRB conceived as a decision concerning the investment in future health. This implies therefore, the most effective (profitable) the health investment the most utility gain the individual obtains from adopting a healthy lifestyle<sup>xii</sup>. Focusing on an investment model in the presence of uncertainty (Selden, [1993] and Dardanoni and Wagstaff [1990]) health risks are modelled by means of a stochastic term in the health investment function. This approach was followed by Dardanoni and Wagstaff (1987) developed a pure investment model as to explain differences in health behaviour, in particular they conclude that risk aversion explains why the poor are to willing to make risk investments.

Individuals are assumed to be expected utility maximises<sup>xiii</sup>. Hence, let us consider the individual two period separable utility function,  $t=1,2$  denoting present and future utility as follows:

$$U_t = U_1(C_1, H_1) + U_2(C_2, H_2) \quad (\text{II.1})$$

where  $C_t$  refers to consumption and  $H_t$  refers to health state. Consumption however, can be classified in terms of its impact (positive or negative) in health status as  $C_t = C(X_t, R_t)$  where  $X_t$  refers to health unrelated consumption,  $R_t$  denote health

related consumption different from medical care inputs that is supposed not to yield utility itself and  $t=1,2$  is time notation.

Individuals are assumed to be rational consumers consequent on the life of death according to life expectancy estimates. Health status is explained by an stochastic formulation as the following general investment equation II.2, where  $H_t$  denotes health in period 2 :

$$H_2 = (1 - \delta)H_1 + \gamma I_1 + \mu_1 \varepsilon \quad (\text{II.2})$$

According to (II.2) , health status is determined by the former health state adjusted by its rate of depreciation, the investment in health - explained by medical care and consumption of health related goods in former periods according to (II.3) - and finally uncertainty is captured by a stochastic disturbance with mean zero and finite variance as Selden (1993)<sup>xiv</sup>.

The investment decision is explained by the consumption of medical inputs and health related goods as hypothetically variables increasing or in some cases decreasing the stock of health. Since defining a functional form for health investment is somehow restrictive we conceive investment as an implicit function, as follows:

$$I_t = I(M_t, R_t) \quad (\text{II.3})$$

where  $M_t$  refers to medical care, and  $I(\cdot)$  is assumed to be increasing and continuously differentiable , that is  $\frac{\partial I}{\partial M} \geq 0$  if medical care is effective and  $\frac{\partial I}{\partial R} \geq 0$  if the good consumed is assumed to influence positively health state, whereas  $\frac{\partial I}{\partial R} \leq 0$  if the good consumed is to influence negatively the future health state.

Consumption in period 2 would be the current income (income period 2) and the individual savings from period 1:

$$C_2 = (1+r)S_1 + Y_2 \quad (II.4)$$

The consumer problem in period 1 is the one (II.5) describes. The individual in the first period has a specific stock of health ( $H_1$ ), and its consumption can be divided as health and non health related consumption. In the second period, consumption is (II.4) and health can be represented as (II.3). The budget constraint states that total consumption and savings should equal ( $A$ )

$$Max_{X_1, M_1, S_1, R_1} U_1 = U_1(X_1, R_1, H_1) + E[U_2((1+r)S_1 + Y_2), (1-\delta)H_1 + \gamma I_1(M_1, R_1) + \mu, \epsilon] \quad (II.5)$$

$$st \ X_1 + M_1 + S_1 + R_1 \leq A + Y_2$$

$$M_1, X_1, X_2, R_1 \geq 0$$

The first order conditions yields the following results (II.6-II.8):

$$U'_1 = (1+r)E(U'_2) \quad (II.6)$$

this result states that the *marginal utility of present consumption must equal the discounted marginal utility of future consumption* (see Dardanoni and Wagstaff, [1987, 1990] and Selden [1993]).

The second first order condition is:

$$U'(R^*) = E[U'_2 \mathcal{H}'(M^*)] - E[U'_2 \mathcal{H}'(R^*)] \quad (II.7)$$

which states that *individuals would consume health related goods since the utility obtained equals the difference between the expected medical care needs and the expected*

benefits . Another two conditions have been set out by Selden [1993] explain that risk averse individuals increase their investment in health according to the following equation:

$$\frac{Cov[U', M'(M^*)]}{E[U']} - (1 + r) = E(I') \quad (II.8)$$

The major limitation analysing this model is that information is disregarded, and therefore risk aversion and preferences over health alternatives involving different risks consequences are not considered as determining HRB. The underlying assumption that guides health behaviour is therefore, that differences in the investment in health explain differences in HRB.

**Conclusion II. 2.** The rationality of bearing health risk from a pure health investment approach states that people demand health related goods (i.e smoke or go on a diet) whenever the utility obtained from this behaviour overcomes the difference between the expected medical care needs and the expected health effects. Moreover, the more risk averse individuals are, the more health related goods they would consume if they expect positive health effects, whereas they would consume less if the expect negative effects. Results depend on the way uncertainty is incorporated into the health investment equation. However the main limitation for explaining HRB is that knowledge on health risks is not taken into account as determining health behaviour.



### **II.3 The rationality of addiction and health behaviour**

This section deals to analyse from an alternative perspective health related behaviour, when addiction turns to be a relevant component. The main perspectives on the consumption of hazardous goods stressing its applicability and limitation for our research. The analysis of health behaviour has a clear paradigm in the consumption of hazardous goods (i.e smoking cigarettes) usually imposing health risks to individuals. In order to explain consumption behaviour, traditional theories of consumption behaviour have been extended also to other HRB usually under the presence of *addiction* (see tale II.2 for a summary). Risks associated with addictive consumption differ from other risks in several aspects. Firstly, health risks associated with the consumption of hazardous goods are to some the result of the individual behaviour, rather than a random effect usually associated in the traditional demand for health models. Secondly, they involve risky choices that are in fact determined by complex informational factors.

As is summarised in table II.2, there are basically four different perspectives to deal with consumption behaviour when the consequences of this consumption are to be associated with a negative impact on individuals health. A fist alternative is *rational addiction*. Under this framework an individual will consume hazardous goods ( in particular will smoke) if the of discount future benefits of smoking exceed the discount of future costs and therefore smokers show a strong forward looking rationality. A second alternative is to view smokers as showing *cognitive limitations*. Under this approach, individuals are strongly influenced by information and therefore its behaviour would be determined by the reaction to risks information provided by several sources. A third alternative is to view smokers as *short sighted* and therefore ignoring the future hazardous consequences of their behaviour. Finally, an extreme approach is the one viewing smoker as myopic. *Myopic individuals* would systematically neglect information about hazards acting according to its past consumption.

### II.3.1 Imperfect rationality approach : the role of short sighted preferences

This was the first tradition in the study of the rationality of smoking (Elster, (1979) , Winston (1980) and Shelling, (1978,1980, 1984). Addictive behaviour is viewed partially as an irrational behaviour, due to an apparent contradiction of smoking with one of the most of the most accepted criteria in economics, a down-sloping demand curve. Similar frameworks have been applied to alcoholic beverages are [Vuchnich and Simpson (1998)]. Addiction causes under the presence of imperfect market information, the consumer to be partially rational, *preferences are stable but time inconsistent*. However, according to Chaloupka and Warner (1999), one of the basic limitations of this analysis is that they do not incorporate a wide idea of price, involving time loss and costs associated with the use of the product. Moreover, they face other clear shortcomings regarding the role of information as shifting attitudes towards the future. In particular, the effects of public policy in terms of consumption restrictions to smoking, advertising and the information policies are not incorporated (see Chapter III for a extended discussion)

### II.3.2 The rational addiction approach

The rational addiction models to take into account the insights appearing when the consumption of a commodity (i.e cigarettes) follows a repetitive pattern despite its hazardous consequences (Contoyannis and Jones (1999)). Since addiction reinforces consumption of hazardous goods, individual would turn to be irrational under the traditional consumption models. Therefore a set of alternative models has been developed analysing "addictive consumption". The main rationality explanation is that current consumption depends on the past consumption<sup>1</sup> (so-called "adjacent complementarity"), where the accumulated past consumption is treated as a stock of habit - through a "learning by doing" process -that is depreciated at a constant proportional rate (Pollack (1970,1975), Stigler and Becker (1977). That is if  $S$  is the stock of consumption capital,

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<sup>1</sup> The exception of this is Young (1983) where they consider the "addiction asymmetry".

C refers to current consumption and D expenditures on endogenous depreciation or appreciation, then investment can be expressed as<sup>2</sup>:

$$\dot{S}_t = C_t - \delta S_t - hD_t \quad (\text{II.9})$$

Up to this point, the main shortcoming is located in the depreciation rate of the addiction stock. In particular, assuming a constant depreciation rate of the stock of addiction is not real at all (Contoyannis and Jones, 1999). The advantage however, is that this framework permits to incorporate the basic elements of consumption dependency (table II.3) and therefore the hypothetical irrationality associated to traditional consumption models is modelled as a rational behaviour, as far as smoking is a reasoned act based on the net worth of individuals (Bartold and Hochman (1988), Becker and Murphy(1988) and Orphanides and Zervos(1998) ). Becker and Murphy (1988) assume that an addict is a maximiser of the discount utility over the life span, where  $T$  refers to the total life and  $\sigma$  to the time preference term. Moreover,  $u$  refers to a specific period utility,  $y, c$  are respectively consumption of non-addictive and addictive goods, and  $S$  is the above-mentioned stock of consumption capital. The life time utility function to maximise subject to the budget constraint is :

$$U(t) = \int_0^T e^{-\sigma t} u(y(t), c(t), S(t)) dt \quad (\text{II.10})$$

From II.10 , Becker and Murphy (1988) state that the optimal path would react to permanent changes in prices but no to temporal changes, having no effect over consumption of addictive goods. Moreover, differences in time preference such as the depreciation of the stock of addictive consumption capital explain differences in addictive behaviour.

<sup>2</sup> Note that this is an extreme assumption, see Contoyannis and Jones (1999) for an extensive discussion.

One of the main traditions has been to consider the individual as an overlife utility maximiser (Becker and Murphy, 1988), showing time consistent preferences, between the present and the future preferences. However, this approach has been also criticised due the restrictive assumptions underlying the individual rationality. Thinking that on the individual behaviour as can perfectly planning its future behaviour does not seem realistic at all. Accordingly, Akerlof (1991) states that individuals who become addicted in a rational addiction model do not regret its future decision. Ainslie (1992) suggest a theory of intertemporal choice applicable for addicts, claiming that individuals do not show dynamically consistent preferences, but accept immediate pleasures (and risks) despite going against its long term care preferences. Moreover, recently Suranovic (1999), recognising this limitation sets a more realistic model for addiction, assuming that individual show a *bounded rationality* and therefore maximise its current consumption without accounting for future consequences<sup>3</sup>. However, despite the Suranovic results are to be well founded according to recent literature of rational decision making (see Lowenstein, 1992), its framework is to some extent rejecting the traditional assumptions associated with rational addiction models.

Table II. 3

Effects of consumption dependency.

Effects	Concept (Description)
<i>Reinforcement</i>	The willing to consume repeatedly.
<i>Tolerance</i>	The process from with the individual adapts to consumption.
<i>Withdrawal</i>	The symptoms appearing when consumption stops.

<sup>3</sup> This may be an explanation of individual time-inconsistencies providing some reasons explaining the wide differences in HRB between the individual life cycle.

### **II.3.3 The myopic preference approach**

The idea that myopic preferences claims is that of the individual consumption guided by its past consumption rather than its future consumption. Preferences are endogenous and change over time, therefore individuals neglect the impact of current decision on his future preferences. The most representative paper is Pollak (1975), stating that naive habit formation can be defined as the opposite to "rational habit formation" where the consumer is aware of the current effects of consumption. Individual preferences can be represented by the following utility function :

$$U = U(X_t, \dots, X_{t-n}, W_T) \quad (\text{II.11})$$

Other traditions have been the "competing preferences" approach where individual is contemplated as displaying a two selves , a first one that wants to smoke and a second one that what to quit (Shelling, 1984).

However, the main misunderstandings that arise are the following. This tradition neglects any informational determinant that condition the addictive behaviour, that is risk perception are supposed to exercise no influence in health behaviour while evidence suggests a strong influence of the informational determinants in health behaviour. Moreover, it should be noticed that while it is too restrictive to assume that the individual holds a perfect foresight, it seems also restrictive to assume a complete neglect to future consequences, at least for adults.

### **II.3.4 Hazardous goods and information response**

There are a large set of factors that could explain all the process concerning consumption of hazardous goods i.e beliefs about consequences, personal values according to the

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amount of existing information, social and familiar norms. The analysis of consumption of hazardous goods has been an issue that extends from the traditional model of demand for health . A clear paradigm is Ippolito (1981) where the role of information on the hazardous goods with consumption is combined in order to determine the optimal life cycle consumption of hazardous goods. A hazardous good is assumed to be a good increasing the subjective probability of death however motility expectations exercise a strong influence in the costs of smoking, that is an individual that expects to die earlier faces a low cost for hazardous goods and therefore should consume more of every hazardous goods. Moreover, the uncertainty surrounding the life span exercises act increasing the consumption of hazardous goods, therefore smoking at an early age would not be viewed as irrational at all.

Another connected tradition involving the perceived risk of hazardous good consumption are Viscusi (1990, 1992). The main idea is that rational behaviour would come from reacting accurately to risk information, therefore if people are to follow an updating of the associated risks of smoking in an accurate manner, they the should be considered as rational whereas if they do not then they would be irrational . This framework it seems to be theoretically founded - based on the bayesian approach- such as a plausible manner to understand health related behaviour , connecting present and future in an appealing manner. However, the main limitation is associated with the extent to which individuals are capable to understand information about risks (see Chapter III).

**Conclusion II.3:** The alternative frameworks for the analysis of addictive behaviour are mainly differentiated on the knowledge on the future consequences of the addictive good, such as the role of information. According to the empirical evidence individuals do not show stable preferences over time and are mainly influenced by the nature of risk information about the hazards of their consumption.

Table II.2. Perspectives on addictive behaviour

Approach	Degree of economic rationality			
	Rational Addiction	Smoker with cognitive limitations	Imperfect rationality	Myopic preferences
<i>Behaviour and Information</i>	Perfect foresight, finite discount of future	Excessive attention to highly publicised risks	Individuals are to be short-sighted, they react only to short run information	Systematic neglect of risk information, infinite discount of future.
<i>Risk Perceptions</i>	Accurate risk perceptions, full knowledge of future impact of current consumption.	Overreacts to highly publicised risks	No long term risks are perceived.	Underassesses risk perceptions, do not recognise the effects of past consumption in future decisions.
<i>Empirical tests results</i>	Long run price elasticity's show a fall down. Important effects of education Significance of future price elasticity.	The assessment of lung cancer risks appears to be biased upward. Risks of smoking are not underassessed.	Not tested	Reaction to price reductions is higher than the reaction to price increases
<i>Basic Reference</i>	Becker and Murphy (1988), Chaloupouka (1991)	Viscusi (1990, 1992)	Elster McKenzie(1979), Schelling (1978,1980, 1984)	Pollak (1970, 1976) Young (1983)
				Price has a significant effects on cigarette demand

## II. 4. Health risks and information

### II. 4.1 The rationality of risk perceptions

From the point of view of the traditional decision models under uncertainty, individuals are guided by its risk aversion (Drèzde, 1987). Under this assumption tolerance to risks levels emerge as the main explanatory variable. Health related behaviour might be viewed as the individual response to the perceived hazards. However, individuals often make mistakes when they set judgements on risky prospects (Slovic ET al, 1982). This is reflected by the fact that people usually err in their perceptions of the occurrence of uncertain events, therefore the assumption of individual rationality should be relaxed. Examples of this behaviour can be found in Tversky and Kanheman (1973), people judge hazards according to the frequency of occurrence, Combs and Slovic, (1979) found evidence of an the presence of optimistic judgements and Fishhoff, Slovic and Lichtenstein (1977) set out a bias relying on the overconfidence of individuals own knowledge. The existence of this bias led to the overestimation of motor vehicle accidents and all cancers and an underestimation of tuberculosis, diabetes or emphysema (see table II.4). Lung cancer and respiratory diseases, such as alcoholic related diseases (Cirrhosis and hypertension) are one of the most relevant causes of mortality in Catalunya. This feature ultimately relates of the so-called *rationality under limited information*.

**Table II.4**

**Premature and avoidable mortality rate by illness in Catalunya**

	Rate Male	Rate Female
Lung cancer and respiratory diseases	36.43	2.91
Hypertension diseases	33.17	15.9
Cirrhosis and related diseases	31.36	13.95
Traffic accidents	32.13	7.81



\* Annual mortality for every 10.000 inhabitants .

Source: Enquesta de Salut de Catalunya, 1994.

The empirical work on the risk bearing behaviour occupies a central role in the study of health related behaviour<sup>xv</sup>. Most of the research focuses on demographic determinants such as age - younger individuals seem to be more willing engage in risky activities - , education and socio-economical status (Taylor, 1991). However, if the interest is focused on the rationality of HRB, a relevant theory should take into account the cognitive factors that are influencing behaviour in this context, that is people's beliefs and perceptions about behaviour. One of the main references is the theory of the reasoned action [Fishbein and Ajzen, (1975, 1980) and Ajzen (1988) ] purposed that people make behavioural decisions on the basis of a reasoned consideration of benefits and costs the available information, therefore rationality appears from the link between behaviour and intentions<sup>xvi</sup>. Another relevant reference is Hersh and Viscusi (1990), they show some empirical evidence of how individual differences in risk attitudes explain real risk bearing behaviour<sup>xvii</sup>. Experimental evidence shows that people overestimate the risks of death from hazards involving reduced "true" probability of death, and by similar factors tend to underestimate the risk of death related to high probability causes (Benjamin and Dougan, 1997)<sup>xviii</sup>. The implications of these results for regulatory policy are large especially as they determine the extent of the efficiency of informational regulatory. For the provision of hazard information to be successful, individuals must be able to think systematically about risks and make sound decision under uncertainty whereas these assumption do not seem to hold much support in the literature (Kanhmen, Slovic and Tversky, 1982).

## **II. 4.2 Beliefs and cognitive dissonance**

An alternative approach that takes into account individuals beliefs is the theory of cognitive dissonance which constitutes an appealing framework for introducing some of the main psychological research in the field of economics. The idea is that beliefs are in some way determining the individuals action <sup>xix</sup>. This idea was depicted by Akerlof and

Dickens (1982) to explain the choice between risky alternatives. In this section we will apply this model to health behaviour .

Let us assume that the relation between the fear ( $\pi$ ) and the perceived probability ( $\pi^*$ ) of a hazards is captured by a function  $\phi$  :

$$\phi = \frac{\pi^*}{\pi} \quad (\text{II.12})$$

where  $0 \leq \pi^* \leq \pi$  . The existence of cognitive dissonance implies that the individual chooses the value of the perceived probability and behave as if this would be the real value Assume that the cost of illness is  $C_i$ , and she can prevent illness by means of a treatment with it's costs is  $C_a$ , assume that  $C_a\pi < C_i$ . Assume that fear can be measured by  $f$  and it's costs are  $C_f$ . Therefore an individual would buy a preventive treatment if the perceived cost of the fear and the perceived cost of illness exceed the cost of the preventive treatment \*\*:

$$\pi^* > \frac{\pi C_i}{(\pi C_a + C_f)} \quad (\text{II.13})$$

The idea can be applied to addictive behaviours also, since according to the Aronson (1975) the individual decision is guided by its beliefs ( $\pi^*$ ) sometimes, an addict find easier to change the cognition rather than the behaviour. However the main limitation of this theory relies in the difficulties associated with its empirical applicability.

#### II. 4.3 The role of risk perceptions : a Bayesian approach

In an imperfect world individuals behave under uncertainty according to some judgements that incorporate information to a probability notion. However does this model fit with

actual behaviour?. Information plays a major role in influencing risk perceptions<sup>xxi</sup>. However, since information is costly people, people are not equally informed about all risks, in principle people should be best informed from high risk events according to its opportunity cost. Therefore the sources where the individual obtains its information should differ according to the magnitude of the risk involved. People tend to form their risk perception from a wide number of sources (publicly provided information, privately held information and hazards rates in their community). This can explain why at aggregate level risk perceptions display a larger dispersion, that is biased perceptions increase when the individual is broadly considered (see Viscusi, 1992) .

A first alternative to incorporate information is to assume a rational expectation framework. That is, given an amount of information people use to set the "optimal response" to estimation question. However according to Benjamin and Dougan (1997) people do not seem rational following this framework<sup>xii</sup>. The alternative framework to analyse the role of information as determining risk perceptions is the bayesian framework. Under this framework the role of different information sources is captured such as the updating process (see Hackes and Viscusi (1997)). Results from empirical models applying this framework seem to show a large explanative power, see Viscusi (1990) and Chapter III.

The bayesian approach is characterised by the assumption that uncertainty is present in the decision problem regarding the values of specific variables, expressed as subjective probability distributions. Assume an individual should choose to use smoke or drink or not, practice sports, etc. These decisions are represented by  $D \in (d_1, \dots, d_n)$ , and assume that the consequences of the decision depend on an unknown value of some parameter  $\theta \in \Omega$ . Therefore, for each value of  $\theta \in \Omega$  and each possible decision  $D \in (d_1, \dots, d_n)$ , let  $\gamma(\theta, d) \in C$  be the consequence of the decision maker when he choose decision  $d$  when the parameter value is  $\theta$ . Individuals have therefore preferences over  $C$  having an associated probability distribution  $\pi$  yielding to an expected utility function  $EU(\pi)$ . That

is assuming the consequence is a health benefit, then if  $\pi_1 > \pi_2$ , the expected utility  $EU(\pi_1) \geq EU(\pi_2)$ . We assume that these utility functions follow some previous requirements: (i) complete ( $\pi_1 < \pi_2, \pi_1 > \pi_2, \pi_1 \approx \pi_2$ ) and (ii) transitive orderings ( $\pi_1 \leq \pi_2, \pi_2 \leq \pi_3, \pi_1 \leq \pi_3$ ), (iii) independence assumption ( $0 < \alpha < 1, \alpha\pi_1 + (1-\alpha)\pi_1 < \alpha\pi_2 + (1-\alpha)\pi_2$  if and only if  $\pi_1 > \pi_2$  and finally the (iv) finite axiom ( $\pi_1 > \pi > \pi_2, 0 < \alpha, \beta < 1, \pi < \alpha\pi_1 + (1-\alpha)\pi_1, \pi > \alpha\pi_2 + (1-\alpha)\pi_2$ )<sup>xxiii</sup>.

The problem that the decision maker has to resolve is the following : assuming a specified probability distribution of an unknown parameter  $\xi$ , the decision maker will choose the decision  $d$  for which the expected utility is maximum  $\max EU(\xi, d)$ . The same can be hold if the decision involved a loss but then the optimal Bayes decision would be to minimise the expected loss. The problem that we are considering is clearly linked with a subjective utility framework<sup>xxiv</sup> since risk perceptions are in ultimate terms reflecting the subjective probability of a concrete event ( i.e fatal hazards from smoking).

The bayesian learning framework is seen as the prominent model for decision making under uncertainty. Under this model rationality individuals are contemplated as understanding the risks they face under probabilistic outcomes. Let  $\pi_0$  be the prior belief of an uncertain event, and  $\pi_i$  be the individual risk, and  $\xi$  is the informational content, under a bayesian learning model the individual risk perception may be seen as :

$$\pi_* = \frac{\pi_0 + \xi \pi_i}{1 + \xi} \quad (\text{II.14})$$

this model explain mainly some issues of psychological research as the overvaluation of small risks and the effect of partial learning as to influence decision making.

**Conclusion II. 4:** Health related behaviour is determined by the individual choice under limited information. Information therefore, plays a major role in shifting individuals behaviour according to their true preferences. From the alternative frameworks available, the theory of cognitive dissonance and the bayesian framework may be explanatory well founded approaches as capturing the main informational determinants of health related behaviour, despite the second approach is the unique empirically tested.

## **5. Concluding Remarks**

Health related behaviour is as other human behaviours the result of a set of choices between healthy and unhealthy alternatives resulting in a long run from a trade-off between health risks and health. If HRB treated as investment behaviour, risk aversion and the utility gain of each behaviour should become the main explanatory variables HRB. However, even though traditional demand for health models may be an appealing framework for the analysis of health behaviour, they dismiss the role of important features that should be considered so far, as cognitive factors and the role imperfect information. An advance to intrand HRB analysed by means of the theory of addiction do not seem to be consistent with the assumptions of stable intertemporal preferences. Therefore, we suggest that an alternative framework based on the decision making under imperfect information would more plausible represent real decision making. A bayesian framework seems to be theoretically founded and has been yet empirically applied, showing appealing results for further research in how preferences for health risks are formed.

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- <sup>i</sup> According to this judgement, "health is one of the most important things that counts in life".
- <sup>ii</sup> A behaviour is something that people do or refrain from doing. Therefore, the analysis of health related behaviour includes the analysis of specific behaviours that have an impact on the improvement or the recovery of health.
- <sup>iii</sup> In particular, time preference is defined as the marginal rate of substitution between present and future utility, therefore rational addicts discount rate would be reduced as time preference is sharply positive. That is, they show higher preferences for present benefits rather than future hazards.
- <sup>iv</sup> For instance in Catalunya, the main public policy objectives are concerted in the Catalan Health Plan in terms of health risks reduction (see *Pla de Salut de Catalunya*, 1997 pages 67-101).
- <sup>v</sup> However the basic improvements are restricted to the demand for health care since health risks and risk bearing are difficult to be captured under traditional demand for health models despite introducing uncertainty.
- <sup>vi</sup> The individual despite influencing his health state cannot determine it completely, since there are environmental and hereditary such as random events that can appear anytime.
- <sup>vii</sup> This could be assumed also for other "risky" investments such as in financial shares, bonds etc.
- <sup>viii</sup> According to Arrow (1963, page 945) "illness is to a considerable extent an unpredictable phenomenon".
- <sup>ix</sup> As far as a "certain outcome is preferred than the same worth expected outcome", that is a sure game ( $\bar{x}$ ) is preferred to a gamble ( $\bar{\pi}$ ),  $U(\bar{x}) > \bar{\pi}$ .
- <sup>x</sup> This is also the tradition framework of clinicians when they scientifically attribute risk factors to determined activities as smoking, i.e a common custom of physicians is to advise of the risk factors of some activities over particular diseases.
- <sup>xi</sup> Since there is a large set of particular latent variables influencing the probability of becoming a smoker and quitting smoking.
- <sup>xii</sup> Traditional demand for health models show clearly restricted results for our purposes, therefore a dynamic model would not improve very much the possible results.
- <sup>xiii</sup> The utility function is increasing, continuously differentiable and concave in its arguments, there is only an exception for unhealthy goods that can both increase or reduce utility.
- <sup>xiv</sup> Note that this assumption differs considerably from the rational addiction and alternative models, since the effect of hazardous goods is not only incorporated in the utility function as generating utility, but is expressed as reducing the stock of health depending on the characteristics of the individual.
- <sup>xv</sup> The economic theory of risk bearing is based on and resource allocation under uncertainty rests on some expected utility framework applicable under objectionable probabilities.
- <sup>xvi</sup> One of the main limitations of this theory is its empirical application, since beliefs and intentions are difficult to measure accurately.
- <sup>xvii</sup> Usually the effects of regulatory policy over society are undertaken on the basis of surveys. However, one of the main limitations of this empirical studies relies on the fact that its results depend on the skills and the information that subjects acquire previously, therefore the "salience" of responses could determine its bias and the dispersion of responses through "true risks".
- <sup>xviii</sup> This kind of research is been carried out by the use of surveys across different groups, the basic conclusion of Lichtenstein (1978) was that *individuals were unable to distinguish large differences in the relative frequencies of probabilistic events*.
- <sup>xix</sup> This theory was developed by Aronson (1972) in order to identify the rationality of some behaviours, and it can clearly be applied to health.

<sup>xx</sup> The cost of the fear is  $(\frac{\pi^*}{\pi})C_f + \pi^*C_i > C_s$

<sup>xxi</sup> This has been demonstrated empirically by Liechtenstein(1979) where the optimally responses to of population wide hazard rates where not to differ substantially from given responses.

<sup>xxii</sup> Individuals have access to an amount of given information of a determined hazard (I) that is related to their perception , so that when they are asked about them they usually predict their estimated hazard rate on an alternative information that they hold (A) that is supposed to be limited.

<sup>xxiii</sup> Similar assumptions are hold within a subjective probability framework : completeness and transitivity of judgements and finally a third assumption that states that there is no event less likely than the null event.

<sup>xxiv</sup> The idea is to separate the determinants of utility from the determinants of the probability distribution of different prospects.

### **Capítol III.**

**Risk perceptions and smoking behaviour:  
a bayesian approach**



## ABSTRACT<sup>1</sup>

The aim of this paper is to investigate from a Bayesian approach the role of risk information in determining smoking behaviour. The paper develops a theoretical framework such as an empirical analysis in order to explain the smoking decision and the informational determinants of smoking. We estimate the subjective probabilities of the main hazards related with smoking and results are compared with actual risks. The empirical analysis is based on a representative survey of the Spanish population from which we develop an econometric analysis of smoking behaviour and risk perception. A first result confirms a rationality hypothesis stating that non-smokers show larger risks perceptions rather than smokers what may explain why they don't smoke, and in general, individuals (smokers and non-smokers) overestimate large publicly provided health risks. The effect of risk perceptions in the probability to smoke is very significant what confirms the idea of rationality adopted in this paper that is closely related to the awareness of risks. Therefore, people may be seen as following a "cognisant approach", being highly sensible to the information about the hazards of smoking. The economic policy implications of this results for smoking informational policies are large, since they state that informational policies may not always display significant effects.

*Key words:* risk perception, smoking behaviour, Bayesian learning  
*JEL classification:* D 81, D 83, I 18.





### **III.1 Introduction**

The analysis of risky choices has been extendedly developed to explain individual behaviour under the presence of uncertainty<sup>ii</sup>. Modelling the decision under uncertainty often requires the inclusion of parameters with unknown values such as stochastic terms, the inclusion of different sources of risk information and different parameters determining the risk judgements in health decision making . This especially emerges when there is a learning process that may affect the nature of uncertainty such as the final decision. For example, suppose that the outcome of an individual decision (for example driving at a high speed) is unknown, or alternatively there is an stochastic term involving unknown parameters, then its plausible to assert that a learning process may influence the decision rule. As information on the possible hazards and own driving historical experience increase, the individual learns more about the risks involving its decision. Therefore, a sequential approach taking the from of a bayesian process may explain the rationality of individual behaviour by means of the role of perceived risks<sup>iii</sup>.

Under the ground of this idea, the application field of this theoretical notion may refers to the risk communication and analysis. An accepted view guiding public policy lies on avoiding risks of death, and therefore saving lives by placing money to prevent those situations enhancing fatal risks - (Viscusi and O'Connor, 1984) - as with the costs of seat belts, vaccinations, and larger risks of death such as smoking. However, the effectiveness of risk policies, concerns on the awareness from both smokers and non-smokers (potential smokers) of the health risks they run if they smoke. That is, a rational informed individual would take into account risks of death in their decision to smoke.

From the point of view of health policy, we may hypothesise that the effectiveness of an informational campaign providing information about risks of specific hazards, relies on the individuals capacity to use the information of health risks. Judgements about those risks should have some effect on personal behaviours, mitigating their risks or reducing their consequences. According to Fischhoff (1981), informational problems, such as the

limitations of the available information and cognitive restrictions appear to explain some failures of decision-making models. Therefore, if this is to be true, information provided to consumers about the hazards of "unhealthy" behaviours, such as smoking, is not neutral over time and over other risk determinants. This paper reports a theoretical framework and an empirical evidence in order to analyse the rationality of individual behaviour, conceived as the ability of individuals to process smoking risk information and make decisions according to this perception.

One of the clearest applications of the risky choices concerning health related behaviour health is smoking. There is a wide epidemiological evidence that smoking is one of the causes of some well known disease such as lung cancer, heart attacks and lung diseases (Peto et al, 1992)<sup>iv</sup> since the American surgeon report in 1964<sup>v</sup>. In contrast to many involuntary sources of risk people face, smoking is a private choice. Nonetheless, it has received special attention from policy makers from at least three decades. To some experts, and medical professionals smoking is conceived as irrational (Sloan et al, 1999). The reasoning process is the following: if information about fatal hazards of smoking is widely provided, then the choice of smoking implies that people do not understand how to make choices in the presence of risk. However, an alternative approach is the one provided by Viscusi (1992). Viscusi suggests that despite the acquisition of more information makes the individual more cognisant of smoking risks, it does not shift completely health related behaviour. Therefore, under this approach smokers are no to be irrational, since they attach high risk measured to the smoking behaviour.

**Figure III.1 A summary of anti-smoking policies**

<b>Instrument</b>	<b>Aim</b>	<b>Limitations</b>
1. <i>Diffusion of Information</i>	Increase the persuasive information.	Cognitive limitations for a correct understanding of the message.
2. <i>Consumption restrictions</i>	Limits the possibility for smoking in some places.	Does not lead with the social reprobation and opposes to the consumer sovereignty.
3. <i>Regulation of advertisement and selling</i>	Avoid increases in the number of smokers and control its selling.	Can be understand as an excessive interventionism..
4. <i>Price control</i>	Use of taxes in order to increase the price of tobacco.	Price elasticity estimates do not show a high reduction of smokers when price rises.
5. <i>Development of pharmacological and medical instruments</i>	Therapeutic and pharmacological treatments	Is not an effective instrument if the smoker has not decide to quite smoking.

Source: Monge and Costa (1999).

Nowadays in Europe smoking is the major preventable cause of mortality. This feature engages the development of large set of health policies as figure III.1 reports. One of the most significant policies are the informational campaigns, addressed to inform the population about the hazards of smoking (mainly carried out by compulsory warnings on cigarette packets, by limiting cigarette advertising and education at schools). Another types of policies are: (i) consumption restrictions - behavioural restricting policies aiming to constrain smoking in public places<sup>vi</sup> - , (ii) advertisement restrictions - aiming to reduce the extension of the number of smokers - , (iii) tax regulation - introducing a market incentive to quit smoking - and finally we may include the (iv) pharmacological and medical treatments - enhancing smokers to reduce the costs of quitting smoking - . In this paper, we will focus our attention on the first source of regulations, that is those policies providing information on the hazards of smoking.

This chapter shows close theoretical and empirical evidence of some rationality ideas concerning risk perception in health related behaviour. The core of this research concerns to analyse the role of a cognitive risk determinants as determining health behaviour. That is, the relation between perceived risks and smoking behaviour according to an empirical model concerning the effect of perceived risks so as to determine the decision to smoke.

Results confirm that the bayesian learning model may be an adequate framework to analyse health risk behaviour, and confirm some cognitive rationality assumption regarding the role of risk perceptions. Furthermore, additional results of this paper can be extended in order to analyse if individuals display a correct estimation of "true" risks obtained by the epidemiological evidence.

Since the efficiency of informational public policies relies on the capacity of individuals to perceive the outcomes of their behaviour, rational behaviour may - in ultimate terms - be affected by the perceived and learned information. When information is included and understand as imperfect, the assumptions underlying the rational addiction theory are sharply disclaimed if individuals are unable to perceive accurate information of the hazards of smoking (see Chapter II). Moreover, accepting that individuals may be capable to assess subjective probabilities to the hazards of smoking -the have some idea about the past consumption as determining the present and future consumption - , then the myopic preference approach doesn't seem to be an adequate framework as to predict correctly health behaviour. Following the statements of chapter II, in this chapter we purpose an alternative bayesian model (Viscusi, 1990) as the adequate framework to analyse smoking behaviour. Essentially, the bayesian learning framework can be applied to analyse the effects of information as determining individuals beliefs about future hazards. Yet, one of the main applications of this tool is the analysis of the informational policies, since its aim is to influence people's beliefs over some courses of future action.

Since information may be broadly catalogued as a public good, we argue that informational health policies should provide accurate public information to consumers about those "true risks" affecting health behaviour. Accordingly, risk information consumer's perceive from the informational campaigns emerge as an essential tool in order to determine if its efficient to spend public resources to them. Therefore a second aim of this paper is to estimate the risks perceptions of the commonly associated hazards of smoking, and in particular (lung cancer, health attacks and lung diseases), such as the determinants according to a bayesian learning model.

The remainder of this paper is as follows, section two introduces the role of beliefs, and perception as to determine health related behaviour. Section three describes a theoretical framework explaining the role of the Bayesian learning process in determining smoking behaviour. Section four, introduces the empirical study and section five analyses the main results. The paper ends with some concluding remarks.

## 2. Individual beliefs and the risks of smoking

### III.2.1 Beliefs and smoking behaviour

People make every day decisions involving risk i.e driving, visiting a foreign country, etc, under some degree of information available . Accordingly, it might be feasible to accept under that there may be (informed) choices that imply some recognisable risk that people accept in order to increase their own well-being. From an economic perspective, health behaviour in the presence of risk is viewed as individuals forming some beliefs about the risks affecting their lives. Beliefs may be conceptualised in terms of probabilities due to some reasons as the neutrality of probability measures, the independence on the agents risk behaviour and knowledge (Billot, 1991). However, they may not capture all the possible qualitative information involved in the risk factors. Moreover, since they are based on human judgements they obviously involve some degree of subjectivity. Research in this field shows that social, cultural and political process are all being involved in the formation of individuals attitudes towards risks and their acceptance . Moreover, there may be differences between hazards people are involuntary exposed respect to those that are voluntary exposed (i.e the smoking hazards). (Pidgeon , et al, 1993).

Individuals as exposed to health risks would behave in such a way that enhance or reduce health risks, especially those facing negative health consequences for them . This can be observed when individuals opt to quit smoking, limit their alcohol consumption, and in general when they practice healthy lifestyles. Moreover, there is a body of evidence that the outcomes of decisions affecting health are based on probability (Gafni, 1991), and therefore individuals make decisions according to the perceived risks of any definite act, that is, individual decisions rely on the subjective probability of the occurrence of outcomes. This evidence leads to focus on the information risk perception stage as to determined the so-called *informed choice*.

Subjective probabilities can be understood as a way to quantify “beliefs and perceptions” on the occurrence of a future event (Karni, 1996), such as suffering from a determined disease conditioned on some activity. However, as beliefs can exist independently of choice behaviour, non-smokers can perceive the hazards of smoking despite the fact they have never smoked. Therefore, the rationality of informed choice would set that individuals beliefs are to some extent, determining the individuals informed choice.

Perceived risks are defined in terms of the consumer’s perceptions of the hazards and uncertainty underlying the consumption of a product. They have been used to model the informational handling in the consumer behaviour as an explanatory variable in empirical research. For smoking behaviour, the main references are Viscusi (1990,1992a) introduces the role of perceived risk as an explanatory variable of smoking behaviour.

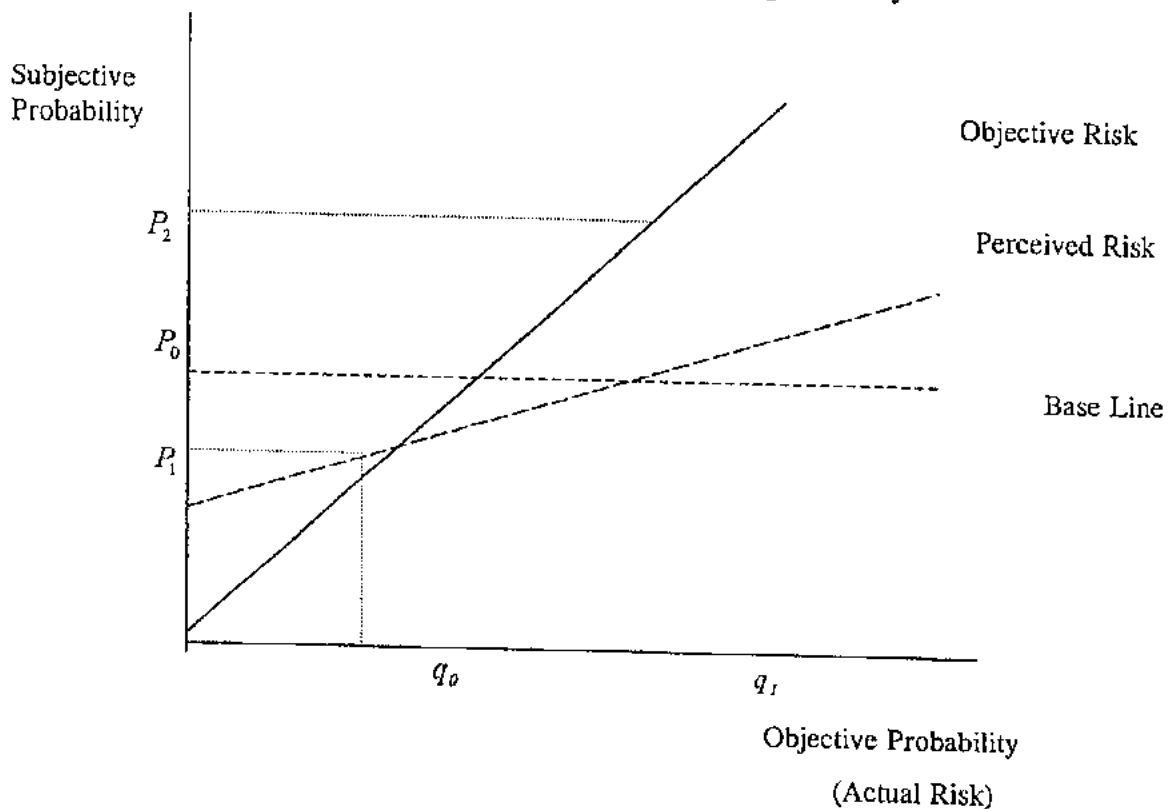
### **III.2.2 The role of information as determining perceived risk**

It has been argued that under imperfect information smokers “will underestimate the risk on their own health” (Viscusi, 1992), since the risk perceptions from smoking are below the true risk revealed by epidemiological studies. The explanation usually given to this feature that risk preferences are affected by addiction, therefore smokers are both uniformed and/or display irrational life values (myopic preferences). Viscusi (1992) defines this approach as the “stylised smoker” behaviour. Individuals under-assess smoking risks, due to the unawareness of smoking risks, and if they are to be cognisant of hazards they just ignore the risks of making decisions<sup>vii</sup>.

An alternative approach is the “rational smoker” (rational addiction), under which individuals are to display accurate risks perceptions in a full information scenario. Finally, an alternative approach is the “smoker with cognitive limitations” purposed by Viscusi (1992). This approach is the basis of our framework<sup>viii</sup>. The idea is that people fail systematically perceiving information of health risks, as they tend to overestimate largely publicised risks .



Figure III.2 The relation between objective and subjective probability



Assuming that individuals care about health risks, value positively health and safety and act the rational decision model that we support in this paper states that “the more information have about smoking hazards (publicly provided information) then the more precise estimation about health risks (true risks estimation) individuals will display”. However, the individual rationality takes into account a great variety of informational sources, and these informational determinants can lead to a different risk perception rather than the true risk. In this case, smoking informational policies would enhance an opposite effect than expected, since they would overvalue the smoking inherent risks (Viscusi,1992)<sup>18</sup>.

The lack of information on future stochastic events induce to individuals to hold failed or biased perceptions .This was reported by means of an application to the risks of death by Fishoff et al (1978) showing that they are some systematic bias that appear when

explaining individuals behaviour under risk . According to figure III.2, for small levels of objective risk, the perceived probability lies above the actual probability line, whereas shows the opposite trend for large risks. They asked educated lay subjects to judge the annual frequency of death in the US from 40 different hazards. Results showed two types of systematic differences : a) overestimation of the number of death from infrequent causes, and b) underestimation of death from frequent cases. However, despite the existence of systematic bias , they confirm that individuals are capable to provide well-founded judgements of the relative magnitude of expected fatalities, in a way in line with statistical estimates.

The public policy implications of this behaviour have been outlined by Arrow (1982) as analysing the idea of rationality for individual behaviour and Viscusi (1992b) as empirically testing it for the smoking behaviour. An explanation of this phenomena according to Benjamin and Dougan (1997) is that since people are better informed about the smoking risks faced by themselves (acquired usually thorough experience ), rather than from the social or community risks (perceived from informational campaigns) . That is, even though people have some information about community risks, they can better obtain accurate information about some risks they individually face, whereas social risks depend on the publicly provided information, and therefore are subjected to an informational bias. However, this assumption could be dismissed when the costs of information are large, since then it may be easier to be aware of the societal risks rather than the personal risks. Moreover, risk perceptions are to vary across the life cycle in different ways. In the case of smoking behaviour, due to the relative novelty of antismoking campaigns, younger individuals are to assess higher risks to smoking than older individuals. This can be observed in the empirical part of this paper, as age is to one the variables that explain differences in risks perceptions.

### **III.3. Theoretical Framework**

The model we develop here is based on the prospect reference theory approach set by Viscusi (1991). In order to treat informational determinants on health behaviour, an appropriate theory seems to be the Bayesian learning model, developed by Viscusi (1984, 1989, 1990). Smoking is considered as a risky activity voluntarily determined. Risk decisions are to be based on prospects involving payoffs over the perceived probabilities of acquiring a hazardous event. Therefore, the decision to smoke according to the prospect decision theory (Kanheman and Tversky, 1979) can be viewed as resulting from the comparison of different prospects despite the utility function may differ between them.

#### **III.3.1 Perceived risk and the decision to smoke**

Smoking is an activity that according to an economic framework may be seen as the result of a "reasoned" action involving a set of perceived benefits and costs weighted by their risks. Therefore there are a set of benefits explaining why people smoke and a set of future losses, quitting costs\* [ see i.e Suranovic, 1999]. Assume that there are two states of the world, acquiring lung cancer or any related smoking disease leading to a determined utility level  $U(k)$  - that we suppose that is different from death - and good health utility (valuation) level  $U(h)$ , where  $U(k) < U(h)$ . From being in good health, individuals get a utility value depending on whether they are smokers or not <sup>xi</sup>. Individuals perceive a subjective probability of acquiring lung cancer regardless of being a smoker. This perception is denoted as  $\pi_{ns}$ , reflecting other determinants rather than smoking. Since information about the association of smoking and acquiring lung cancer is well known by individuals, the perceived probability of acquiring lung cancer if an individual smoke is  $\pi_s$ , where  $\pi_{ns} < \pi_s$ . Therefore, a rational individual following a discrete choice model would behave as :

$$\text{Max } [(1 - \pi_s)U_s(h) + \pi_s U_s(k), (1 - \pi_{ns})U_{ns}(h) + \pi_{ns} U_{ns}(k)] \quad (\text{III.1})$$

Equation III.1 reflects that individuals would compare the expected utilities of the two behaviours, choosing to smoke if :

$$(1 - \pi_s)U_s(h) + \pi_s U_s(k) > (1 - \pi_{ns})U_{ns}(h) + \pi_{ns} U_{ns}(k) \quad (\text{III.2})$$

therefore the latent variable is :

$$U^* = [(U_s(h) - U_{ns}(h)) - \pi_s (U_s(h) - U_s(k)) + \pi_{ns} (U_{ns}(h) - U_{ns}(k))] \quad (\text{III.3})$$

There is, the rational individual would smoke if  $U^* > 0$ , and analogously would not smoke otherwise.

Interpreting the results from (III.3): the first term refers to the current net benefits of smoking (say pleasure effects)<sup>xii</sup>. The second and third terms reflect the difference between the expected future losses of smoking if an individual smoke with respect to a non-smoker. According to this approach, a rational individual will smoke if the net benefits exceed the future losses. Thus, the decision to smoke depends on the perceived probability of acquiring lung cancer whether people smoke or not, as follows:

$$\partial U^* / \partial \pi_s < 0, \text{ and } \partial U^* / \partial \pi_{ns} > 0 \quad (\text{III.4})$$

**Conclusion III.1** An increase in the perceived risk of smoking diseases increases the expected utility loss of smoking, whereas an increase in the perceived risk of smoking diseases if not smoking reduces the expected utility loss of smoking. Therefore, the decision to smoke depends on the differential risk of smoking with respect to non-smoking<sup>xiii</sup>.

### III.3.2 The determinants of risk perceptions

In section 3.1 we assumed that the perceived probability of acquiring lung cancer was given. Since its a restrictive assumption, in this section we develop a Bayesian learning model (Viscusi, 1984) to explain the process that characterises the risk perceptions formation, focusing on prior beliefs and the role of the types of information that are to influence subjective probability, that is public -provided by informational campaigns - and private information -obtained for own experience and informal relationships - . We assume that individuals display a prior belief - quantified by a subjective probability - of the hazardous outcomes of smoking, that is a baseline belief ( $\rho_0$ ). However, as risks are not fully understood, individuals according to private and public information - provided by public informational policies- update their perceived risks, in such a way that if the perceived risks are sufficiently high, the perceived costs would be larger than the benefits, determining the decision to quit smoking.

More precisely, we assume that the perceived risk of non-smoking is null ( $\pi_{ns} = 0$ ) then the critical probability is given by:

$$\pi_s^* = \frac{U_s(h) - U_{ns}(h)}{U_s(h) - U_s(k)} \quad (\text{III.5})$$

Furthermore, how are perceived probabilities formed? According to the Bayesian learning model, individuals prior assessments (prior beliefs) are weighted by a cognitive parameter ( $\eta$ ), which determine the informational content of the individuals baseline beliefs<sup>xiv</sup>. Since individuals adapt their responses to their new information -reported by warning labels, antismoking campaigns etc - their latest information received from the true probability of acquiring lung cancer is  $\rho_1$ , and its weight is  $\theta$ , denoting the informational content of

the latest estimation of the true probability<sup>xv</sup>. Thus, outcomes from the learning adaptation process of the risky event are:

$$\pi_s^i = \frac{\eta\rho_0}{\eta + \vartheta} + \frac{\vartheta\rho_1}{\eta + \vartheta} \quad (\text{III.6})$$

and differentiating with respect to  $\vartheta$  we obtain :

$$\frac{\partial \pi_s^i}{\partial \vartheta} = \frac{\eta(\rho_1 - \rho_0)}{(\eta + \vartheta)^2} \quad (\text{III.7})$$

Equation III.7 indicates that if the new information is to convey a higher risk ( $\rho_1 > \rho_0$ ) then an increase in the informational content of new information increase individuals risk perceptions.

According to the assumptions of a Bayesian learning model, as individuals update their prior beliefs to the new information of the latest estimation of true probability of the hazardous event, they will underestimate high risks. That is, since  $\eta > 0$ , and increase in the level of true risk will cause a less proportional increase in the perceived risk as:

$$\frac{\partial \pi_s^i}{\partial \rho_1} = \frac{\vartheta}{\vartheta + \eta} < 1 \quad (\text{III.8})$$

**Conclusion III.2** Accordingly to (III. 8), individuals acting according to this model would underestimate high risks as has been pointed out by the empirical evidence (Benjamin and Doughan, 1997). Therefore, the role of public policy under this scenario is to is conveyed on affecting the informational content of the new information.

### III. 3.3. Determining the informational sources

A next step in order to extend the model as to capture different informational determinants is to distinguish between public and private information, since the informational content of the two types of information could affect differently the individual's risk perception, and consequently the decision to smoke. Accordingly, let's distinguish the latest estimation of the true probability depending on the informational source as  $p_{11}$  if comes from informational champagnes and  $p_{12}$  if it comes for own experience and other private sources. As before, the informational content parameter can be expressed as  $\vartheta_{11}, \vartheta_{12}$  depending on the public or private source of information. Under this assumptions we can re-write (III.6) as:

$$\pi_s^2 = \frac{\eta p_0}{\eta + \vartheta_{11} + \vartheta_{12}} + \frac{\vartheta_{11} p_{11}}{\eta + \vartheta_{11} + \vartheta_{12}} + \frac{\vartheta_{12} p_{12}}{\eta + \vartheta_{11} + \vartheta_{12}} \quad (\text{III.9})$$

Accordingly, we can determine the effect of an increase in the publicly provided information as:

$$\frac{\partial \pi_s^2}{\partial \vartheta_{11}} = \frac{\eta(p_{11} - p_0) + \vartheta_{12}(p_{11} - p_{12})}{(\eta + \vartheta_{11} + \vartheta_{12})^2} \quad (\text{III.10})$$

and the effect of an increase in private information as :

$$\frac{\partial \pi_s^2}{\partial \vartheta_{12}} = \frac{\eta(p_{12} - p_0) + \vartheta_{11}(p_{12} - p_{11})}{(\eta + \vartheta_{11} + \vartheta_{12})^2} \quad (\text{III.11})$$

**Conclusion III.3.** Results from III.11 indicate that if the informational content of public information increase, then the individuals risk perception will rise depending on the weigh of public information respect to private information in the risk perception formation. Moreover, from III.11 we can hypothesise that since young individuals are

more influenced than adult's respect by informational campaigns they should show higher risk perceptions



### **III.4. The Empirical Study**

Most of studies of the demand for cigarettes are based on national surveys using individual socio-economic characteristics in order to explain the differences in addiction and tastes (Lewit,1982;Chaloupka, 1991, Wassermann et al,1991) . Prices also show significant effects over consumption, price elasticity estimates are therefore especially relevant for taxation purposes (Garcia and Labeaga,1995). However, despite price elasticity's ranges from -0.2 to -0.5, according to Chaloupka and Warner (1999) most of the price effects is captured by the impact of price on smoking initiation and the effects of price in smoking cessation for adults. Moreover, there is evidence of a clear association between tobacco and other "unhealthy " goods such as drinking alcohol (Jimenez and Labeaga,1994) suggesting that smoking can become a relative proxy of overall health behaviour. However, more research is needed in order to clarify this question<sup>xvi</sup>. Finally some studies deal with behavioural aspects regarding the decision to smoke, Viscusi (1990,1992a) analyses smoking as a risk taking behaviour, finding some evidence on some specific behavioural bias emerging from the impact of information in the smoking behaviour. Hu et al (1995) focus on the demand for cigarettes introducing behavioural aspects by means of a double hurdle- model, his main finding is that high-risk behaviours tend to cluster around cigarette smoking.

In this empirical part of the paper we try to provide some additional insights on the risk perception influence in smoking. Even though this issue already has been analysed for the US, it's the first time that has been applied to a European country, where smoking regulation differs in many aspects. Moreover, one of the main limitations of the Viscusi (1990, 1992) paper was the assumption that lung cancer risks were a proxy of overall risks associated with smoking. In this paper we test this assumption by collecting information on heart attack such as pulmonary disease risk perception.

#### **II.4.1 The nature of the sample**

The data used in this study was collected through a national telephone survey conducted by a private firm INNER Research during June 1997<sup>xvii</sup>. From the best of our knowledge there is no specific survey available involving risks perceptions. Firstly, a telephone pilot questionnaire was designed and validated<sup>xviii</sup>. Those who took part were 18 and older, both male and female. The original sample was 2550 and it was made up using professional sampling according to region, province and municipality. The home selection was randomly designed by quotation from age and individuals, as presented in table III.1. Table III.11 shows that the sample selected is significantly representative of the Spanish population. Over a half of the sample were males, 49% were middle-low class and 40,2% were household maintainers. Table III.2, shows that about 35% of the population are smokers and the 96% have been smoking for more than a year, and the remainder were non smokers (65%) from which the about 26% were ex - smokers. Furthermore, table III.3 shows that there were more male smokers than female, probably explained by cultural and social role differences between them. The second feature displayed in table III.3 is that smoking increases with age however after the age of 30-44 it reduces significantly, due to quitting smoking and deaths. Moreover, another relevant feature is the large correlation between smoking and higher social strata.

Table III. 1.  
Socio - demographic variables

Variable	Category	Sample (%)	Spanish Population (%)
Sex	Male (1)	48,5	48,9 (1)
	Female (0)	51,5	51,0 (1)
Age	18-29	27,5	22,6 (1) (2)
	30-44	26,7	28,3 (1)
	45-59	21,7	22,3 (1)
	60+	24,0	26,9 (1)
	High	5,6	4,0 (3)
Social Strata	Middle High	16,9	7,9 (3)
	Middle	44,9	18,9 (3)
	Middle Low	18,9	49,1 (3)
	Low	13,7	19,5 (3)
Home sustainer	Yes	40,2	
	No	59,8	
Education	Less than primary	13,6	16,1 (3)
	Primary	37,6	53,0 (3)
	High school	32,3	14,1 (3)
	Middle studies	8,1	6,1 (3)
	Superior	8,3	9,7 (3)
Occupation	Firm owners	1,7	
	Agriculture worker	0,8	
	Liberal occupation	6,2	
	Managers and Directors	1,5	
	Specialist Professionals.	24,2	
	Civil servants	6,2	
	Industrial workers	3,5	
	Unoccupied	6,7	
	Retired	12,6	
	Students	13,9	
	Other	22,9	
Municipality Size	Less than 5.000 Hab.	15,4	15,89 (4)
	From 5.001 to 30.000 Hab.	27,6	25,6 (4)
	From 30.001 to 200.000 Hab.	27,8	15,59 (4)(5)
	More than 200.001 Hab.	18,4	42,9 (4)(5)
	Barcelona and Madrid	10,8	

(1) Statistics of the natural movement of population. INE. Madrid, 1996.

(2) The age interval is from 20 y 29 years, so its weigh is underestimated.

(3) Subdirección General de Epidemiología, Promoción y Educación para la Salud. Dirección General de Salud Pública. Encuesta Nacional de Salud de España 1995. Centro de Publicaciones. Secretaría General Técnica. Ministerio de Sanidad y Consumo, Madrid, 1997.

(4) Sensed population classified by municipalities, number of habitants. Anuario Estadístico 1995 INE. Madrid, 1995.

(5) The municipality dimension corresponds to 30.001 a 100.000 hab

**Table III. 2. Smoking Behavior**

	Sample		Spanish population (1)
	Frequency	Sample %	Population %
Smoke	879	34,5	36,9
Yes	1671	65,5	63,0
No	2550	100,0	
Total			
Non-smokers	77	4,5	
Ex-occasional smoker	1190	69,7	
Never smoked	440	25,8	
Ex-smoker			
Ex-smokers	6	1,4	
Less than 1 month	13	3,0	
1-3 months	19	4,3	
3-6 months	22	5,0	
6 months - 1 year	39	8,9	
1-2 years	29	6,6	
2-3 years	22	5,0	
3-4 years	23	5,2	
4-5 years	98	22,3	
5-10 years	168	38,2	
> 10 years	2	0,5	
Do not remember	440	100,0	
Total			
Smokers			
Soft Smokers	77	9,1	
< 3	176	20,9	
3-7	180	21,4	
8-12	297	35,3	
13-20	108	12,8	
Hard Smokers	4	0,5	
(>20 cigarettes per day)			
No answer	843	100%	
Total			
Time smoking	38	8,7	
< 6 months	22	5,0	
6 months - 1 year	68	15,7	
1-3 years	45	10,2	
3-5 years	98	22,3	
5-10 years	168	38,2	
> 10 años	2	0,5	
Do not remeber			

(1) Spanish State Heath Survey, 1995

Table III. 3. Smoking Profile Determinants

	Smoker (%)	Non smoker (%)
Sex		
Male	476 (38,5)	761 (61,5)
Female	367 (28,0)	946 (72,0)
Age		
18-29	312 (44,5)	390 (55,5)
30-44	313 (45,9)	368 (54,1)
45-59	158 (28,6)	396 (71,4)
60+	60 (9,7)	553 (90,3)
Social Strata		
High	62 (43,1)	82 (56,9)
Middle	150 (34,7)	281 (65,3)
High		
Middle	438 (38,3)	706 (61,7)
Middle	129 (26,7)	353 (73,3)
Low		
Low	65 (18,7)	284 (81,3)

Table III. 4. Smoking risks Beliefs (do you think smokers acquire a determined disease more than non smokers?)

Answer	Lung Cancer (%)	Heart Disease (%)	Lung Disease (%)	Diabetes (%)
No, the same	(6,3)	(12,6)	5,5	35,41
Yes, the smokers more	(90,1)	(79,6)	91,7	21,14
No, the smokers less	(0,5)	(0,9)	0,4	1,96
Do not know	(3,1)	(7,3)	2,4	41,49

Table III. 5. Variation in lung cancer risk perceptions distribution

Distribution of lung cancer risk perceptions(RISK)	smoker	Total	Age 18-29	Age 30-34	Age 45-59	Age > 69	Female	Male
Risk < ,05	0,040	0,024	0,008	0,027	0,043	0,023	0,032	0,016
,05 ≤ Risk < ,10	0,029	0,032	0,023	0,032	0,040	0,034	0,035	0,028
,10 ≤ Risk < ,20	0,115	0,083	0,058	0,090	0,095	0,095	0,105	0,063
,20 ≤ Risk < ,30	0,141	0,123	0,104	0,141	0,122	0,125	0,136	0,110
,30 ≤ Risk < ,40	0,076	0,069	0,070	0,073	0,065	0,069	0,081	0,056
,40 ≤ Risk < ,50	0,074	0,080	0,091	0,079	0,087	0,063	0,086	0,075
,50 ≤ Risk < ,60	0,191	0,195	0,182	0,203	0,175	0,222	0,161	0,228
,60 ≤ Risk < ,70	0,074	0,081	0,090	0,064	0,091	0,079	0,071	0,090
,70 ≤ Risk < ,80	0,081	0,109	0,138	0,097	0,098	0,100	0,099	0,119
,80 ≤ Risk < ,90	0,097	0,099	0,117	0,090	0,103	0,083	0,097	0,100
,90 ≤ Risk < 1,0	0,065	0,084	0,099	0,081	0,066	0,087	0,078	0,090
Risk = 1,0	0,017	0,020	0,020	0,025	0,015	0,022	0,018	0,022
Mean Risk	0,453	0,495	0,540	0,479	0,467	0,486	0,468	0,521
(standard deviation)	(0,273)	(0,269)	(0,258)	(0,273)	(0,272)	(0,268)	(0,276)	(0,259)
Sample size	735		691	661	524	576	1195	1257

Table III. 6. Variation in hearth attack risk perceptions distribution

Distribution of lung cancer risk perceptions(RISK	smoker	Total	Age 18-29	Age 30-34	Age 45-59	Age > 59	Female	Male
Risk < ,05	0,051	0,045	0,022	0,052	0,050	0,039	0,056	0,054
,05 ≤ Risk < ,10	0,037	0,031	0,016	0,040	0,032	0,030	0,034	0,038
,10 ≤ Risk < ,20	0,120	0,107	0,101	0,114	0,140	0,075	0,114	0,099
,20 ≤ Risk < ,30	0,160	0,141	0,114	0,167	0,157	0,126	0,146	0,139
,30 ≤ Risk < ,40	0,082	0,083	0,091	0,083	0,087	0,079	0,104	0,053
,40 ≤ Risk < ,50	0,080	0,073	0,065	0,074	0,073	0,072	0,058	0,094
,50 ≤ Risk < ,60	0,212	0,196	0,227	0,196	0,152	0,237	0,176	0,175
,60 ≤ Risk < ,70	0,064	0,083	0,098	0,064	0,074	0,092	0,069	0,100
,70 ≤ Risk < ,80	0,062	0,091	0,100	0,076	0,086	0,097	0,090	0,100
,80 ≤ Risk < ,90	0,072	0,076	0,087	0,062	0,072	0,081	0,081	0,077
,90 ≤ Risk < 1,0	0,044	0,057	0,064	0,058	0,065	0,050	0,051	0,056
Risk = 1,0	0,016	0,016	0,015	0,013	0,011	0,021	0,022	0,015
Mean Risk	0,411	0,444	0,481	0,415	0,420	0,467	0,430	0,446
(standard deviation)	(0,261)	(0,267)	(0,256)	(0,265)	(0,274)	(0,258)	(0,276)	(0,269)
Sample size	700	2335	667	627	635	654	503	537

Table III. 7. Variation in pulmonary diseases risk perceptions distribution

Distribution of lung cancer risk perceptions(RISK)	smoker	Total	Age 18-29	Age 30-34	Age 45-59	Age > 59	Female	Male
Risk < ,05	0,027	0,015	0,008	0,015	0,030	0,009	0,020	0,010
,05 ≤ Risk < ,10	0,022	0,023	0,011	0,026	0,026	0,030	0,023	0,022
,10 ≤ Risk < ,20	0,095	0,072	0,046	0,077	0,091	0,082	0,090	0,050
,20 ≤ Risk < ,30	0,114	0,107	0,081	0,110	0,116	0,126	0,125	0,090
,30 ≤ Risk < ,40	0,083	0,075	0,064	0,077	0,094	0,070	0,083	0,068
,40 ≤ Risk < ,50	0,081	0,067	0,072	0,081	0,051	0,061	0,071	0,063
,50 ≤ Risk < ,60	0,183	0,179	0,169	0,187	0,176	0,185	0,142	0,214
,60 ≤ Risk < ,70	0,082	0,083	0,094	0,072	0,082	0,085	0,087	0,080
,70 ≤ Risk < ,80	0,102	0,113	0,132	0,110	0,091	0,113	0,102	0,123
,80 ≤ Risk < ,90	0,079	0,122	0,149	0,106	0,125	0,103	0,120	0,123
,90 ≤ Risk < 1,0	0,090	0,101	0,131	0,101	0,083	0,081	0,095	0,106
Risk = 1,0	0,042	0,044	0,045	0,038	0,037	0,056	0,041	0,046
Mean Risk	0,499	0,539	0,595	0,524	0,502	0,522	0,516	0,560
(standard deviation)	(0,279)	(0,275)	(0,260)	(0,274)	(0,282)	(0,277)	(0,283)	(0,265)
Sample size	742	2466	693	664	534	574	1196	1270



### **III. 4.2 Individual perceptions smoking associated risks**

This study explores the risk perceptions of smokers and non-smokers with regard the best-known diseases related to smoking, that is lung cancer, heart attacks and pulmonary (lung) diseases. A first variable showing the baseline perception is whether smokers are more likely to acquire a related disease due to smoking more than non-smokers. Results from this question are shown in table III. 4. It shows that perceived risk is higher for smokers rather than non smokers (90,1% for lung cancer, 79,6 for heart disease, 91,7 for lung diseases). Moreover, a control variable was introduced as to capture the informational content of responses. In particular, individuals were asked if smokers would be more likely than non-smokers to acquire diabetes (an unrelated smoking disease). Answers show that individuals seem informed, as 77% of individuals did not assign a higher assessment to smokers. However there is a 21% of responses remaining that showed uninformed perceptions, what can be explain as a general negative attitude towards smoking since there is a large correlation between the smoking beliefs and the uninformed responses ( $\sigma = 0.64$ ).

The risk perception variable has been measured following Viscusi (1990) by asking people the following question : "for every 100 smokers how many will die due to lung cancer?"; therefore, the lung cancer fatality risks can be easily determined by just dividing the individuals responses by 100. According to table table III. 5, III.6 and III.7, showing the risk perception estimates by age groups for the three different diseases considered, the mean risk perceptions are higher for younger (0,540) and older individuals (0,467-0,521) respectively. Judgements about risk perceptions are to be influences by some well knows factors as the qualitative aspects of hazards, individual attitudes and societal views Pidgcon et al (1993). Accordingly, two equivalent hazards in epidemiological terms might still differ due to this factors. These results provide a first intuition of this features. In particular, younger individuals may be more influenced to risk information campaigns (negative advertising), and therefore they largely react to publicised information rather than the other age groups. The middle age groups show a

reduced risk perception, since its also the age group that shows a large share of smokers. However, older individuals show a different pattern probably due to the influence of own experience, increasing the risks perception. These explanations are clearly in line with the bayesian learning approach aforementioned. Using this approach, the elderly risk perception would outweigh publicised risks with own experience and private information. Finally, another relevant feature is gender differences. In particular, males show lower risks perceptions than female, what was an expected feature according to the percentage of males smoking. Moreover, the most interesting results is that smokers lower higher risk perception than non-smokers. This result seems robust according to the standard deviation. A t -test for equality of means has been carried out for the three diseases rejecting the null hypothesis of equality of means  $t=4.1511$  for lung cancer,  $t=3.4672$

for hearth attack and  $t=2.4529$  for pulmonary debases. Therefore, this result suggests that individuals seem to behave rationally according to the rational behaviour model outlined. Finally, a Chi square test has been carried out to test the hypothesis of equality between risk perception estimates, results confirm the rejection of this hypothesis at a 5% confidence level.

Epidemiological evidence suggests (CPS-II) that the fatality risk of lung cancer is about 0,22 what implies that the 13,8 of the full sample underestimates the true risk, and that the majority tend to overestimate the true risk. However, the fatality risk associated with heart attacks and pulmonary diseases do not show the same pattern according to scientific evidence (fatality risk  $\approx 1-3$  and  $10-12$ ). Therefore, a first result would suggests that people overestimate lung cancer risks, which is consistent with the section III Bayesian learning model. Since learning is partial, individuals tend to overestimate highly publicised such as low probability risks (Fishoff et al ,1981). However, since information on heart attacks and pulmonary disease risk may not be as publicised as lung cancer risks, this feature might explains why individuals risk perception are considerably lower.

**Conclusion III.4 :** Risks perception estimates are to be large according to scientific evidence, according to the Viscusi (1990) framework they appear to be biased upward. The first results seem quite consistent with the bayesian model since younger individuals show a higher risk perception than the older generations. The mean risk in our sample is 0,4935, which is significantly higher than the means risk of the Viscusi (1990) sample (0.426). This result suggests that Spanish respondents have already acquired substantial information about cigarette hazards. A substantial difference from the Viscusi framework is that the assumption that lung cancer risk can be contemplated as a proxy for overall risk cannot be held anymore according to these estimates.

#### III.4.3 The empirical model

The nature of the relation between smoking and its associated risks can be contemplated as endogenous. As it has been shown in section III.4.2, risk perceptions may be influenced by the smoking status. Therefore the perceived risk distribution could affect the consistency of the estimation following a two-equation model. In order to capture the existence of endogeneity we purpose according to Liu (1995) and Maddala (1983) a simultaneous equation model estimated by means of a two-stage procedure.

##### *a) The smoking decision*

Assume there are two states of the world acquiring or not acquiring lung cancer, a heart attack or a fatal pulmonary disease. Then an individual would smoke if the benefits from smoking (first term of the following equation) were to exceed the expected losses (second term of the equation) as follows<sup>xix</sup>:

$$(U(smoking) - U(don't)) + \pi(V - U(smoke)) > 0 \quad (III.12)$$

Equation (9) can be parameterised as follows using a linear model:

$$SMOKE_i^* = \beta_0 + \beta_1 RISK + \beta_2 X_i + \mu \quad (III.13)$$

where *RISK* reflects the smoking loss, *X* is the vector of variables involving the determinants of the smoking decision (age, household size, sex, etc) ,  $\beta_i$  refers to coefficient vectors and  $\mu$  is the random error.

However, since *SMOKE\** is not directly observable, we define a corresponding indicator variable *SMOKE* such that takes that value 1 is  $SMOKE_i^* > 0$ , and the value 0 otherwise. Assuming a normal distribution for the random term  $N(0,1)$  then a probit estimator could be used to estimate the parameters of (10).

#### b) The risk perceptions

The risk perceptions of the individual *i* with respect to the hazards *j* can be expressed according to the bayesian model by means of a linear equation as follows :

$$RISK_{ij} = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \varepsilon_i \quad (III.14)$$

where *X* refers to the vectors of variables associated with the information source. The intercept  $\alpha_0$  refers to the prior beliefs (Viscusi,1990), variables determining the experience such as age , education , sex and profession can be captured by the variable  $X_{1i}$ , and  $X_{2i}$  is assumed to capture those variables concerning general sources of information.

#### c) The two stage estimation

The two-stage procedure requires to estimate *RISK* and *SMOKE* by OLS and a ML probit model respectively, treating these variables as exogenous. After this, the second stage consists on re-estimating the former equation but substituting the *RISK* and *SMOKE* by its estimated values (Maddala, 1983). Let  $RISK = y_1^*$  and  $SMOKE = y_2^*$ , such that :

$$y_2^* = y_2 \begin{cases} 1 & \text{if } y_2^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (\text{III.15})$$

the reduced form may be represented by :

$$\begin{aligned} y_1 &= \Pi_1 X_1 + u_1 \\ y_2 &= \Pi_2 X_2 + u_2 \end{aligned} \quad (\text{III.16})$$

Since  $y^*$  is unobservable as a dichotomous variable, we can only estimate  $\frac{\Pi_2}{\sigma_2}$  where

$\sigma_2 = Var(u_2)$ , and therefore, the resulting estimation would be

$$y_2^{**} = \frac{y_2^*}{\sigma_2} = \frac{\Pi_2}{\sigma_2} X_2 + \frac{u_2}{\sigma_2} = \Pi_2^* X_2 + u_2^* \quad (\text{III.17})$$

As a result, the structural equation is :

$$y_1 = \gamma_1 \sigma_2 y_2^{**} + \beta_1' X_1 + u_1 \quad (\text{III.18})$$

$$y_2^{**} = \frac{\gamma_2}{\sigma_2} y_1 + \beta_2' X_2 + \frac{u_2}{\sigma_2} \quad (\text{III.19})$$

The estimation procedure defined by Maddala (1983) is to estimate by OLS (III.18) after substituting  $\hat{\Pi}_i X_i$  for  $y_i^{**}$  and estimating (III.19) by means of a ML probit model, after substituting  $\hat{\Pi}_i X_i$  for  $y_i$ .

Table III. 8.  
Lung Cancer Risk Perceptions Estimation(OLS)

Independent Variable	Model 1	Model 2	Model 3	Model 4
Age3545	-.0731697	0.000	-.0729096	0.000
Age4555	-.0362558	0.034	-.0475355	0.006
Age5565	-.0468264	0.005	-.074294	0.000
Age65	-.0596627	0.003	-.0966599	0.000
Gender	-.0563929	0.000	-.0396104	0.002
Household Size	.0036122	0.351	.0025438	0.507
Edu2	-.0162291	0.377	.0042568	0.841
Prof1		.0504442	0.579	0.618
Prof2		.1025736	0.030	0.035
Prof14		.0454957	0.005	0.009
Prof11		.0025008	0.912	0.579
cl5		.0587731	0.054	0.070
cl4		.0598943	0.024	0.029
cl3		.0518558	0.031	0.036
cl2		.0169421	0.516	0.613
Smokes			-.0423307	0.000
Smokes*				-5.08148
Affects the same		.2458616	0.002	0.003
Smokers more		.0737319	0.326	0.357
Intercept	.5630712	0.000	.598538	0.000
R-square	0.0212	0.0531	0.0578	0.5911
Adj.R-square	0.184	0.466	0.0509	0.5881
F	7.69	0.000	8.44	0.000
N	2497			199.01

Note: First column refers to coefficients and second column refers to p-value.

**Table III.9.**  
**Smoking probability equations for Lung Cancer Risk ( Maximum Likelihood Probit Model)**

Independent Variable	Model 1	Model 2	Model 3	Model 4				
Age3545	.0836097	0.276	.1261558	0.109	.0773059	0.333	-.0612114	0.497
Age4555	-.3400786	0.000	-.2907079	0.000	-.3257015	0.000	-.3873034	0.000
Age5565	-.811535	0.000	-	0.000	-.659793	0.000	-.7536376	0.000
			.6053818					
Age65	-.312501	0.000	-1.212509	0.000	-1.259489	0.000	-1.423074	0.000
Sex	.3590167	0.000	.2751763	0.000	.2643024	0.000	.1585668	0.016
Houmem	-.198074	0.291	-.0171711	0.368	-.0172393	0.376	-.0113141	0.553
Edu2	.17679	0.083	.1048364	0.369	.0914236	0.446	.0810483	0.486
Prof1			-.3979288	0.366	-.3692326	0.404	-.2739079	0.534
Prof2			-.2607169	0.243	-.1777168	0.435	.0084888	0.971
Prof14			.3276776	0.000	-.3028403	0.001	-.2083449	0.018
Prof11			.1303466	0.219	.1179913	0.271	.1319708	0.213
Cl5			-.2752435	0.068	-.2334077	0.128	-.1241301	0.424
Cl4			-.1768095	0.164	-.132744	0.305	-.0204936	0.877
Cl3			-.1036419	0.361	-.0761865	0.509	.025657	0.827
Cl2			-.2430399	0.049	-.2350947	0.061	-.2027855	0.101
Bcp1				0.155	.8591511	0.041		
			.2552352					
Bcp2			-.295456	0.050	.3669731	0.369		
RISK					-.350774	0.001		
RISK*							-2.519934	0.000
Intercept	-.4181838	0.001	.0997076	0.665	-.3711497	0.414	1.130575	0.001
pseudoR-square	0.0934		0.1095		0.1124		0.1062	
LR chi2(7)	308.12	0.000	361.30	0.000	359.92	0.0000	350.46	0.000
Log likelihood	-1495.932		-469.3439		-1420.7203		-1474.7629	
N	2571							

Note: First column refers to coefficients and second column refers to p-value.



**Table III.10.**  
Heart Attack and Pulmonary Disease Risk Perceptions (OLS)

Independent Variable	Heart Attack		Pulmonary Disease					
	Model 1	Model 2	Model 1	Model 2				
Age3545	-.0659502	0.000	-.0546783	0.002	-.0000797	0.741	-.000039	0.872
Age4555	-.0380489	0.034	-.065318	0.002	.0000784	0.749	-.0001864	0.537
Age5565	-.0633034	0.000	-.1146426	0.000	.0004076	0.095	.000401	0.101
Age65	-.0130807	0.557	-.0942036	0.020	.0002575	0.395	-.0000332	0.930
Gender	-.0437128	0.001	-.0206913	0.199	-.0000183	0.919	.0000684	0.720
Household Size	.0081768	0.039	.0066794	0.096	-.0001457	0.007	-.0001689	0.003
Edu2	-.0069622	0.753	-.0041487	0.851	.0001163	0.698	.0003466	0.294
Prof1	.0671165	0.520	.0401861	0.702	-.0011598	0.376	-.0017108	0.207
Prof2	.0348728	0.465	.0129182	0.790	.0003741	0.577	.0007833	0.269
Prof14	.0140115	0.402	-.0049155	0.790	-.0002825	0.216	-.0002862	0.210
Prof11	-.0199759	0.393	-.0070379	0.769	-.0001745	0.591	-.0002187	0.501
cl5	.0103357	0.743	-.0128542	0.697	-.0000409	0.925	-.0003614	0.452
cl4	.0414199	0.127	.0253356	0.365	-.0002049	0.585	-.000354	0.362
cl3	.0246464	0.167	.0239351	0.339	-.0004771	0.163	-.0006556	0.069
cl2	-.0213352	0.425			-.0006617	0.075		
Smokes	-.0369782	0.003	-0.367845	0.001	-.000287	0.094	-0.003012	0.045
Smokes*			-2811545	0.006			.0039916	0.094
Intercept	.469686	0.000	.583873	0.000	.0208827	0.000	.01962	0.000
R-square	0.0318		0.0313		0.0128		0.0128	
Adj R-square	0.0318		0.0248		0.0112		0.0066	
F	4.86	0.000	4.78	0.0000	2.07	0.0074	2.07	0.007
N	2384		2384		2571		2571	

Note: First column refers to coefficients and second column refers to p-value.

**Table III. 11.**  
Smoking probability equations (Heart Attack and pulmonary disease) ML Probit model.

Independent Variable	Heart Attack		Pulmonary Disease					
	Model 1	Model 2	Model 1	Model 2				
Age3545	.1016432	0.214	.1259756	0.109	-1.592435	0.000	-.4665906	0.000
Age4555	-.2942152	0.001	-.2905175	0.000	-1.200624	0.000	.227465	0.036
Age5565	-.6173425	0.000	-.6031141	0.000	-2.168062	0.000	2.329372	0.000
Age65	-1.249875	0.000	-1.213525	0.000	-1.431048	0.000	.8096137	0.000
Sex	.2528077	0.000	.2752241	0.000	-.9176475	0.000	.0376234	0.627
Houmem	-.0130132	0.512	-.0182302	0.340	.1937542	0.000	-.9627765	0.000
Edu2	.0871773	0.482	-0.324503	0.357	-.0611071	0.649	.72804	0.000
Prof1	-.5032017	0.326	-.4067485	0.355	1.331966	0.006	-7.661003	0.000
Prof2	-.2259674	0.318	-.6574391	0.245	.6212574	0.015	2.456505	0.000
Prof14	-.3452367	0.000	-0.33456	0.000	.012006	0.903	-2.203394	0.000
Prof11	.1306379	0.231	.130233	0.220	-.3891803	0.001	-1.179649	0.000
C15	-.3225441	0.041	-.2778276	0.065	-.0411513	0.808	3.036404	0.000
C14	-.1862373	0.157	-.1793251	0.158	.8637863	0.000	2.020594	0.000
C13	-.090356	0.440	-.108361	0.339	.7286003	0.000	.2180874	0.007
C12	-.2294586	0.071	-.2489851	0.044	-.8318844	0.000		
Bcp1	.2632644	0.244	.1624098	0.407				
Bcp2	-.2827221	0.159	-.3556982	0.025				
RISK	-.2773374	0.007			-26.19884	0.000		
RISK*			7.658112	0.002			-6767.122	0.000
Intercept	.2206041	0.427	.3458583	0.266	11.80285	0.000	136.7784	0.000
pseudoR-square	0.1124		0.1099			0.3152	0.5001	
LR chi2(7)	343.70	0.000	362.68	0.000		1040.2	1650.32	
Log likelihood	-1356.670		-1468.651		-1129.8804		-824.83115	
N	2384		2571		2571		2571	

Note: First column refers to coefficients and second column refers to t-value.

### **III.5 Results**

Table III. 8 show four specifications representing alternative estimations of the lung cancer risk-perception. Model 1, includes only a set of four demographic variables and education. Compared with the youngest cohort (age 18 to 24) that is the omitted reference group risk perceptions are to reduce with age until an age 45 that starts rising. This follows a pattern of an U, and suggest that since public information has increased in the last 20 years, the youngest age group is the one that shows a larger risk perception than its following cohort. However, due to the effect of experience, people update their previous beliefs and therefore risk perception starts rising. Males show a lower risk perception than female, probably due to traditional causes such as they are the collectives than show higher smoking habits. Education does not show significant effects over risk perceptions such as the household size, the omitted group refers to those individuals not holding a high school qualification.

Model 2 also includes professional determinants, in particular firm owners, non working women and the unemployed, and additional variables included is social class (a proxy for income). Social class displays a clear effect over the risk perceptions, however these results do not seem robust compared with other equations (the omitted dummy variable is the variable referring to high class). Model 3, includes a dummy variable for whether the respondent is a current smoker (non-smokers and ex-smokers are the omitted group). As the bayesian model predicts, current smokers have a lower risk perception, for current smokers 4.2 percent points decrease the risk perception. These results are clearly higher when the current smoker status is treated as an endogenous variable (Model 4) and a Hausaman test (1978) has been carried out to test the endogeneity<sup>xx</sup> and there is clearly a significative effect between the considered parameters, therefore we cannot accept that risk is endogenous.

Table III. 9, show the smoking probability equations for lung cancer. As anticipated, the risks of cigarette smoking show a significant effect on the smoking probability, results

seem robust and signs remain quite significant in all equations. Results show that respondents in the middle age group show a high propensity to smoke, the effect of education is not significant, risk beliefs show a significant effect, those individuals that do not accept that smokers are subject to higher risks show a higher smoking probability. Finally, a Hausman test (1978) has been carried out in order to test the endogeneity showing that the difference between the estimates of model 3 and 4 is statistically significant, thus we can reject the hypothesis that risk is exogenous.

Table III. 10, shows the determinants of other well-known diseases associated with smoking, health attacks and pulmonary disease. They show a similar pattern as in lung cancer case for health attack, however this is not the case of pulmonary disease. In general heart attacks follow the same pattern as lung cancer disease, however estimates for pulmonary disease is clearly different, we cannot reject that risk perceptions are to be treated as an endogenous variable.

### **III.6 Concluding Remarks**

This paper has provided some evidence of the rationality assumptions underlying smoking behaviour. We have presented an explanation of the smoking risks perception according to a bayesian framework. We estimate the smoking risks perceptions and we estimate a simultaneous equation system to test the hypothesis of risk perception on smoking behaviour. The hypothesis to contrast empirically where that risk perception has a negative effect on the smoking probability and that risks perception may be explained by the bayesian framework.

Results suggest that smokers seem to be consequent of the risks they assume when smoking. In fact, they overestimate smoking risks, despite they differ depending on the nature of risk considered. The interpretation we provide is that largely publicised risks as smoking are to be overestimated such as lower probability risks. Overall results indicate that risks perceptions of smoking are substantially overestimated. Our findings confirm that respondents seem to behave according to the Bayesian learning model, since the model predict adequately the role of the different informational sources. We have tested the endogeneity for the sample considered, except for the pulmonary disease there is no evidence of endogeneity. We have test also the Viscusi assumption to treat all lung cancer as a proxy of other risks, results suggest people seem to discriminate between different kinds of risk . The public policy implications of this paper are of great relevance if informational policies are to depend on perceived risks. If individuals are to behave according to the perceived risks are overestimated, then the additional effect of new informational policies would be clearly small.

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<sup>i</sup> A version of this paper has been presented in *XLIX Jornadas de Economía de la Salud*, Zaragoza, 1999. Financial support was received from Philip Morris Spain.

<sup>ii</sup> In our case the distinction between risk and uncertainty has no sense according to the definition set out by Knight (1920). The Bayesian approach assumes that any uncertainty involved in the decision problem regarding the values of the variables taken into account can be expressed by means of a joint probability distribution of those values. In this paper we develop a Bayesian framework where every event can be described as holding a subjective probability by the decision-maker. Therefore, uncertainty would appear when the outcome of any decision is not accurately predictable.

<sup>iii</sup> Since, risk perceptions rely on the capacity of individuals to perceive and judge their behaviours according to its expected outcomes and consequences<sup>iii</sup> (Weber and Milliman, 1997; Gaba and Viscusi, 1998).

<sup>iv</sup> As smoking is the most important cause of chronic bronchitis, increasing the risk of dying from the disease and from the emphysema.

<sup>v</sup> In order to prevent such diseases and its consequences, health policy plays a major role on preventing individuals from the hazards of smoking. However, despite the higher publicity of health risks, a large part of individuals continue smoking, despite risk informational programs seem to shift the knowledge about the hazards associated with smoking (Viscusi, 1992).

<sup>vi</sup> Usually applied not just for protecting the rights of the non smokers but inducing smokers to deprive themselves from smoking in those places where smoking is not permitted, and therefore providing smokers with incentives to quit smoking. This kind of policies are extendedly applied in Europe (see European Directive 89/622, 1 January 1992).

<sup>vii</sup> This approach has been the traditionally argument of clinicians, as they conceive the smoker as an addict that is unable to predict the future consequences of its behavior.

<sup>viii</sup> We introduce the concept of relative risk instead of the perceived risks developed by Viscusi (1990).

<sup>ix</sup> The relevant effects of a smoking information campaign in this context is that if informational policies are just introducing more information about the effects of smoking in health without giving a precise value of their effects, then the perceived risks will increase, and therefore the accuracy of information is dismissed.

<sup>x</sup> Quitting costs are conceived as a future utility loss associated with the feature that smokers are expected to increase the probability of dying earlier than non smokers.

<sup>xi</sup> We standardise the number of cigarettes, considering that an individual is a smoker if the number of cigarettes smoked a day is to overcome a determine number.

<sup>xii</sup> The social costs of smoking and the quitting costs could be introduced as a negative entry

<sup>xiii</sup> The differential risks of smoking could explain why those people living in an urban habitat, are to smoke more than individuals in a rural habitat. In particular, the opportunity costs of smoking in an urban habitat are worth respect to the rural habitat, due to contamination and other possible events increasing the risk of having lung cancer without smoking.

<sup>xiv</sup> According to Viscusi (1984), this parameter is defined as the equivalent number of draws from a urn representing information.

<sup>xv</sup> We assume that probabilities follow a beta distribution adjusted by a Bernoulli-type process.

<sup>xvi</sup> See Hu et al,(1995).

<sup>xvii</sup> The framing system implemented was a computer assisted survey extended to the whole Spanish regions including Balears and Canarias

<sup>xviii</sup> The results from this pilot survey induced to frame a more precise questions

<sup>xix</sup> We assume that when individual is affected by the smoking associated risks would quit smoking having a payoff of  $V$

<sup>xx</sup>  $\chi^2(18) = 11342.70$



## **Tercera Part**

The rationality of risk shifting :  
application to acute and chronic  
illness insurance



*"The failure of the market to insure against uncertainties has created many social institutions in which the usual assumptions of the market are to some extent contradicted. The medical profession is only an example, though in many respects an extreme one".*

J.K. Arrow (1963). *Uncertainty and the welfare economics of medical care*. American Economic Review, 53, 941-969.



## **Capítol IV.**

The demand for private health insurance in National Health Systems





## ABSTRACT

Why do individuals demand private health insurance when a National Health System (NHS) finances health care? This paper investigates the role of the attitude towards the NHS as a prior decision process enhancing the demand for private health insurance by means of an application to a the Catalan Health System. We focus on the particular benefits associated with private health care. Especially we consider the determinants explaining why the public health system may not provide satisfactory health care to some users, and therefore they are compelled to search for additional coverage (conceptualized as access benefits) in the alternative private system. A simple model is outlined as describing the decision process and an econometric two-process estimation has been carried out. The estimation results suggest that there may be two processes underlying the health insurance demand, a first process defining the attitude towards the NHS and a second process defining the purchase of private health insurance. The public policy implications relate the development of the private health insurance market to the attitudes and benefit perceptions from health care received from the NHS.

*Key words:* private health care, health insurance, attitude towards the NHS.  
*JEL Classification:* I1; G1



## **IV.1 Introduction**

In many countries the health care financing is dominated by the public sector. However, in some of these countries the publicly financed health care competes with a private health care sector that seems to maintain or increase its share in the total population despite health system reforms. In health care such as in education, there are some interaction between the public and private health sectors for certain goods and services<sup>i</sup>. This paper explores this issue as to determine the demand for private health insurance under National Health Systems (NHS) focusing on an application to the Catalan health system. As in the vast majority of countries, private health insurance does not reduce the access to NHS care, but acts as an additional coverage for its beneficiaries<sup>ii</sup>. Therefore, private (voluntary) health insurance (PHI) can be viewed as a limited "market" substitute for the publicly financed health insurance<sup>iii</sup>. Probably the main characteristics that distinguish privately financed health care from the publicly financed is to some extent the "flexibility" of private health care to deal with the population needs, as Besley et al (1996) show for the UK, there is a middle age upper-class individuals that are relatively the well off if they purchase PHI rather than if they do not<sup>iv</sup>.

According to Besley et al (1999) health care financed by NHS differs from the one privately financed in terms of the limitations in catering the diversity of tastes in the population. The explanation of this feature mainly relies on the fact that health care is a private good despite the existence of ethical and equity motives justifying its public subsidization. Therefore, if the NHS is the main financier and does not fulfill the individual demand for insurance coverage, it seems logical to expect in a market economy the development of alternative insurance mechanisms dealing to cover some "quality" gaps of the main public provider. This is especially true for elective procedures where people are placed in waiting lists, but also it may be true in general, whenever access restrictions limit the provision of medical care. Finally, quality gains may explain also part of the demand for services, this would be the case of the

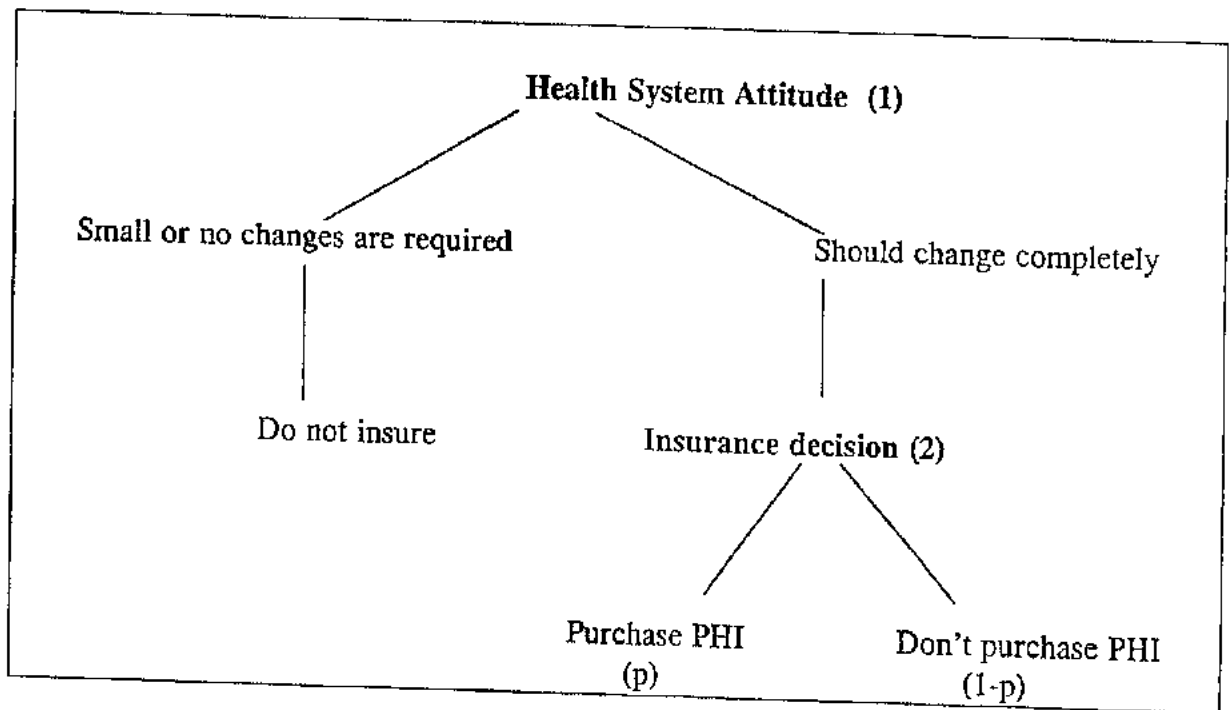
"residential or hotel benefits".

If its true that the development of the private health insurance has to do with some failures in the public provision of health care , then we hypothesize that the decision to purchase a PHI should be dependent on the evaluation individuals undertake from the publicly financed health care. We shall attempt to explain the decision process underlying the demand for PHI as relying on two processes rather than one<sup>v</sup>. A first process is linked to the perceived access to publicly-financed health care<sup>vi</sup> and other benefits conceptualized in terms of the attitude towards the NHS<sup>vii</sup>, and a second process is that of the choice between the insurance and no-insurance prospect (figure IV.1). However, it should be noted from figure IV.1 that the no-insurance prospect does not mean holding no health insurance coverage, but receiving publicly financed health care and eventually purchasing private health care by out - of - pocket expenses. Some empirical support to this decision model may rely on Calnan et al (1993), suggesting that people with PHI are more dissatisfied with the NHS, and tend to emphasize the individual responsibility for health care. Moreover, Propper and Burchardt (1999) found that those holding PHI are less likely to support universal for of health care, and therefore less likely to agree on the necessity to increase NHS expenditure.

Since estimating the demand for PHI without taking into account alternative determinants of the decision process may produce inconsistent estimates, the study undertaken in this chapter differs from the previous Spanish applications [such as Gonzalez,1996 and Szabó, 1997] in some aspects, primarily the nature of the decision process, the empirical application and the source of the data . First, we focus on explaining the interaction between the public and the private health system. Hence, the main variable we rely on is the *attitude towards the NHS*<sup>viii</sup>. Second, since the Catalan health system differs in some aspects from the Spanish health system, we could expect some different results concerning the demand for PHI in Catalunya<sup>ix</sup>. Third, the source of the data used has not been obtained from a General Household Survey as Gonzalez (1996). Instead the database employed is a representative health survey - the Catalan Health Survey - ,

containing data on health related variables and therefore capturing the adverse selection and moral hazard effects.

Figure IV.1 The decision to purchase PHI



The aim of this chapter is twofold. Firstly, it examines the rationality of the underlying decision process that determines the purchase of private health insurance. We sustain that the health insurance purchase is closely linked with a negative attitude towards the NHS. Secondly, according to the results obtained we provide some insights to the public policy debate on the role of private health insurance under NHS<sup>x</sup>. The relevance of the PHI purchase derives from the importance of studying an aspect concerning the health system reforms. In particular, how NHS reforms may affects welfare benefits. Furthermore, since some research shows that there may be cone connection between private welfare benefits demand , this research may be fitted in a amore general discussion dealing to study the characteristics of the demand of relevant private welfare benefits in Catalunya<sup>xi</sup>. Our findings confirm that the decision to purchase a private health insurance may not be independent on the attitude towards the NHS . We also

have found a host of individual and household characteristics associated with the demand for PHI .

The remainder of the chapter is as following. In section 2 we review previous applications undertaken in similar health systems and we outline the decision model explaining the choice of PHI. In section 3, we analyze the basic characteristics and previous evidence from the Catalan PHI market, we describe the nature of the sample employed and the econometric specification based on theoretical arguments. Estimation results are presented in section 4. Section 5 concludes.

## **IV.2 The choice of private health insurance**

### **IV.2.1 Conceptual background**

Private health insurance under the existence of a public health care supply and financing (NHS) may be seen as a market mechanism to avoid the costs associated from obtaining additional private health care from the one publicly offered. Thereby, following this assumption, private health insurance would develop a relevant function covering an unrealized demand that otherwise would not be covered<sup>xii</sup>. Evidence from qualitative research obtained from two focus group discussions (Costa, Rovira and Berenguer, 1999) suggests that the major benefits of purchasing PHI are concerned with improving the immediate access to some particular health services such as public attitude towards the publicly financed health care<sup>xiii</sup>. However, a relevant feature arising from this discussion was that some of the participants holding private health care private insurance show a negative attitude towards the NHS, suggesting that probably the decision process leading to PHI should be conditioned on this attitude<sup>xiv</sup>.

The traditional approach for explaining health insurance demand has a main reference in the feature that people dislike risks [Arrow,1963]<sup>xv</sup>. Accordingly, assuming that health risks are privately insurable, health insurance demand is contemplated as the consequence of risk shifting behavior<sup>xvi</sup>. Pauly (1968) introduced the moral hazard argument phenomenon, and thereby explained why risk-averse individuals may be willing to pay more than the "actuarial fair premium" to shift the risk of suffering a welfare loss due to illness. However, recent studies for the US health system (Feldman and Dowd, 1991; and Manning and Marquis, 1996) suggest that the moral hazard loss constitute the major explanatory variable for the purchase of PHI<sup>xvii</sup>. This feature suggests according to Nyman(1999), that the access to health care constitutes the main determinant of the purchase of PHI<sup>xviii</sup>. Therefore, the demand for PHI under a NHS may also be interpreted as that the existence of access limitations reflected by the attitude



towards publicly provided health care could emerge as a relevant determinant for the demand of PHI<sup>xix</sup>.

In the Spanish context the best known recent study dealing with the analysis of the determinants of the demand for private health insurance are Gonzalez (1996). In this study she deals with the determinants of the demand and expenditure for both compulsory and voluntary PHI. The main relevant results suggest that income and some professional activities are associated with the demand for PHI. However, due to the source of the data there were some relevant variables missing. In particular, those associated with adverse selection or access to public health care. Another relevant paper has been Szabó (1997) aiming to test the endogeneity such as health care use and the purchase of a HCI, final results suggest that socioeconomic and demographic variables explain constitute the major factors associated with the demand of PHI, however its results reject the hypothesis of endogeneity and the presence of adverse selection<sup>xx</sup>. Other related studies are Palenzuela (1997) which find some evidence of risks selection and firm service selection Murillo et al (1996) and Lopez (1998) focus on the determinants of the private health care financing and the heterogeneity of health care demand respectively. Results from the two papers claim for the possible effects of co-payments care such as the effect of access limitations in publicly financed health, since they may affect the use of this source of health care encouraging private health care consumption.

Nonetheless, the basic references for this paper have been Propper (1993) and Besley (1998,1999). The first one attempts to investigate the role of the captivity problem<sup>xxi</sup> in the UK private health insurance market while the second one provides evidence of the role of the health care failures of the NHS as to explain of the demand for private health insurance. Nevertheless, the two papers share a main issue, the demand for private health insurance when a NHS is the main agency financing health care is not independent of the role of the NHS is providing health care. Even though Propper (1993) findings set up the importance of non-economical determinants (such as political concerns) in

explaining the demand for PHI, she found no evidence of captivity as defined in a two-stage process. Besley et al (1998,1999) provides clear evidence of the importance of the quality indicator as to base a previous process of PHI demand. The idea is that one of the indicator users employ to evaluate the quality of health care are waiting lists, since they may reduce satisfaction towards the NHS. Additional evidence of this issue is found in Calnan et al (1993) , they find that people purchasing PHI are more dissatisfied with the NHS. Therefore , one interpretation of this results is that the more unsatisfactory coverage of the NHS, the larger is the share if the private medical care, virtually purchased by means of PHI mechanisms.

#### IV.2.2 The basic model

Let us consider an individual obtaining utility from health  $H_i$  and net consumption  $C_i$ <sup>xxii</sup>  $U(C_i, H_i)$ . Health is produced from medical care and other goods,  $H_i = (M_i, Z_i)$ . Under a NHS, medical care ( $M_i$ ) is supposed to be composed by public ( $M_{ii}$ ) and private medical care ( $M_{pi}$ ) . Assuming a simple additive function, total medical care is can be viewed as composed by publicly financed medical care offering a basic and general coverage, and privately financed health care that has a supplementary role for some services, i.e when long term waiting lists are large<sup>xxiii</sup> and a complementary role i.e in the case of hospital benefits . The main difference between the two sources of medical care is that public medical care does not reduce net consumption –since its publicly financed- whereas private medical care does. However, the explanation for the demand for private medical care relies on the welfare loss associated its role, that is the use of some public medical care as a consequence of waiting lists and queues. Therefore the utility of holding private and public medical care is at least as higher as the utility of holding only public medical care,  $U(M_i) \geq U(M_{ii})$ <sup>xxiv</sup>. Finally,  $Z_i$  refers to a composite of other health inputs that are assumed not to influence the decision to insure. Therefore we can write a state-dependent utility function as a continuous, twice differentiable and concave function respect to consumption, however we assume for simplicity that medical

care, yields no utility itself in a healthy state<sup>xxv</sup>:

$$\begin{aligned} U_i^{sh} &= U(H_i(M_1, M_2, Z_i), C_i) \\ U'_c &> 0, U''_c < 0, U^h(M_i) = 0 \end{aligned} \quad (IV.1)$$

If private insurance is purchased, then consumption will be reduced to  $C_i - P_i$ , where  $P_i$ <sup>xxvi</sup> refers to the insurance premium and therefore the utility loss caused by a known premium payment equals  $U(C_i) - U(C_i - P_i)$ . Therefore, the role of PHI is to provide annually private medical care, which is assumed to be cheaper than purchasing the same amount out-of pocket ( $M_i > P_i$ )<sup>xxvii</sup>, and therefore the welfare loss of not insuring private medical care is  $U(C_i - P_i) - U(C - M_i)$ . The probability of requiring medical care is  $\pi_i$ , lying between  $0 < \pi_i < 1$ <sup>xxviii</sup>. Let us assume for simplicity that fair insurance policies are offered at a price equal  $\pi_i M_i = P_i$ , where the price of private medical care is normalized<sup>xxix</sup>.

Form these assumptions, we may outline a simple insurance decision process as resulting from the comparison of three different prospects, mainly described in the Figure V.1. Without a publicly financed health care, the insurance decision could be immediately explained by the comparison of two prospects. However, here we want to note that the existence of a NHS shifts largely the decision process since now the PHI purchase is going to rely on the utility of the different sources of medical consumption. Essentially the three different prospects considered are :

A first prospect where no PHI is purchased and private medical care is consumed, a second prospect where it is purchased and no private medical care is consumed and finally we may consider a third prospect where PHI is purchased regardless of if its used or not.

In the first case, if no PHI is purchased, and the individual opts to purchase private medical care out-of-pocket due to eventual need, under a sick health state, the individual would suffer a welfare loss - as it reduces net consumption - whereas under a healthy state no welfare loss will happen. The expected utility of this first situation may be described as:

$$EU^1_i = \pi_i U_i^s(M_i, C_i) + (1 - \pi_i) U_i^h(0, C_i) \quad (IV.2)$$

A second prospect may be defined by a the case where no PHI is purchased and private medical care is not purchased anyway, i.e due many reasons as satisfaction with the publicly financed health care, but also we may include political reasons [ Calnan et al (1993), Propper 1993, Besley et al, 1996] and other related factors. We may represent its expected utility as:

$$EU^2_i = \pi_i U_i^s(M_{ii}, C_i) + (1 - \pi_i) U_i^h(0, C_i) \quad (IV.3)$$

Finally, if PHI is purchased, then during the period of coverage the expected utility would be:

$$EU^3_i = \pi_i U_i^s(M_i, C_i - \pi_i M_{2i}) + (1 - \pi_i) U_i^h(C_i - \pi_i M_{2i}, 0) \quad (IV.4)$$

The net gain from PHI when *no private medical care is purchased* the resulting weighted average from the expected welfare gain if illness occurs, the net welfare gain from private medical care and the premium costs if illness does not occur.

$$\pi_i [U_i^s(M_{ii}, C_i) - U_i^s(M_i, C_i - \pi_i M_{2i})] + (1 - \pi_i) [U_i^h(0, C_i) - U_i^h(C_i - \pi_i M_{2i}, 0)] \quad (IV.5)$$

However, if under the illness state *private medical care is purchased*, then the decision would result from out-weighting the benefits for a reduced price of medical care is illness

occurs and the advanced premium cost does not occur.

$$\pi_i [U_i^s(M_{2i}, C_i - M_{2i}) - U_i^s(M_i, C_i - \pi_i M_{2i})] + (1 - \pi_i) [U_i^h(0, C_i) - U_i^h(C_i - \pi_i M_{2i}, 0)] \quad (IV.6)$$

From this simple model we can state some primary results to be tested empirically. (i) The amount of private medical expenses expected to be used during every period is a variable that encourages the demand of PHI. (ii) They increase the quality and access of publicly financed health care, as reducing the benefits of insuring, discourages the purchase of PHI. (iii) One of the major problems of the demand for HCI is the presence of *adverse selection*, since we can only detect adverse selection from observed health status while tastes are to be unobservable. We may expect that there is a *positive relationship between coverage and the use of health services*, however, the presence of a NHS may undermine the effects moral hazard effects inherent to health insurance. (iv) The higher illness probability would increase the demand of PHI<sup>xxx</sup>. Therefore, age is a relevant variable influencing the demand for PHI, accordingly we hypothesize that younger individuals show a reduced probability of illness. However other possible age influences may relate us to consider the maternity period as increasing the willingness to insure. Finally, (v) *income and more generally wealth*, are frequently related variables predicting the demand for PHI, as greater wealth implies a higher possibility to afford welfare lost from PHI costs. In general, the  $U(C_i)$  becomes flatter with income, that people with increasing income are more likely to insure.

**Conclusion IV. 1** The decision to purchase a private health insurance is the result of a three stage evaluative process relying on the access to and quality of the publicly financed health care. Expected private medical care, age and wealth are expected to influence the demand for PHI. If the quality and access to health care publicly financed is large, then people might prefer not to purchase a private health insurance, since the expected benefit from not paying the health insurance premium and eventually consuming out of pocket private medical care outweighs the health insurance costs.

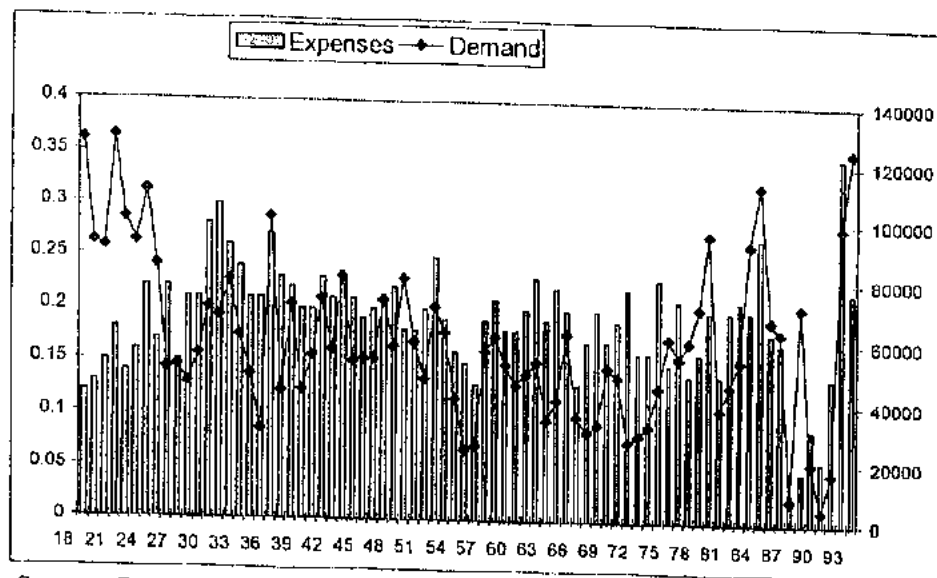
### **IV.3. The Empirical Approach**

#### **IV.3.1 An overview of the Catalan health insurance market**

Despite the NHS in Catalunya covers the 98,1% of the population (Enquesta de Salut de Catalunya, 1994), the PHI market shows a large size<sup>xxxi</sup>. Moreover, the size of insured the population has not varied significantly from 1991, covering approximately 1,400,000 individuals which is equivalent to the 22.74% of the Catalan population [Enquesta d'Assegurances Lliures, 1997]. The majority of insurance policies purchased are medical care policies usually under the form of indemnity<sup>xxaii</sup>. Evidence from Spain suggests that approximately 4 million individuals have purchased during 1997 some kind of voluntary private health insurance what is approximately the 15% of the total population [Freire, 1999]. In the UK, estimates of PHI coverage lie between the 14-17% of the population and has increased form in the last year . However, in social security systems we may find larger shares of PHI, i.e the most clear reference is the Netherlands with a share of PHI around the 30%. Therefore, the health insurance market in Catalunya is large compared with the two previous reference systems, but is not as large as other social security systems.

The age pattern of insurance purchase and expenses is displayed in figure VI.2, showing that the demand for PHI in Catalunya seems to show a U shape. That is the share of privately insured decreases until the age of 30, and remains stable up to the late sixties that starts rising again. Moreover, the price of insurance increases at the age of 40 displaying a large variance and increases again around the sixties . Therefore, health expenditures show an opposite pattern than the one of PHI purchase until some middle age around 55 , and after that lies beside the PHI purchase curve.

Figure IV.2  
Observed PHI purchase and expenses



Source : Enquesta de Salut de Catalunya, 1994.

The Catalan health insurance market is made up of approximately 63 entities, however showing a high concentration degree - the eight main insurers capture the 70% of the market in 1997 - <sup>xixiii</sup>. Moreover, table IV.1 shows that the greatest part of the Catalan health insurance market is concentrated in Barcelona (78.6% of the insured). In relative terms, it consists of around 23% of the total population what is a higher share than in Tarragona (17%) and practically the same as in Girona and Lleida (22%). The medium cost of an PHI policy, differs from every province between 51,555 in Tarragona to 63,883 in Barcelona. This can be explained by the large number of facilities and private health care concentrated in Barcelona.

**Table IV.1.**  
Insured individuals by Catalan provinces

Provinces	Total (number individuals)	Share of total population	Share of total province population	Mean Premium Cost (ptas)
<i>Barcelona</i>	1,052,355	78.6	23	63.883
<i>Girona</i>	113,780	8.5	22	51.287
<i>Lleida</i>	76,920	5.7	22	57.162
<i>Tarragona</i>	96,108	7.2	17	51.555

Source: Direcció General de Recursos Sanitaris, 1998

Examining the purchase of private health insurance in Catalunya, there are some features that appear to be relevant. Age appears to be a relevant determinant of the demand for private health insurance since the use of health service shows a positive relationship with the lifecycle (Propper, 1993; Gonzalez, 1996). From Table IV.2 we can observe that there are clear differences from the point of view of age. The largest insured group is the one between 15-44 years (41.6%) followed by the elderly - >65 year old - (22.1%) and the age group between 44-64 years old that shows slightly the same share (21.8%). According to sex, males are slightly more insured than female, however since females may have a largest life span, this pattern changes for the age group between 45-64 years old.

**Table IV.2.**  
Insured by age intervals

Age Interval	Insured	%	Male	%	Female	%
<i>0-14</i>	175,851	14.4	90,266	15.9	85,585	13.1
<i>15-44</i>	509,404	41.6	240,110	42.2	269,294	41.1
<i>45-64</i>	266,626	21.8	123,658	21.7	142,968	21.8
<i>&gt;64</i>	271,585	22.2	114,581	20.2	157,004	24

Source: Direcció General de Recursos Sanitaris, 1998



### **IV.3.2 The nature of the sample**

The data used in the present analysis is the Catalan Health Survey (CHS,1994). This is a cross-sectional health survey of 15.000 individuals covering the Catalan population and was collected during the autumn 1993 . This is survey - usually undertaken every five years - is a representative survey of the 8 Catalan health regions. Apart from standard detailed socio-demographic items, it contains records about a large number of health service use and NHS attitudes. The main results from the sample show some differences with other data sources used. Approximately 47% of individuals were female and 53% were male. 18,9 % of individuals had a private health insurance and only a 4,1 % had compulsory health insurance. The aging population represents 22,7% of the overall population according to the Catalan Health service.

The main two question to base or analysis where the following :

Private health insurance : *do you currently hold any voluntary (private) health insurance policy ?*

Attitude to the NHS: *Which of the following statements define your personal attitude towards the NHS: a) No changes are needed, b) Some small changes are needed or c) should completely change.*

Approximately 19% of individuals within this age group were covered by some voluntary insurance, what is slightly less than for other ages 19,8%, however younger individuals have less coverage than other groups who have private insurance (18,3%). Since we were also interested in the aging population, a relevant variable is the perceived health status. For the overall population, 7% display some restrictions related to daily activities 24,2% were not in a "good health", corresponding in the majority of

cases to older individuals. Among those who are insured, 18.3% showed a bad perceived health, corresponding in a 53% to elderly age group.

#### **IV.3.3 The Econometric specification**

The empirical analysis of some specific decisions i.e smoking for a health reference, show clear problems emerging from distinguishing the type of responses limiting the consistency of estimated demand equations (Jones,1993; Garcia Labeaga, 1995). In an insurance market scenario where the decision to insure of a discrete nature, we may find zero responses ( no insurance) arising from economic conditions ( i.e due to incapacity to purchase a private health insurance) however, we may also find zeros due to non economic conditions (no consumption at any offer). This was tested by Propper (1993) arguing that political concerns could limit the decision to purchase PHI, finding no evidence of this feature on the grounds of the UK insurance market. However, within the one response (affirmative response), we may also find responses due to the benefits of insuring (economic conditions) or may be, as we suggest in this paper due to the other non economic reasons as the attitude to the NHS. The model proposed by Cragg (1971) permits to discriminate between these two different reasons. The model involves two-stage process, a first stage where individuals evaluate (positively or negatively) the publicly provided health care and a second process where, the individual decides, whether to insure privately or not.

Since the idea guiding this paper is to test the attitude towards the NHS as determining the demand for PHI, we consider two different processes. The latent variable for insurance and the propensity to show a negative attitude to public health system (the access problem) it should be treated as following a two stochastic process. The empirical part of this paper is to investigate the assumption of the independence between the two processes that as we assume it is to influence the demand for health insurance. If there is a high association between the two variables -insurance and the attitude towards the NHS

- then we cannot include the attitude variables in the estimated equation since they would produce bias estimates. The econometric model purposed is a double-hurdle model as the insurance demand may be affected by political, or satisfaction beliefs associated with the attitude towards the NHS. Therefore, if there is an underlying believe about health insurance determining its consumption , a first hurdle model ( in the terminology of Jones (1989)) would not produce consistent estimates.

This paper departs from the Propper (1993) framework. She investigated the role of the captivity phenomenon as determining the health insurance demand. In this case captivity was obtained asking to non insured if the ever considered the possibility of buying private health insurance, results suggest that captivity cannot be associated with demand for insurance according to its evidence. Here, we take into account a different scheme. People where first asked to consider whether or not the public health system offers adequate health care coverage, we argue that the result of this decision is the one that determining health insurance demand.

#### *a) The insurance process*

Let us assume an individual comparing the underlying prospects determining the decision to insure dependent of income ( $y$ ) , prices ( $p$ ) and other benefits. Hence, the individual would compare the expected utility of two prospects, whether he insure or not as follows:

$$EU_{insurance}(y - p_i, \pi, X, \varepsilon) - EU_{no-insurance}(y_i, \pi, X, \varepsilon) = I^* \quad (IV.7)$$

Where  $I^*$  is the variable conceptualizing the expected benefits of insuring, that are dependent on income, its costs, the probability of illness and other benefits. If there are only two independent alternatives then the decision process can be summarized in terms of two alternatives (i) to purchase (i) or not to purchase a private health insurance policy . Then the probability of purchasing a health insurance policy would be

determined by (assuming a random component) where  $EV$  reflects the indirect utility function :

$$pr_i = pr(EV_i > EV_j) = pr(\varepsilon_i - \varepsilon_j > EV_i - EV_j) \quad (IV.8)$$

Let us then define the latent variable capturing the difference of the two prospects (insuring or not) as follows :

$$I^* = x_i' \beta + \mu_i \quad (IV.9)$$

where  $x_i'$  is a vector involving those variables that determine the expected utility difference. Since  $I^*$  is not directly observable, we define a dichotomous decision variable ( $I$ ) such that :

$$I = \begin{cases} 1 & \text{if } X_i \beta > 0 \\ 0 & \text{if } X_i \beta \leq 0 \end{cases} \quad (IV.10)$$

therefore if  $I = 1$  , then an individual buys private insurance, and 0 if he does not. Since the deductibles and coinsurance such as other co-payments are not extended in Catalunya, we may employ such an empirical model. Moreover, differently from the US the purchase of HCI is usually an individual decision rather than a decision concerning an employee decision. Assuming a normal, distribution for the random error, with 0 mean and variance 1, this model can be estimated from a probit model.

#### *b) The attitude toward the NHS*

The attitude towards the NHS is captured by a question introduced in the CHS framed as an opinion variable as "do you thing the NHS should be completely reformed?". To

incorporate the attitude of the NHS as influencing the demand decision let us define  $A^*$  as the latent variable defining the second hurdle "attitude towards the NHS". Accordingly, the latent variables would be :

$$A^* = z_i' \alpha + w_i \quad (IV.11)$$

where  $z$  refers to the variables conditioning the attitude towards the NHS( $A$ ) that can be both modeled as taking the value 1 if  $A^* > 0$  that is displaying a negative attitude towards the NHS, estimated as a bivariate probit model. Its distribution is defined by  $N(z_i' \alpha, x_i' \beta, \rho)$  where  $\rho_i = corr(w_i, \mu)$  informing us about the independence of the two processes<sup>xxxiv</sup>.

The sample likelihood function can be written as :

$$L(\beta, \alpha, \rho) = \prod_i F(z_i' \alpha, x_i' \beta; \rho) \prod_k (z_k' \alpha, -x_k' \beta; \rho) \prod_p (-z_p' \alpha) \quad (IV.12)$$

where  $\Phi$  denotes the cumulative distribution, allowing for correlation between the two process. That is, if the correlation between the two processes is positive, then an individual that is more likely to evaluate negatively the NHS coverage will more likely buy HCI. The idea behind the attitude towards the NHS is that those people that do not find an adequate health care coverage in the service financed by the NHS, are to purchase a private health insurance without evaluating the benefits from PHI.

**Conclusion IV.2.** The demand for health insurance can be treated in terms of two process when there is another institution, the NHS conditioning the decision to purchase a private health insurance policy: a first NHS evaluation process and a resulting second process that determines the purchase of a private health insurance policy.

## IV.4 Results

The analysis of data departs from a first cleaning process, after which the set of relevant variables are defined (see table IV.3). Table IV.4 shows some information of the descriptive statistic of the data used.

**Table IV.3.**  
**Variable Definition**

Variable	Definition	Interpretation
<u><b>SOCIO-ECONOMIC VARIABLES</b></u>		
<i>Sex</i>	Male=1	
<i>Age</i>	Number years old	
<i>Members</i>		Number of members of the family.
<i>Civil status</i>	Married =1	
<i>Income</i>	Income 1,2,3,4	Dummy variables for annual family net income
<u><b>EDUCATION</b></u>		
	ED1 = 1	The individual is illiterate or has no educational background
	ED2 = 1	Primary studies completed
	ED3=1	High School completed
	ED4=1	Middle university or professional studies
	ED5=1	University studies
<u><b>HEALTH</b></u>		
<i>Perceived health</i>	Excellent 1 Bad 5	Own health perception.
<i>Specified diseases (allergies.)</i>	1=yea 0=No	
<i>Chronic conditions</i>	Chronic conditions = 1	Respondent has chronic conditions
<u><b>HEALTH CARE USE</b></u>		
<i>General Practitioner visits</i>	GP visits	Number of GP consultations in the last two weeks
<i>Specialists visits</i>	Specialist	Number of outpatient specialist visits in the last two weeks
<u><b>REGION</b></u>		
<i>Barcelona</i>	Barcelona	Dummy variable for Barcelona

**Table IV.4.**  
Means and Standard deviation of relevant variables

Variable	Type	Mean	SD
<i>Insured</i>	Cathegorical	.1900	.391
<i>Family members</i>	Numeircal	3.680	1.432
<i>Gender</i>	Cathegorical	.4762	.499
<i>Perceived health</i>	Numerical	2.699	.916
<i>Asthma</i>	Cathegorical	1.638	.747
<i>Barcelona</i>	Cathegorical	.1234	.328
<i>Married</i>	Cathegorical	.5994	.490
<i>Income2</i>	Cathegorical	.2282	.419
<i>Income3</i>	Cathegorical	.1276	.333
<i>Income4</i>	Cathegorical	.3486	.476
<i>Hs attitude</i>	Cathegorical	.0722	.0294
<i>Age</i>	Numerical	39.614	22.933

Since we are interested in testing the two-process underlying the decision to insure we estimate a double hurdle model by means of two probit models as Proper (1993) and we compare the results obtained. Estimation results are provided in table IV.5. Let us first start by analyzing the hypothesis of independence. The Log -likelihood tests indicate that the hypothesis of independence can be rejected, this is reflected also by the significant estimate of  $\rho$ .

**Conclusion IV.3 .** Conditional on the variables in the vectors of the demand for PHI and the attitude towards the NHS, the purchase of PHI is dependent on the attitude towards the NHS.

Let us start examining the determinants of the attitude towards the NHS. The variable measuring education seems to show at first an increasing pattern and afterwards starts to decline. The more educated the individual is, their more negative attitude towards the public sector until university studies are reached, when its effects are reduced. Income is associated with the NHS attitude, the higher income the more negative attitude however is significant only at a 10%. Gender also shows a significant pattern, females show a higher negative attitude than males. Living in Barcelona seems to be a relevant variable

negatively associated with PHI purchase. Finally, from the health care use variables, the visits to the general practitioner s are to be positively associated with the attitude towards the NHS whereas the visits to the specialist do not appear to show significant effects.

Table V.5. Maximum Likelihood estimates

Insurance	Coefficient	Standard Error	t-value
<i>Age</i>	.0046**	.0011	4.153
<i>Age</i> <sup>2</sup>	-0.0001**	0.00004	-3.234
<i>Household Size</i>	-.0259*	.0139	-1.856
<i>Health</i>	-.0268	.0224	-1.193
<i>GP visits</i>	-.0043	.0028	-1.504
<i>Gender</i>	-.0038	.0426	-0.090
<i>Income 2</i>	.1993**	.0799	2.492
<i>Income 3</i>	.2387**	.0646	3.690
<i>Income 4</i>	.3292**	.0625	5.261
<i>Barcelona</i>	.3654**	.0475	7.680
<b>Attitude HS</b>			
<i>Education 2(omitted low Ed)</i>	.3996**	.1633	2.446
<i>Education 3</i>	.4194**	.1245	3.366
<i>Education 4</i>	.2592**	.1021	2.538
<i>Education 5</i>	.1756	.1197	1.466
<i>Barcelona</i>	-.477**	.0119	-4.008
<i>Income2(omitted low income)</i>	.1416*	.0084	1.646
<i>Income 3</i>	.1834	.0095	1.535
<i>Income 4</i>	.1834*	0.074	1.914
<i>Gender</i>	-.155**	.0652	-2.404
<i>GP visits</i>	.0054**	.0013	3.990
<i>Specialist</i>	-.000071	.0017	-0.391
<i>Intercept</i>	-1.851**	.1137	-16.279
<i><math>\rho(1,2)</math></i>	.8205	.0555	14.767
<i>N</i>	15000		
<i>Censored</i>	10042		
<i>Uncensored</i>	4958		
<i>Log L</i>	-3881.24		
<i>Wald test</i>	126.52		
	(0.000)		
<i>Likelihood ratio test</i>	62.2651		
	(0.000)		

\*\*Denotes significant at a 5% or below

\*Denotes significant at a 10% level.



(a) Wald(a)  $\chi^2$  (11)

(b) LR test of  $\rho=0$   $\chi^2$  (1)

Let us now examine the determinants of purchasing PHI. Younger age individuals are positively associated with the PHI demand. However, results turn top be the opposite when age increases. This results are similar to Szabó (1997) and Gonzalez (1996) since age is an observable variable for the PHI companies. Moreover, they may explain why health does not seem significant, leading to reject the hypothesis of adverse selection, since insurers can discriminate their customers by means of age. The household size exercises a negative influence on the purchase of PHI <sup>xxxv</sup>. Additionally, this coefficient is quite robust since it does not significantly vary with age. There are strong regional explanative variables, showing the strong influence of the health region (Barcelona center), this is probably to reflect those individuals living outside these regions show a small choice of private facilities, they usually use publicly financed health care. The insignificant effect of health care use, permits to primary reject the hypothesis of moral hazard. Finally, income is also an important variable, income elasticity shows us that we are referring to a luxurious good [Murillo et al , 1996].

**Conclusion IV. 4 .** The decision to purchase PHI is not determined by health related as that is there is no evidence of adverse selection. Moreover, health service use is not associated with the purchase of PHI. Results support the idea that the attitude towards the NHS is clearly linked with individuals with high income and related to show some educational skills, gender and regional variables which exercise a strong influence in determining the demand for health insurance.

## **IV.5 Concluding remarks**

Many publicly financed services as health care coexist with a private provision of similar services. Therefore, the study of PHI without taking into account this circumstance is neglecting the possible interaction between the public and private choices. In this paper we provide an alternative explanation for the demand for PHI under a NHS, showing the influence of the attitude towards the NHS as to determine the purchase of PHI. We have tested this assumption by means of an empirical specification of a probit double hurdle model where the purchase of PHI and the attitude towards the NHS are treated as dependent on each other.

Empirical results suggest that the attitude towards the NHS explains the demand for PHI. We assume that individuals show some source of attitude towards the NHS determining the decision to purchase PHI. This attitudes may reflect possible familiar interactions , pre-existing views of the publicly financed health care such as possible political concerns towards the NHS. However, the source of the data does not allow us for going further in our interpretation. This result sets out relevant evidence for discussing the role of the NHS performance as determining the extension of the private health insurance market. In particular, there are in Catalunya some personal attitudes – may be linked with family tradition on insuring and former publicly provided health care quality limitations- that seem to be currently sustaining the private health insurance market. However, there is evidence that those individuals showing a negative attitude regarding the NHS are to be high income and holding some middle university degree.

The theoretical model allows us to interpret some of the empirical findings. The effect of individuals attitude towards the NHS shows that even though people may care about the public provision of health care, there are other arguments captured in individual attitudes that still maintain the PHI as a relevance source of health care financing.

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<sup>i</sup> There is some literature such as Besley and Coate (1991), Fernandez and Rogerson (1997), Gouveira (1996) and Stiglitz (1974) where the consequence of interactions of the public and private sector is that some individuals to opt out their public sector allocation, i.e publicly financed health care.

<sup>ii</sup> However this structure is not followed in some countries i.e in Canada private health care insurance market is enclosed to cover different benefits that the ones covered by the NHS.

<sup>iii</sup> The Spanish health system is defined by the coexistence of a compulsory social insurance financed by taxes and other voluntary private health insurance providers that usually supplement the public coverage by additional health care services

<sup>iv</sup> In this paper it was argued that the private insurance demand was the response to the state of the NHS, in particular to the access problems to health care. The main findings reflect a positive association between the purchase of private health care insurance and the length of local NHS waiting lists. Moreover, evidence suggested that the dissatisfaction with the NHS was likely to enhance PHI purchase and finally another relevant finding was that higher income, middle age and best educated individuals where those that more likely hold private health insurance. That is PHI may be seen as a luxurious good, that is purchased by educated individuals such as middle age reflecting attitudes to private sector.

<sup>v</sup> Consult Propper (1993) for a similar application.

<sup>vi</sup> The concept of access to health services may have different interpretations. A first view refers to *geographical accessibility* to health care, this kind of access has been empirically taken into account. The second view refers to *economic accessibility* to health care and health technologies, this has also been included in our empirical estimated. However, this paper emphasizes a third concept of access related to *temporal accessibility*, mainly associated with waiting lists and time spend. We stress therefore the idea that the use of public health care implies a higher opportunity cost of time, a reduced election capacity and a higher bureaucratization than private insurance (see Ramis and Merediz, 1997).

<sup>vii</sup> Users of the private health care may be less supportive of publicly financed health care than other people, probably due to ideological concerns or small benefits perceived. However other possible interpretations would be the appearance of a "frustrated" public user preferring a higher level of public coverage rather the one existing. That is expressing a claim of the insufficient access to health care.

<sup>viii</sup> Basis of this issue may be founded in Besley et al (1996) where the party identification may explain the PHI purchase. In particular the purchase of the PHI is associated with being less supportive of an increase of the NHS expenditure.

<sup>ix</sup> There hasn't been an extended analysis of the Catalan health insurance market.

<sup>x</sup> As Aad Ro (1995) suggests, the extension of private health insurance may be a clear indicator of a quality of the public health system.

<sup>xi</sup> The extension of private welfare benefits may be the results of the existence of a private welfare class defined by the repeated purchase of private health care, explained due to familiar interactions or alternatively by means of a pre-conception of the role of the NHS. Ultimately, the existence of a private welfare class could be reflected in a general attitude towards the NHS (Propper and Brutchard, 1999).

<sup>xii</sup> More specifically, we are referring to large waiting lists, inadequate attention and quality etc that usually discourage the use of social health insurance service and therefore induce to purchase a private health insurance in order to assure health care benefits

- <sup>xiii</sup> That is reducing waiting lists, increasing the range of alternative assistance, increasing the quality of hospitalization and reducing waiting time
- <sup>xiv</sup> A first clarification before continuing with this analysis, we should admit that the concept of PHI demand may be more complex than the one offered here. However, since available data does not able us to discriminate between the source of insurance coverage we adopt a broad homogeneous concept including all types of health care insurance.
- <sup>xv</sup> The traditional function of insurance is to exchange certainty for a defined premium covering expected losses and loading costs.
- <sup>xvi</sup> Uncertainty, per se causes dis-utility, and hence uncertainty may be seen as a commodity yielding positive marginal utility, for which individuals may be willing to pay a positive price (Barr, 1998).
- <sup>xvii</sup> The increase in the health care use (moral hazard effects) is larger than the risk-bearing (risk aversion) effect.
- <sup>xviii</sup> The relation between the health service use and insurance is documented by the studies on the RAND Health Insurance Experiment (Newhouse et al, 1993).
- <sup>xix</sup> The additional constraint that we introduce is the existence of a public insurer where queues and waiting lists are the rationing system rather than price.
- <sup>xx</sup> This results indicates that there is no sign for adverse selection and therefore political proposals for a compulsory health insurance would be dismissed.
- <sup>xxi</sup> The idea of the captivity problem according to Propper (1993) is that some individual in reality do not face the choice of insuring or not, due to political concerns.
- <sup>xxii</sup> After taxes being paid.
- <sup>xxiii</sup> Popper and Bruchardt (1999) show that there is mixture of NHS visits and private health insurance visits. The main example they provide is the case of the GP, acting sometimes as a gateway for access to the NHS.
- <sup>xxiv</sup> This would not be always true if there are political concerns limiting the purchase of HCI (see Propper, 1993)
- <sup>xxv</sup> The subscript  $s$  and  $h$  refer to the states of being sick or healthy.
- <sup>xxvi</sup> The insurance premium may be conceptualized as:  $P_i = (1 + l)M_i\pi_i$ , where  $l$  refers to loading costs, including administrative costs, loading charges and selling costs. However, for simplicity we assume, since it does not exercise a strong influence in the results this paper provides.
- <sup>xxvii</sup> This is directly derived from the Jensen's inequality for concave functions. Consult also Barr (1998) page 300-301 for a UK reference.
- <sup>xxviii</sup> An extreme assumption we issue in this paper is that the probability of requiring medical care is exogenous, what it could be to some extent criticized since income and other household characteristics may influence this probability.
- <sup>xxix</sup> The price of insurance may be seen as an income transfer from a healthy state to a illness state, however since the individual in the sick health state may also received public medical care, the interpretation could be seen as an income transfer to gain access to medical care in a sick state.
- <sup>xxx</sup> Since young individuals show a reduced probability of illness, what is to discourage the purchase a PHI
- <sup>xxxi</sup> We are referring to those individuals that show a supplemental coverage from the one provided by the NHS, and therefore we exclude from this estimation the public servants and those individual holding only a dental insurance policy.
- <sup>xxxii</sup> Reimbursement policies do not seem to be highly demanded despite there have been offered for a long time. Furthermore, recently it has been developed dental care policy however its coverage is limited to the 9,1% of the population.



<sup>xxxiii</sup> Consult Memòria del Servei d'Entitats d'Assistència Sanitària d'Afiliació Col·lectiva, 1998.

<sup>xxxiv</sup> The estimation process is equivalent to the Van der van Praag (1981) and the software used in Stata 6.0.

<sup>xxxv</sup> The number of family member appears to be significant confirming that if somebody lives in community with other, they would help then in case of illness

## **Capítol V.**

**Disability risk perceptions and the demand  
for long - term care insurance**



### **ABSTRACT\***

This paper aims to investigate from the perspective of the individual rationality why there are reduced purchase or even no transactions for LTC insurance in some European countries. There are a set of relevant factors to take into account, that to some extent have been developed by the current published economic literature. In particular, we are referring to the unawareness of future costs, the role of family interactions, the existence of transaction costs, the role perceptions of disability risks and the benefits received from the public sector and the possible existence of moral hazard and adverse selection problems. In this paper we analyze some behavioral determinants of the demand for LTC insurance by means of both a theoretical and empirical approach. That is, we focus on the individual point of view as determining the demand of LTC insurance. In particular we explore the role of individual disability risk perceptions as explaining the willingness to purchase LTC insurance. We argue that -own an population - disability risk perceptions such as other informational determinants may be determining the rationality of the purchase of LTC insurance. The theoretical basis of the paper departs from a model for LTC insurance under uncertainty conditions where disability is assumed to result from a stationary chronic shock requiring high costs referred to care and cure. The empirical application suggest that the disability risk perceptions and the unawareness of the coverage resulting from a LTC insurance policy explain partially existence of LTC insurance non purchase. Moreover, despite there is evidence of adverse selection, probably limiting the expansion of this market, family interactions - resulting from a large household size - do not seem to be associated with the willingness to purchase LTC.

*Key words:* long -term care insurance, disability risk perceptions, rationality.

*JEL classification:* I12, I11, and D81.



## **V.1 Introduction**

Reduction in fertility and morality rates accompanying the demographic transition around many European countries, have led to the growth of the number of the very elderly in every industrialized society. One of the main consequences has been that public sector and the private institutions turn to focus its attention on how to provide long-term care directly correlated with the process of aging. Indeed, aging poses complex concerns on the provision and financing of specific long-term care (LTC) benefits, virtually consumed by the elderly – i.e residential nursing and nursing home care-. About a half of all women and a third of all men who turn 65 will need intensive care for periods that average two or more before dying (Glennerster, 1996). According to the Catalan projections, on the year 2015 the number elderly population would be approximately 1.100.000 in Catalunya (18.2% of total population) what means that, for every 100 young individuals there would be 119 elderly individuals<sup>1</sup>. Therefore, the process of aging is expected to be the main demographic characteristic to be taken into account when planning the financing of future health care in general social needs.

As a result of aging, the Catalan demographic growth shows a downward tendency . Table V.1 shows that the population growth rate is projected to shift, following a negative pattern between the years 2005 and 2010. Therefore, depending on future impact of health technologies, lifestyles and other determinants that may extend the number of healthy life expectancy, aging may increase the likelihood of becoming disabled. Nevertheless, we are assuming in this case that is disability risk are to increase with the aging process. However, that may be not always necessarily true, since the extra years of life may delay the onset of disability (healthy life expectancy argument). Regardless of the magnitude of the increasing effects on the healthy life expectancy , the uncertainty on the age that disability may appears, emerges as a main explanatory element justifying the need of insuring LTC.

Because of the gradual deterioration of health, the elderly face an appreciable probability of not being able to care themselves (Kemper et al, 1991) and therefore, requiring personal help during the last days of their life. The growth of the elderly population increases the population risks of the so-called "dependency problem" - characterized by a high demand for LTC whereas the public and private supply remain in Spain insufficient to completely cover individuals claims<sup>ii</sup>- coupled by likely increases in the costs of LTC<sup>iii</sup>. This feature enhances policy makers to focus its attention on analyzing alternative social prevision mechanisms to provide and finance LTC<sup>iv</sup>.

Table V.1 Estimates of future population in Catalunya 1991-2015

	Population	Index (1990=100)	Period	Absolute Change	Relative change
1991	6,059,494	100			
1996	6,105,644	100.76	1991-96	9,230	1.52
2000	6,137,881	101.29	1996-2000	8,059	1.32
2005	6,163,084	101.71	2000-2005	5,200	0.85
2010	6,142,133	101.36	2005-2010	-4,190	-0.68
2015	6,050,497	99.85	2010-2015	-18,327	-2.98

Source: Generalitat de Catalunya. Departament de Sanitat i Seguretat Social. Servei d'Informació i Estudis.

There is no reason why LTC insurance cannot be provided by the private sector. LTC is a private good characterized by the presence of scale economies in its provision. Although may be seen also as a "merit good" argument justifying public provision, such as similar arguments than the ones assesses for social security systems - myopic preferences and insufficient knowledge - , the efficiency condition theoretically does not seem to meet the neutrality -behavior may change when LTC insurance is offered - and cost minimization properties. Therefore the public or private financing and provision of LTC relies in ultimate terms as a trade-off between risk related payment and social catastrophic payment (Burchardt,1997).

It should be noted that disability and its inherent dependency consequences appear as a gradual process therefore *people can rationally prevent its associated costs* (Pitaud,

1999)<sup>v</sup>. From the stand of point of market failure with respect to individual decisions under uncertainty, LTC demand may raise some questions concerning the understanding of the potentials long terms risks related of becoming disables, and requiring nursing some or any other related service. Regarding the possible behavioral determinants determining the demand of LTC insurance we may analyze if individuals do understand their risks concerning the aging process, essentially the risks of longevity and the risks of disability . Moreover, a second issue that arises is if they take into account this risks, and particularly the risk of disability when they decide whether to insure LTC. Therefore, if individuals are assumed to be rational, their behavior concerning the LTC insurance should follow some idea of perceived risk.

One of the main indicators of disability is the so-called healthy life expectancy. Since in this paper we are interessted on individual percepitions of risks concerning aging , previously we provide some evidence of the real disability risks. Evidence of the healthy life expectancy in Catalunya is provided in table V.2 displaying estimates for healthy life expectancy (HLE)<sup>vi</sup>. In Catalunya, static HLE is approximately the 86% of total life expectancy without sensible gender differences. Therefore, according to this data, Catalan's are expected to live 1/7 of their lives under some degree of disability conditions. Despite there are no estimated of the dynamic HLE, its seems reasonable to argue that there are relevant social changes that limit the provision of the so-called informal care, and therefore institutional care becomes as the major source of LTC provision. Hence, an increasing demand for these services should make long-term care (LTC) insurance more likely to be expand<sup>vii</sup>.



Table V. 2. Healthy Life Expectancy

Age	Life Expectancy	Healthy Life Expectancy	Life Expectancy	Healthy Life Expectancy
	Male		Female	
0-4	77.88	66.66	82.22	68.57
5-12	70.34	62.18	77.69	64.11
15-24	60.47	52.6	67.81	54.34
25-34	50.94	43.24	57.98	44.61
35-44	41.99	34.37	48.36	35.12
45-54	32.89	25.56	38.75	25.87
55-64	24.24	17.26	29.45	17.33
65-74	16.43	10.53	20.50	10.20
75-84	10.10	5.15	12.49	4.81
> 85	5.68	1.79	6.68	1.31

Source : Gisbert, R Rué, M (1994). *Esperança de vida sense Incapacitat. Catalunya i Regions Sanitàries*, Servei Català de la Salut.

In contrast to the acute medical health insurance, the market for insurance covering LTC is not well established in Europe. Private LTC insurance transactions are rarely observed<sup>viii</sup>. Whereas, acute illness is completely covered by the public sector, social aid for LTC is received solely under extreme resource constraints. In general, there are very limited protection instruments against the large costs associated with chronic illness care at an advanced age. Only a few range of OECD countries deal with some insurance coverage for LTC – recent initiatives enhancing a market regulation process<sup>ix</sup>. In particular, a set of specific benefits dealing with the care requirements associated with disability - i.e Alzheimer illness - show limited coverage both by the public health sector and the private health insurance, even though the middle and low income class of the elderly, face large risks of morbidity and impoverishment associated with them<sup>x</sup>. Figure V.1 illustrates four different types of LTC insurance schemes. Note that Germany is the European country with the earliest LTC insurance market. However, after the 1997 reform, LTC benefits have been inserted into the compulsory medical insurance financed by both employers and employees. Despite the fact that most developed LTC insurance market is in the US, the market is still not widespread (Cutler, (1993), Cohen et al

(1997)). . In Catalunya there is no specific coverage for the elderly although the elderly prompt much more expenses since they largely use health services (ESC, 1994)<sup>xi</sup>.

**Figure V.1.**

**Comparative schemes of LTC insurance systems**

	<i>Germany</i>	<i>UK</i>	<i>France</i>	<i>US</i>
	1985	1991	1996	1974
<i>Coverage</i>	Public: (special compulsory dependence insurance <sup>xii</sup> ) Private : LTC insurance (fixed reimbursement and income benefits)	Community Act Care, assistance plan according to needs. Private : just initiated private pensions <sup>xiii</sup> .	Public: Presentation Spécifique Dependence <sup>xiv</sup> (PSD) Private: complementary whole life insurance	Private insurance. Its benefits are defined in terms of professional and personal attention.
				LTC

European and especially the Catalan health system differ substantially from the US health system in many aspects in the provision of LTC. In the US there is an specific "delimitation " of the Medicare coverage and hence a great majority of individuals show a definite information about what is publicly covered.

The most famous literature dealing with the rationality of the purchase of LTC was first set out by Pauly [1989,1990] exploring for the US Medicaid program a couple of reasons explaining the small private protection for LTC. Other important contributions revised have been Cutler (1993) devoting to the variability of long term costs an explanation for the failure of LTC insurance explaining why insurers cannot accurately guarantee the future costs of care and suggesting that this feature is to limit the demand for LTC<sup>xv</sup>. Furthermore, Meier [1994,1999] suggests that the alternative savings instruments may be superior to the instruments of LTC. Form the perspective of family interactions, Zwiefeld and Stüwe (1996) suggest from principal agent model that parents contracting LTC insurance reduces the incentives for their sons to deliver care.

This paper examines the demand decision response to an hypothetical LTC insurance. We to provide some insights to the hypothetical market failure since risks are uncovered

whereas individual demand shows a rational response to risks. In section two we describe the Catalan LTC insurance context and the main determinants of demand . In section three we develop a theoretical model to explain which is the role of disability risk perception in determining the purchase of LTC insurance. Section 4 sets an empirical framework to test the role of disability risks perceptions. Finally, the paper ends with some concluding remarks.

## **V.2 An overview of the LTC insurance market**

### **V.2.1 Empirical evidence**

Currently in Spain about 1,600,000 elderly face personal limitations from which 275.000 live in Catalunya (UCEAC, 1999)<sup>xvi</sup>. However, the public supply of LTC benefits is to some extent reduced. Indeed, the ratio between places/100 elderly is of about 2.8, whereas the OECD average is 5.1 (IMSERO, 1995), therefore a first evidence suggests the existence of a sensible lack of coverage<sup>xvii</sup> for LTC benefits. Usually an implicit public subsidy associated with NHS use, and large out-of - pocket expenses, finances LTC. In Catalunya 82.7% of the elderly receive exclusively familiar help, 12% receive help from neighbor and the share of social service and voluntary help is less than 2% of total elderly help<sup>xviii</sup>. Furthermore, only a few insurance companies provide a reduced LTC insurance coverage following a reimbursement system<sup>xix</sup>. Despite recent regulation (Decret 47/1999) has defined the meaning of LTC coverage<sup>xx</sup> and encourages the development of LTC insurance social prevision benefit societies the remaining problems for its extension are by no means shifted. Therefore, the development of a supplemental private health coverage still could be contemplated as a feasible instrument to prevent the future possible consequences of the rise in life expectancy and health expenditures. Current systems of LTC financing rely on residential and nursing out-of pocket payments by individuals an their families, and medical services publicly financed..

### **V.2.2 Limits to the LTC insurance market**

In this section we survey some of the main limits that are associated with the expansion of the LTC insurance. In particular we stress the feature of a market failure for the provision of LTC. The relevance of this section is to delimit the basic limitations concerning the demand for LTC insurance. Some authors claim for a lack of demand for LTC despite there is no previous evidence about this feature. Since there are a large number of issues to be discussed, we have classified the identified limitations into six subsections each one would be considered separately. The existence of public subsidies for LTC coverage taking into account the described characteristics of disability, suggests that there is some evidence of a market failure in the provision of LTC (Gravelle and Taylor, 1989).

A relevant reference point in order to set some of the possible motives for the purchase of LTC insurance has been provided by a study of a German insurance company (Münicher Rück) . According to this source, the motives underlying the purchase of LTC insurance are four : economic independence (30%), service benefits (25%), wealth protection (20%) and other motives (25%)<sup>xxi</sup>.

The provision of LTC insurance might be widely heterogeneous<sup>xxii</sup> - it can be defined as service benefits, institutional care and similar deliveries, reimbursements of expenses or an annual subsidy – but its positively correlated with age. We suggest, however, that the extension of this market is closely determined by the role of the public policy encouraging its demand such as defining clearly what is to be offered by the public system. The duration of LTC varies according to the age, sex and the cause originating the dependency (IMSERSO, 1995). However, recent estimates suggest an oscillating period between 4 and 20 years coinciding with its average life expectancy.

### V.2.2.1 *Family and Social Interactions*

Therefore, a set of possible explanations for the LTC undercoverage going beyond income and wealth constraints, are the role of bequests ( Pauly, 1990; Zweifel and Strüwe,1996). The argument underlying is that *family interactions* can limit the expansion of the LTC insurance as they provide a substitute of LTC by means of informal help. However, despite its a relevant issue to take into account, recent evidence suggests a clear reduction in the familiar financial help so called informal help . Felder and Zwifeld (1998) suggest that formal help becomes more important since salaries increase and women are getting inside the labour market . In particular, potential household care is limited by the increase of the elderly population followed by a reduction in the family members<sup>xxiii</sup> [Kondratovitz,1999]. This feature does not dismiss the role of the intergenerational households but sets a trend for a future increase of the formal care. Moreover, it seems relevant to distinguish between the two different types of *formal help*, the nursing home-based care from the elderly residential care, since usually the first one is combined with *informal help* (familiar help) whereas the residential services are not usually associated with household care. Focusing on the “individual decision” to purchase a LTC insurance, the emergence of large costs associated with the dependency – i.e the need of family care and the underlying financial resources required - are to be something that individuals tries to prevent.<sup>xxiv</sup>.

Charity and beneficence, such as other types of solidarity may be playing a relevant role in covering the gap for LTC needs even though its seems unrealistic to assume that this type of informal care could cover the existent and future gap. A large set of related issues such as if LTC should be subsidiarized are nowadays motivating a large debate

#### *V.2.2.2 The definition of the public coverage*

A second group of reasons that individually seem more realistic are the presence of *mistaken perceptions about what is covered by the social health insurance and public programs*. According to Rivlin and Weiner (1988), more than a quarter of the population thought during the eighties that the Medicaid was paying LTC. Furthermore, even though individual's may face accurate information about what is publicly covered, other possible behavior is the one that some people may guess that, ultimately, the public sector would take care of them (Postner, 1995). The argument is somehow simplistic: "society would not let them die because they are unable to pay", known as the free rider problem for public welfare. However, free rider problems for not insuring is partially limited by the public requirement of facing insufficient resources to personally finance the LTC costs<sup>xxv</sup>. Moreover, in most European countries the private health insurance for acute illness is clearly developed, despite the NHS covers full medical expenses.

#### *V.2.2.3 Short sighted preferences*

Alternative explanations rely on suggesting that *non elderly are short-sighted and optimistic*, that is underestimating the consequences of long term events- defined in terms of costs and risks -, since LTC is something that is most likely to occur in the long run<sup>xxvi</sup>. This ideas is usually advocated to justify also the public intervention for financing pensions and social security benefits. Therefore, "myopic individuals" would not make arrangements for the distant future. This would imply an underestimation of the life expectancy and disability costs and thus people may set aside consumption for an advance age<sup>xxvii</sup>. However, deferring the purchase of LTC to a distant future increases the insurance premium, which in ultimate term encourages the underpurchase of LTC, since heavy premiums are expected to discourage consumption. However, if individuals are short sighted, why is there a market for private pension funds or life insurance and there is no market for LTC insurance?. A possible argument relies on the conception of the

role of the state as funded of LTC , some people may face the view that "the sate should look after me". Moreover, whereas almost retirement and death is something that happens to almost everyone, not everybody need LTC.

#### V.2.2.4 *The unawareness of the implicit risks and costs*

The *unawareness of the implicit risks and costs* could be a possible reason for the un-existence of an insurance market. If if the attributed to the insurance market the function to cover a set of risks, and therefore the degree of risk aversion would determine the consumption of particular commodities (Arrow, 1963).

According to Cutler (1993) costs exercise a strong influence over LTC insurance markets, since costs associated with future illness are by a wide extent subject to the increasing patterns of nursing home costs and health technologies not policy changes . Insurers have no incentives for developing this market since the uncertainty inherent to the costs of future technologies overcomes the possible profits to be obtained. Despite this is a possible reason, in this section we are not interested on developing a supply model for LTC, but we are interested on focusing on the demand side of LTC insurance. Accordingly, we take as given the Cutler explanation from the point of view of costs, *costs are substantial and seem to rise over time*. Therefore, the individual unawareness of LTC cost could be a determine factor explaining the undevelopement of this market.

However, as we know under the presence of uncertainty, future costs are always subjects to be treated according to expectations. Expectation are to differ by means of the risk involving the contingency considered. Long term care, is an event most likely to be consumed after the 85 years old, therefore if an individual survives until such an age there is a high probability of requiring such care. However, the simple fact that disability risks emerge condition to survival at some point of time might outweigh risk perceptions. Moreover, risk perceptions do not seem to show a consistent pattern over time, but are supposed to vary with age such as personal characteristics associated with the subjective

rate of time preference<sup>xxviii</sup>. Similarly, uncertainty on the own probability of becoming disabled at an advanced age, may be a relevant feature for avoiding an insurance arrangement, therefore those healthy individuals may hold optimistic beliefs are more likely to display higher risk perceptions. All these features are discussed in section V.3 and V.4.

The unawareness of risks, are assumed to influence the individual risk perceptions, those people largely "aware" of their personal risks are most likely to display higher risk perceptions. This assertion departs from the standard risk analysis under subjective probability theory<sup>xxix</sup>. Therefore, if risks are underestimated, the expected costs calculated as  $EC_i = \sum \pi^d C_d$ .

#### *V.2.2.5 The role of survival probability: the self insurance prospect*

Survival probability is to essentially modify the costs and benefits of LTC insurance. Pauly (1990) suggests that LTC can be viewed as a "low probability" event although depending on the period of survival can become a costly event. However, the increase in the LTC needs may not be always a small probability event, but is a feature that may be the consequence of aging. This ideas has also been adopted in other paper (Meier, 1999). The argument is that the probability of becoming disabled is strongly influenced by age. In particular, there is a negative correlation between the remaining duration of life and the need of LTC (Felder and Zwiefel, 1988). Moreover, the probability of premature death, inducing to premature savings loss if the individual dies before becoming disabled is a relevant feature to discourage LTC insurance.



*V.2.2.6 The difficulty of finding an adequate designing for LTC coverage : the role of adverse selection and moral hazards looses*

A possible limitation emerges on defining who would be eligible for LTC. Then a clear adverse selection problem arises (those high risk individuals are more likely to insure). Moreover hidden actions have been also suggested by the literature as an explanatory supply side variable explaining the underpurchase of LTC insurance. According to Cutler (1993) the key consequence is that then the insurer fails on pricing correctly intertemporal risks. Whereas insurers may deal with the diversification with intratemporal risks since they involve cross sectional hazards.

A second main problem is the existence of moral hazard, since the elderly and their relative may skip on the efforts to prevent the need of LTC. Since there is generally some subjectivity in the definition of LTC, its feasible for the insured to manipulate the costs derived form LTC by hidden actions. Thus, the decision to institutionalize a old person may depend on the fact of having purchased LTC insurance.

### V.3 The basic model

Even though there may be some difficulties with the precise definition of disability – usually is defined as a health state where the individual is no longer able to look after himself<sup>xxx</sup>, we assume that by means of a measurement scale we could deal with an operative clarification of this concept. An operative definition just for making a theoretical framework more realistic may be found in the so-called "Activities of Daily Living" (ADLs). That is an assessment of activities that the individual is no longer be able to perform or that is suffering from a severe cognitive impairment. A reference study using this concept is Burchardt (1997).

Moreover, usually disability lasts a significant period of time. Under this assumptions, the individual life can be conceived into two different stages: a first undisable stage<sup>xxxi</sup> ( $T^{nd}$ ) after which if the individual does not die starts being disabled until he dies ( $T^d$ )<sup>xxxii</sup>. Therefore total life is :  $T = t^{nd} + t^d$  where  $\alpha^d = \frac{t^d}{T}$  is the share of disability time respect to total life. Disability is the result of an illness at an advanced age, and therefore if an individual does not survive until an elderly period  $\alpha^d = 0$ .

Aging can be viewed from the perspective of the individual as leading to two major risks, the risk associated with its life span ( $T$ ) and therefore the probability to survive i.e more than 80 years, and the risk associated with the disability period ( $\alpha^d$ ), according to table 2 between 4 and 11 years depending on the cohort considered. Under this theoretical framework, we integrate the two risks under an extensive definition of disability risk that includes both. A relevant feature therefore is to take into account the role of individual risk perceptions on becoming disabled. That is the individual subjective probability  $pr(t^d > A)$  where a  $A$  is a positive real number different from 0.

An individual can be viewed in terms of two periods (elderly and non elderly period). Assume that disability is initiated at some point of the ending life time appearing as a result of a chronic stationary shock ( $\varepsilon$ ), lasting  $t^d$  years after with the individual dies. The individual is assumed to be risk averse and its utility function is :

$$U(C_t, H_t), U'_{H,C} > 0, U''_{H,C} < 0 \quad (V.1)$$

determined by two different parameters , consumption ( $C_t$ ) and the individual health state ( $H_t$ ) both increasing utility . We assume additionally that there are no family interactions and no charity mechanisms to provide LTC care.

### V.3.1 Health state and disability

Individuals are subject to two types of shocks ( $\varepsilon$ ): a disability shocks disabling for current activities ( $\varepsilon^d$ ) - we assume they appear at an advanced age- and acute shocks ( $\varepsilon^a$ ) not dealing to disability. The difference between the two shocks is twofold. Is limited by both the period of appearance, the elderly period, and the effectiveness of medical treatments, since medical care overcomes partially or totally acute shocks whereas as a result of a chronic shock the individual never recovers its previous health state.

The individual health state is diminished by the depreciation factor ( $\delta$ ) and health shocks ( $\varepsilon$ ), partially offset by health are ,  $\theta_i = (\theta_m, \theta_n, \dots, \theta_i)$  explaining its stationary nature<sup>xxxiii</sup>.

$$H_t(\varepsilon_t, \theta_t, \delta) = \delta H_t - \theta_t \varepsilon^i \quad (V.2)$$

The health shock leading to disability is represented according to the following known probability  $\pi^d(t)$ , that is dependent on time, therefore if  $\lim_{t \rightarrow T} t^{nd} = T$  then  $\pi^d \cong 1$  and  $t^{nd} = 0$  then  $\pi^d = 0$ . However, since an individual can die without being disabled,  $(1 - \pi^d)$  refers to a prospect where the individual lives until immediate death time during the second period.

### *V.3.2 The two period decision*

At every considered point in time individuals maximize the following two period expected utility function :

$$EU = U(C_1, H_1) + \pi^d(t)(U(C_2 - D_1, (1 - \delta)H_1 - \theta\varepsilon^c) + (1 - \pi^d(t))U_2(C_2, H_2)) \quad (V.3)$$

Disability care costs are fixed<sup>xxxiv</sup>  $D_1$ . Assume for simplicity a fair insurance premium is offered:  $P = \pi^d \beta D_1$ , where  $\beta$  refers to the coverage level. This assumption implies that during the non elderly period individuals can buy the coverage at the same price, therefore they would rationally buy LTC insurance at the end of the first period. Since the probability of a chronic health shock leading to disability is sufficiently small, despite total wealth  $W_1 \leq D_1$ , an insurance policy would be provided

The purchase of a LTC insurance implies a reduction of net consumption. Therefore the expected two period utility function is<sup>xxxv</sup> :

$$(V.4)$$

Note that the first term refers to the first period utility when insurance is paid, the second terms refers to the expected utility when disability occurs and the third term refers to the expected utility if disability does not occur, that is if the individual dies without being disabled.

**Conclusion V. 1.** The insurance prospect will be purchased (desired) if the expected utility of its consumption exceeds the expected consumption loss in the first period and the expected loose of not being disabled. Therefore, those individuals expecting a higher disability risk would more likely insure (adverse selection). This conclusion immediately follows from comparing V.3 and V.4.

### V.3.3 The lifetime decision

The consumer decision is self determined assuming there is no family interactions and full information about LTC. Therefore, the decision to purchase a LTC insurance can be explained according to the maximization of its expected utility subject to the lifetime wealth from the initial planning period. This approach was issued by Pauly (1990) assuming that the marginal utility of an additional dollar in the lifetime chronic illness was defined as zero. However, we do consider the existence of consumption. The expected lifetime utility function if the consumer does not purchase a LTC insurance is :

$$EU(no\ insurance) = \sum_{t=1}^T [(1 - \pi^d)U(C_t, H_t) + \pi^d U(C_t - \theta_t, H_t^c)] \quad (V.5)$$

where T is the maximum length of time, and  $U(C_t, H_t) > U(C_t - M_t, H_t^c)$ . Differently from Pauly(1990) under the chronic health state we do not assume that all desired consumption is devoted to M, since its a strong assumption. However if the consumer purchases a LTC insurance, then the expected lifetime utility can be written as follows :

$$EU( insurance) = \sum_{t=1}^T [(1 - \pi^d)U(C_t - P, H_t) + \pi^d U(C_t - \theta - P, H_t^c)] \quad (V.6)$$

**Conclusion V. 2 :** Since the purchase of LTC insurance is determined by the EU gain, the welfare gain from LTC insurance is a weighted average of the long term expected gain if chronic shock occurs and the premium costs if does not occur.

#### V.3.4 Disability risk perceptions

The main points of this paper relies on the relevance of the probability of becoming disabled in determining the purchase of LTC coverage. The uncertainty on the probability of becoming disabled assuming asymmetric information constitutes an argument for purchasing LTC insurance (Meier, 1999). If the probability of a chronic shock is small enough to assign a larger weigh to the welfare loss for insuring, then insuring LTC could be rationally rejected . This is consistent with the extended idea than individual tend to underestimate small probability high-cost events as was pointed out Kunreuther (1978). Although this is a credible and founded explanation, should take into account the role of information as limiting the capacity of individuals to estimate the correct probability of chronic shocks appearance<sup>xxvi</sup>. Therefore, individual perceptions of being disabled is  $\pi^{d*}$  and we assume that is a function of the expected probability of becoming disabled  $\pi^{d*} = \phi(\pi^d)$ . The LTC insurance premium are to be guided by  $E(\pi^d)$ , therefore we can re-write V.4 as:

$$EU_{LTC} = U_1(C_1 - \beta D \pi^d, H_1) + \pi^{d*}(\iota) [U_2(C_2 - \beta D \pi^d - (1 - \beta)D, (1 - \delta)H_1 - \theta \varepsilon^c)] + (1 - \pi^{d*}(\iota)) (U_2(C_2 - \beta D \pi^d), (1 - \delta)H_2) \quad (V.7)$$

the first order conditions are respect to  $\pi^{d*}$  are :

$$U(C_2 - \beta D \pi^d - (1 - \beta)D, H_d) - U_2(C_2 - \beta D \pi^d) H_{nd} \quad (V.8)$$

where health sate with disability is  $H_d$  and health state without disability is  $H_{nd}$ .

**Conclusion V.3.** The purchase of LTC depends on the utility increase associated with LTC costs. The first order condition respect to  $\pi^d$  :

$$U'_1 \beta D - \frac{\partial \pi^{d*}}{\partial \pi^d} U'_{2d} + \pi^{d*} \beta D U'_{2nd} - U'_{2nd} \beta D + \frac{\partial \pi^{d*}}{\partial \pi^d} U'_{2nd} + (1 - \pi^{d*}) \beta D U'_{2nd} \quad (V.9)$$

where  $U_{i,j}$  is a state dependent utility where  $i$  refers to the period and  $j$  to disability. Reordering terms we obtain :

$$\frac{\partial \pi^{d*}}{\partial \pi^d} = \frac{\beta D \left[ (U'_1 + U'_{2nd} - U'_{2d}) + \pi^{d*} (U'_{2nd} - U'_{2d}) \right]}{U'_{nd} - U'_d} \quad (V.10)$$

**Conclusion V. 4.** Disability risk perceptions are to be updated by the relative net utility benefits from insuring in the first period and the perceived utility benefits from insuring in the second period .

The first order condition respect to coverage  $\beta$  are the following :

$$U'_1 \pi^d + \pi^{d*} U'_{2d} [\pi^d - 1] + (1 - \pi^{d*}) [U'_{2nd} \pi^d] \quad (V.11)$$

and reordering we obtain :

$$\frac{\pi^{d*}}{\pi^d} = \frac{U_1' + U_{2nd}'}{U_{2nd} - \pi^d (U_{2nd} - U_{2d})} \quad (V.12)$$

**Conclusion V.5.** The relative risk perception bias is directly determined by the magnitude of overall benefits from insuring and inversely determined by the difference between utility gains from insuring and the bias respect to utility losses if disability does not occur.



## **V.4. The Empirical framework**

### **V.4.1 Previous evidence**

A primary task in the study of the complex issue set in this paper (why there is not LTC insurance market in Catalunya such as in other similar European countries) is to determine the expected need for such services as perceived by individuals. That is, there are a set of relevant variables that may determine the individual need for LTC, such as expected life expectancy, the overall and own perceived risk of becoming disabled (suffer a disability chronic shock in the terminology used in this paper). Therefore the empirical part of this paper concerns on estimating the role of risks perception as determining the purchase of LTC insurance<sup>xxxvii</sup>.

There has been small empirical research on this issue. However, there are some empirical references that should be taken into account. One of main references is Sloan and Norton (1997) they find clear evidence for the US LTC insurance market that adverse selection such as the presence of the Medicaid coverage explains why people do not purchase LTC insurance. However, an interesting result to be noted is that the bequest motive such as other exchange motives (Zwiefel and Strüwe, 1996) may influence the demand for LTC. Another relevant connected study is Hoereguer et al (1996), they find that Medicaid eligibility subsidies does not affect family choices of living arrangements.

In principle people are assumed to dislike risks, however the willingness to purchase an insurance policy –as a way for shifting risks– may depend on the nature of the risk, since there may be some risks that are not perceived like that by some individuals. Therefore a first hypothesis to test is whether people perceive disability risks as a real risk, that is the individual risk awareness. A second aim of this empirical part of the paper is to test the existence of a bias regarding the disability and longevity risks. Finally, the paper tries to

identify is disability risks perceptions are to be associated with the willingness to purchase a LTC insurance policy.

#### **V.4.2 Data and empirical specification**

The data was collected by a private firm IRC consultores form Barcelona during July 1999. The questionnaire investigate if individuals hold any kind of insurance and specifically health care insurance. However, much of this data has not been used in this study. Since there is no relevant market for LTC insurance in Catalunya, the questionnaire was designed under hypothetical conditions, there fore results could be biased due to these reasons, however as we though this is the unique way in countries with no market for LTC to investigate the reasons for its reduced demand. The demand question was the following : "would you insure against LTC risks if it would be available were 40 old under a similar insurance premium as the current private health insurance".

#### **V.4.3 The explanatory variables**

Variables used in this paper fall in three different categories : (i) risk perceptions and expectations (adverse selection ), (ii) family interactions, and (iii) other relevant variables.

##### *a) Adverse Selection and risk perceptions*

IRC asked respondents the to assign a probability of an individual to become disabled at the age of 80, and their own perception of being disabled at this age. Respondents could give any value from 0 to 100. The idea was to capture the adverse selection effects such as the effects of risk perceptions, those individuals that have a high probability of being disabled in the age of 80 should display a higher demand for LTC.

The individuals disability risk perceptions have been widely used for a wide variety of public policy reasons. Here we are interested in capturing the determinants of individual risk perceptions in becoming a disabled and therefore needing LTC. Although research demonstrates that individuals show some difficulties in conceptualizing mathematical probabilities of adverse outcomes, some research shows that people act by heuristic notions about risk (Slovic et al (1979)). Although individuals risk perception may not be correct, they exist in fact and exhibit some influence on individual behavior.

Individual risk perception have been computed by means of a simple estimate, asking "for every 100 individuals approaching to 80 years old, how many would be disabled", this is a similar question to the one used in Chapter III for the case of smoking. This results are divided by 100, and therefore we obtain final probabilities as a proxy for risk perceptions. In order to provide a better understanding of individual risk perception we examine the influence of demographic characteristics, health appears to be significant, such as risk attitudes and, sex and regional proxies.

#### *(b) Familiar interactions*

From the perspective of social interactions derived from living in an intergenerational household, we should expect that those individuals living with a large family would be less likely to purchase LTC since informal care would be more feasible to be provided. The average number of family members was 2,76 what indicates that in Catalunya in average terms the family extension is not very large. However, this effect can be explained by the significant number of individuals that live alone 16% in our sample. However, differently from Sloan and Norton (1997) we did not include in the questionnaire any belief about the desirability of leaving in an inheritance.

#### *(iii) Other relevant variables*

In Catalunya, like in other OECD countries private health insurance is being subjected to a "captivity" phenomenon (Propper, 1993) due to the presence of a NHS such as the important share of the public sector in the overall economy. A relevant variable to take into account is the respondent is insured or not by a private health insurance. In principle it is feasible to hypothesize that those individuals that would never insure due to political reasons or any other connected reason may be skeptic on purchasing LTC insurance since they believe the public sector should cover their expenses. Moreover, income and wealth may be also relevant variables to take into account, however since they are strongly correlated with insurance we drop them for the demand estimation. Moreover, geographical variables seem to be also important, since as we show in Chapter IV there are relevant regional differences in terms of the probability of holding an insurance. Finally, sex, education and age theoretically seem likely to influence the LTC demand.

## V. 5 Results

The perceived life expectancy does not show significant differences from the actual life expectancy in Catalunya, however is slightly overestimated. Therefore, we carry out an analysis of the bias between perceived and actual life expectancy in Catalunya. Results (in table 3) show that younger individuals overestimate life expectancy whereas older individual underestimate its life expectancy until the age of 85, showing a pattern that we define as a the "growing pessimism". Moreover, nearly the 70% of respondents believe they would survive more than form the 80 years old.

Table V. 3. Perceived life Expectancy and mean disability risk

Perceptions	Mean	Standard Deviation	Bias(*)
<u>LONGEVITY RISK</u>	83.6	7.277457	
25-34	51.7	7.55	+0.96
35-44	43.39	7.55	+1.4
45-54	33.8	8.056	+0.91
55-64	21.56	5.24	-2.84
65-74	16.36	5.97	-0.07
75-84	9.66	3.95	-0.44
> 85	12.66	6.35	+6.98
Life Expectancy > 80	0.691	.4622253	
<u>DISABILITY RISK</u>	0.4812	.2250092	

(\*) Perceived life expectancy - actual life expectancy.

Risk perceptions show that in average the perceived risk of disability when an individual is 80 years old is about 0.48, whereas table V. 4 displays the risk distribution evidencing that risks perceptions are approximately symmetrically distributed. However, it does not seem reasonable that the 100% of the 80 year old individual would be disabled. The 80% of the same shows risk perceptions ranging from .2 and .7. However assessing if there is a bias or not, depends on what we define as disability, taking into account the results of the Catalan Health Survey, and understanding disability as a state where there is nor limitation, we would find that people overestimate disability risks perceptions. This is

consistent with the accepted idea that people tend to overestimate high cost and small probability events. However, this may not be strongly hold, as far as depends on the definition of disability that is been assumed.

**Table V.4. Risk Perception distribution (social disability risk)**

<b>Risk Level</b>	<b>Frequency</b>	<b>Standard Deviation</b>
Risk < 0.1	.0081169	.0898003
0.1 < Risk < 0.2	.0211039	.1438475
0.2 < Risk < 0.3	.1314935	.3382139
0.3 < Risk < 0.4	.0665584	.2494583
0.4 < Risk < 0.5	.0909091	.2877134
0.5 < Risk < 0.6	.0032468	.0569339
0.6 < Risk < 0.7	.1525974	.3598912
0.7 < Risk < 0.8	.0405844	.1974858
0.8 < Risk < 0.9	.0633117	.2437206
0.9 < Risk < 1	0	0

Table V.5 shows that life expectancy is negatively determined by living in Barcelona, and positively associated with age and health such as insurance. This results suggest, that living in a city as Barcelona the risks of dying before the age of 80 is higher that outside, sue to the style of life often associated with living in a city (i.e stress, larger health risks,...) . Moreover, those individuals that currently fell healthy, are also expecting to live longer than other individuals. However, this results may be limited with the "optimistic bias" since the optimistic individual could be at the same time optimistic in assessing its own health state, such as when assess its perceived life expectancy. Finally, age plays a major role in increasing life expectancy, since older individuals turn to be after the age of 85 more optimistic about its life expectancy. Finally, the statistically significant and negative sign of the intercept provides some information of some variables, influencing negatively the perceived life expectancy that we have not captured by means of this specification. Even though, other variables certainly may influence life expectancy (Income, education etc) our purpose is not entirely devoted to this issue, but just analyzing with are the main variables that theoretically explain life expectancy (age, sex, health and regional parameters).

Table V.5. Perceived Life Expectancy

Dependent variable	Life Expectancy > 80	
	Coef.	t
<u>REGION</u>		
Barcelona	-.3854952**	-2.922
<u>CURRENT HEALTH STATUS</u>		
Health	.1626775**	2.568
<u>SOCIO-ECONOMIC CHARACTERISTICS</u>		
Sex	.0900087	0.697
Age	.0215416**	5.203
INTERCEPT	-1.548289**	-4.092
Log likelihood	-257.28903	
LR test $\chi^2_4$	38.94**	
Pseudo $R^2$	0.0703	

Turning to the risk perceptions, results obtained by means of an OLS estimation – since there was no reason for censoring the regression – of the determinants of the disability risk perceptions are displayed in Table V. 6. The main results from this analysis is that risk perceptions in Catalunya are associated with health, sex and regional variables. Education does not play an major such as age. However, sex and regional variables are clearly influencing risks perceptions. Finally, health and especially personal risk attitudes (a proxy of risk aversion). Moreover, there are also clear regional differences that explain this behavior.

**Table V.6. Disability risk perception determinants**

Variable N=400	Coefficient	Std. Err.	t-value
<b><u>SOCIO-ECONOMIC CHARACTERISTICS</u></b>			
Age	.0007399	.0007063	1.047
Education (1 > primary school)	.0103034	.0079717	1.292
Sex (1 = male)	-.0506558**	.0210348	-2.408
<b><u>HEALTH AND RISKS</u></b>			
Health (1 = bad, 5 = exelent)	-.0219471**	.0102046	-2.151
Risk Attitude (1-10 scale, 1 = averse)	-0.252185***	.006818	-3.699
<b><u>REGIONS (omitted Girona)</u></b>			
Lleida	.1048796**	.0458744	2.286
Tarragona	.2911922***	.048081	6.056
Barcelona	.1307594***	.0351818	3.717
INTERCEPT	.5585028***	.0745408	7.493
Adj R <sup>2</sup>	0.1739		
F-statistic	10.33***		

\*\*\*Significant at P=0.01

\*\*Significant at p=0.05

\*Significant at p=0.1

Finally, the demand for health insurance estimated under hypothetical conditions, shows that age influence positively in the demand for LTC. At a 10% significance level living in Barcelona such as education and own risks also exercise a positive influence, suggesting that there is evidence for adverse selection in this market, those individual that perceived they would be disabled they would insure. Moreover, since living in Barcelona can be contemplated as a proxy of access to LTC it's clearly associated with the purchase of LTC. However, the family size is not significant therefore the hypothesis abovementioned of family interactions would be rejected according to this evidence. This results quite similar to Sloan and Norton (1997). Finally, risk perception do seem to influence the purchase of LTC insurance and displays the correct sign. Therefore, more research should be done in this field Table V. 7. Willingness to purchase LTC insurance in Catalunya (Probit estimates)



Table V. 7. Willingness to purchase LTC insurance in Catalunya (Probit estimates)

LTC insurance purchase	Equation 1	Equation 2
<u>SOCIO-ECONOMIC CHARACTERISTICS</u>		
Age	-.0420089 (.0282881)	-.0458655 (.0285788)
Age square	.0002467 (.0002684)	.0002745 (.0002707)
Education(1 = > primary school)	.3022015 * (.1648425)	.3201172** (.1669171)
Large household ( Dummy = 1 if > 5 members)	.1488027 (.1622124)	.1361803 (.1633521)
Income2 (Low income omitted)	-.2393434 (.283163)	-.224381 (.2851202)
Income3	.0133655 (.2264173)	.0081095 (.2294344)
Income4	0.129 (0.218)	.1356762 (.2207146)
Income5	0.919** (0.358)	.231054 (.2045443)
Sex (1 = male)	.1942565 (.1380145)	.2031704 (.1399043)
<u>REGIONAL CHARACTERISTICS</u>		
Barcelona	.4876002*** (.1559108)	.4573997*** (.1587831)
<u>HEALTH AND RISKS</u>		
Own risk (1 = disabled at 80 year old)	.3179703* (.1788381)	.3619366** (.1805611)
Health (1 = bad, 5 = exelent)	.0192582 (.0728297)	.0036872 (.0740707)
High risk (Dummy = 1 if > .7)		1.020498*** (.39052)
Middle risk (Dummy = 1 if < 0.4 to > .7)		.3382844* (.1922154)
INTERCEPT	0.451833 (0.8267)	.4523343 (.8271841)
N	400	400
Pseudo R square	0.1138	0.13
Log-L	-234.06484	-228.11703

(standard deviation in brakets)

\*\*\*Significant at P=0.01

\*\*Significant at p=0.05

\*Significant at p=0.1

## **V.6 Concluding Remarks**

This paper sets some evidence on the possible failure of LTC insurance market from the perspective of the individual rationality. That is the adequacy of the willingness to pay for LTC insurance -in order to shift the costs of disability - and the disability risk perceptions.

We have shown some theoretical insights that explaining this feature, focusing on the relevance of risk as determining the benefit perception of LTC insurance. Moreover, we have presented empirical evidence on how individuals form beliefs about disability risks and the links between disability risks and the willingness to pay for shifting this risks. Unfortunately, empirical evidence dos not permit us to assert that individuals are unaware of their future risk covering LTC needs. Moreover, familiar interactions does not seem to show a significant influence in the purchase of LTC, whereas we also have set out an additional evidence for the presence of adverse selection in this market. The economic policy implication are large and especially relevant since they suggest that that individuals seem well informed about their future events concerning their health state. Therefore, under the presence of correct risk perceptions and correct estimates of life expectancy, this means that people.

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- \* This paper has been partially presented to the HESG meeting held in Aberdeen, July 1999. Financial funds has been received from the Fundació Salut, Empresa i Economia, 1999.
- <sup>i</sup> This data has been obtained from el *Pla de Salut de Catalunya*, (1998).
- <sup>ii</sup> Further in the chapter we will provide more insights to this feature.
- <sup>iii</sup> See Lakadawulla and Philipson (1999).
- <sup>iv</sup> Almost four of every ten people reaching the age 65 will use nursing home at some point in their lives, and many will need other related services (*Enquesta de Salut de Catalunya*, 1994).
- <sup>v</sup> The "dependency" situation can be defined by two basic elements: (i) the existence of a personal health limitation and (ii) the need of a another person care.
- <sup>vi</sup> This indicator has been elaborated adjusting the life expectancy indicator for Catalunya with the dependency data obtained form the Catalan Health Survey 1994.
- <sup>vii</sup> Prompting important "budget concerns" for the public health sector, as well as for the straining family finances
- <sup>viii</sup> Only a 2% of US elderly (1986) and less than 0.2 % in Germany (1993), in Catalunya there is only a few insurance companies but its share is depreciable.
- <sup>ix</sup> Under a NHS the costs associated with cure (health care) are in principle largely subsidiarized.
- <sup>x</sup> For instance, a recently approved Law in France (october, 1995) introduced a monthly subsidy for dependent elderly of 4,300FF (107,000pts aprox) for those individuals with a monthly income lower than 13,000FF( 325,000 pts). However, has not demonstrated a great success since only 11,000 for the total 700,000 disabled in France receive thus financial help.
- <sup>xi</sup> There are in fact publicly contracted hospitals and other related facilities supplying implicitly LTC to individuals that are unlikely to recover its health state what is to reduce the function of health care to the one of *care* rather than *cure*
- <sup>xii</sup> The payment system is shared between employee and employer, whilst employers works an additional day every year.
- <sup>xiii</sup> The insurance benefits are originated when an individual shows a 2 or 3 points in the ADL scale.
- <sup>xiv</sup> Cost reimbursement for people older that 60 and offered by the French "Départaments".
- <sup>xv</sup> That is, insurers deal with current "cross section" risks ( intratemporal risk). However, LTC insurance should provide coverage for future aggregate risks where there is a large component of uncertainty associated with the variability of nursing home costs, so- called intertemporal risk. The argument is that it might not be possible to diversify intertemporal risk, and therefore the provision of LTC is enclosed to a fixed monetary amount of care covering intratemporal risks, but not intertemporal risks. This is an explanation of the reduced demand for LTC.
- <sup>xvi</sup> Where we should add 1,250,000. disabled individuals under 65 years old (IMSERSO, 1995)
- <sup>xvii</sup> Is should be noted that socioeconomic care delivery is especially guaranteed by Law.
- <sup>xviii</sup> This data has been obtained form the *Enquesta de Salut de Catalunya*, questions 111-131. In the whole Spanish State the 63.8% of the LTC is provided informally by the family according to IMSERSO (1995)
- <sup>xix</sup> One of this insurance companies is MUTUAM, offering a dependency coverage of 25.000 pts during three years after a one year disability appear.
- <sup>xx</sup> The art 3 states that a dependent individual (that is to be covered by a LTC insurance) is "*a person disables to come up autonomously with the normal activities of its daily life and /or the necessary instrumental activities for its societal coexistence, and in both cases needs help or vigilance of another or other people*".
- <sup>xxi</sup> This data has been obtained from Rivera Saganta (1999).
- <sup>xxii</sup> It can include a large set of institutional services, intermediate care, custodial facilities etc.

<sup>xxiii</sup> The number of single member families is growing spectacularly in Europe

<sup>xxiv</sup> That is disabled elderly usually don't want to become an additional charge to their families, despite they need the family affection.

<sup>xxv</sup> However, this constitutes a disincentive for saving since "the more the individual saves in prevision for long-term events the less public resources would receive".

<sup>xxvi</sup> This is non elderly show lower discount rates (the rate at which future values or costs are equated to a present one) what is to encourage investment in LTC.

<sup>xxvii</sup> The underlying argument was set out by Rosen (1994): "Its entirely rational for the elderly to spend heavenly in expanding medical care to extend the quantity and quality of their lives however, young individuals seem to show different preferences, probably because they are short-sighted".

<sup>xxviii</sup> This reasons *rely on the uncertainty associated with the own life expectancy* since the more an individual lives, the higher the expected costs of LTC. However, since an individual can die due to a large number of motives, and even if a chronic shock occurs there is a huge uncertainty on the period of being disabled, this would be a discouraging arrangement.

<sup>xxix</sup> People tend to underestimate high risks and to overestimate small risks.

<sup>xxx</sup> Whereas the state of life and death are clear, disability as exhibiting LTC needs is something less clear. However, there are a large set of definition (see Richter and Ritzeberg (1995)).

<sup>xxxi</sup> Can be represented as a period without chronic health states.

<sup>xxxii</sup> For instance, in Catalunya, individuals in average live 6/7 of their life without disability and the remainder (1/7) disabled

<sup>xxxiii</sup> Those benefits associated with LTC as nursing home, medical care etc, do not yield itself utility

<sup>xxxiv</sup> Even though this is a restrictive assumption, see Cutler (1993) we consider the perspective of the individual, and therefore the insurer cost variability should not affect our results.

<sup>xxxv</sup> We implicitly assume that insurance would be bought indifferently during the first period or before the second period since they lead to similar allocation (see Meier, 1999).

<sup>xxxvi</sup> This simple model is consistent also with most of the assumptions of the Pauly (1990) model. However, the Pauly's model was based on the Medicare system whereas in Spain the coverage restrictions for increasing the LTC subsidization induce to set out an alternative mechanisms.

<sup>xxxvii</sup> It should be noted that this issue clearly links with Chapter VI aiming to estimate by means of contingent valuation approach the valuation of LTC benefits

## **Capítol VI.**

**Assessing the willingness to pay  
for Long-Term Care benefits**





### **ABSTRACT\***

This chapter aims to estimate the individual willingness to pay for long-term care coverage in Catalunya. The analysis of this question has been undertaken from a hypothetical contingent market analysis. In particular, the empirical method used is a referendum contingent valuation survey. The main idea is that disability risk perception s determine the ability to pay for long-term care. The instrument to assess the LTC coverage valuation has been a dichotic, single ended willingness to pay (WTP) approach using the insurance payment system. The methodological WTP novelty introduced in this paper has been: (i) the use as reference bids, results obtained from a previous open ended WTP focus group trial study and, (ii) the use of "health insurance premium" as the payment instrument. . This chapter consists on a first part of the paper provides a theoretical reference for the WTP estimation of long run benefits. The second part of the paper deals with experimental evidence and empirical estimation for long term care benefits. Previous experimental results reject the presence of an asymmetric demand for LTC between insured and not insured, which confirm the theoretical validity of this method. The third part of the paper confirms the role of the disability risk perception in determining the decision to purchase LTC.

*Key words:* Long-term care; willingness to pay; health insurance.

*JEL classification:* D63, D78, I11, and H43.



## **VI.1 Introduction**

Individuals are involved in a large number of health risks concerning their current and future health state. When those risks emerge, medical and other related care is individually claimed in order to fulfil the individual demand for health care. As we stressed in chapter II, long-term care risks are clearly distinguished from short-term care risks (Moore and Viscusi (1990)). In this paper we concern on long term care risk, the disability risk as to influence the decision to purchase LTC insurance. A basic explanations for the cited distinction rely on the argument that people highlight cognitive restrictions on identifying their own future health risks due to information asymmetry<sup>i</sup> (Tversky and Kanheman (1974), Slovic et al (1979)). However, according to the experimental evidence provided by Tversky, Slovic and Kanheman (1990), although people seem to be highly aware of their current short-term risks, they tend to overvalue long term care risks.

A priori we may expect an asymmetric *valuation of risks according to its effects over time*, therefore the valuation of benefits that may be acquired with a determined small probability may be affected by this asymmetry. A specific case where this feature emerge as playing a relevant role is the LTC insurance. Accordingly, in order to investigate from a hypothetical point of view the LTC insurance is by using the contingent valuation approach. The aim of this paper is to elicit the willingness to pay for LTC benefits by means of a referendum closed-ended approach. It can be seen as a "particular" application of the WTP, analysing the long term risk- shifting by means of a LTC willingness to buy insurance at different hypothetical prices. As analysed in chapter V, there is a reduced coverage of LTC in Catalunya, despite demographic projections suggest life expectancy may increase, increasing the risks of longevity and less clearly the risks of disability. However, there is still no research reference that has deal with the valuation of this benefits.

The traditional response to the presence of uncertainty is the development of private and/or public health (or health related) insurance mechanisms covering the wide range of risks associated with health care and care, at an advanced age<sup>ii</sup>. However, in Catalunya there is a *clear asymmetry between short term and long-term care risk coverage*<sup>iii</sup>. Both the NHS and the private insurance market cover the first one, whereas the second is not clearly covered neither by the public sector unless the individual holds no resources, not by the supply of private LTC insurance<sup>iv</sup>. In Chapter V we provide some insights to this issue from a risk perception perspective. This chapter attempts to value LTC coverage assuming a hypothetical market, where a LTC insurance policy would be offered at different prices following the contingent valuation approach. Therefore, even though there are only a few transactions for LTC insurance, there are strong reasons that may induce to think that individuals may be willing to cover their disability risks.

Recent theoretical discussions suggest that resources should strongly favour the young rather than the elderly according to previous evidence (Cropper et al [1994]), however the process of ageing poses rises the costs associated with longevity and disability risks. Despite the duration of disability may not increase, the number of disabled candidates increase when the elderly population increases. Moreover, recent evidence suggest that despite people may agree on devoting more resources to the young when they are asked if they are willing to pay the costs of *own survival* when they become older they don't seem to follow this criteria (Johannesson and Johanson [1996]). Therefore, more research should be done in order to clarify this issue.

In this paper we investigate the valuation of LTC benefits from a contingent valuation scenario. According to Reed et al (1998) *theoretically correct choices concerning longevity are to be made by means of an ex - ante framework*, that is before the resolution of uncertainty. Theoretically, utility depends on individual choices and subsequently the outcomes obtained. In particular, this paper outlines the role of a set of the determinants of the decision to insure LTC risks, described in section VI.3.2.

The organisation of this paper is the following. In section two we develop a theoretical framework in order to conceptualise the willingness to pay for long term benefits. Section three outlines the methodological improvements of this study, the hypothesis on the determinants of the willingness to pay estimates and the empirical model used in this approach. Section four provides some previous evidence based on a small-scale experiment undertaken as a trial study to test the hypothesis of a differential valuation between long term and short terms benefits. Section five, describes the source of the data used, and finally section six provides the results on the basis of the hypothesis set in the empirical model. The paper ends with some concluding remarks.

## **VI.2 The theoretical framework**

### **VI.2.1 The willingness to pay for long run benefits**

One of the proposed schemes that we hypothesise it appears to be adequate an adequate context for obtaining long run values, refers to the willingness to pay approach. The payment mechanism considered is the insurance context, since the large experience that people face in coming up with this mechanism enables the “contingent market” scenarios interpreted as offering a supplementary benefit to be provided<sup>vi</sup>. In this context two prime uncertainties usually emerge : the one related to health  $H_t$  and the other concerning financial uncertainty  $C_t$ , which is the welfare loss, derived from affording the health care expenses. Under this approach the purpose is defined on obtaining the “monetary expressed values” people attach to different prospects defining our focus of interest. The subject of interest is LTC conceptualised as a set of services expected to be consumed in the long run assuming if disability is to occur<sup>vii</sup>. As our main interest relies on the expected valuation of LTC benefits when an individual becomes disabled, an additional constraint limiting our approach is the influence of survival probability such, as the time preference in determining the expected valuation.

Assume that individuals are expected (health dependent) utility maximisers <sup>viii</sup>. The individual utility is  $U = U(C_t, H_t)$ , twice continuously differentiable, strictly increasing and concave.  $C$  refers to consumption and  $H$  refers to health state. Health state can be measured as a range going from death that is assumed to be 0 –despite being a restrictive assumption - and maximum health  $H_t \in (0, H_{max})$ . Disability can be measured as some intermediate health state  $H_d$ ,  $0 \leq H_d < H_{nd}$  and is assumed to appear after a fixed age  $t_i = 60$  with a probability  $\pi^d(t)$  that increases with age. If disability appears, then some kind of specific services would be demanded, i.e nursing home involving large costs  $D_t$  to provide adequate treatment. Assume that  $C_t > D_t$ , therefore the NHS would not pay

for disability expenses. If no insurance was involved, then the expected utility of a 60-year-old individual would be:

$$EU_{t_0} = \pi^d U(C_t - D_t, H_d) + (1 - \pi^d) U(C_t, H_{nd}) \quad (VI.1)$$

that is, individuals would have to afford the expenses associated with disability. However an individual could die before  $t_0$ , and the probability of survival until age 60 is  $\pi^s(t)$  and  $1 - \pi^s(t)$  is the probability of dying before and therefore not requiring LTC. Therefore, the expected utility of a younger than 60 year old individual is<sup>ix</sup>:

$$EU_{t < t_0} = \pi^{ds} U(C_t - D_t, H_d) + (1 - \pi^{ds}) U(C_t, H_{nd}) \quad (VI.2)$$

where  $\pi^{ds}$  is the disability probability conditional on survival to age  $t_0$ , that is an increasing function with age,  $-\pi^{ds}(t)/\pi^{ds}$  increases with age. If an individual lives longer to some older, then its assumed to update his probability of disability function. Accordingly, the individuals expected utility can be obtained by weighting the utility payoffs in the states of nature "disabled" and "not disabled" subjected to being alive at some point of time  $t > t_0$ . Therefore the desired marginal rate of substitution (marginal WTP) for avoiding  $D_t$  is:

$$MRS(\pi^{ds}, C_t) = \frac{U(C_t, H_t) - U(C_t - D_t)}{\pi^{ds} U_c(C_t - D_t, H_d) + (1 - \pi^{ds}) U_c(C_t, H_{nd})} \geq 0 \quad (IV.3)$$

where  $U_c$  is the partial derivative of utility respect to consumption. This result shows the marginal valuation of a change in the probability of becoming disabled. Furthermore, results from a constrained maximisation yield to the indirect utility function  $V(Y, C)$ . According to Zwiefel and Breyer (1997) WTP is firmly connected with the "axiomatic



nature of subjective valuation". Therefore, the subjective time preference would reduce while the individual becomes older ( $\rho$ ).

Therefore, willingness to pay can be defined as in the certainty case as the amount that if paid leaves the initial expected utility level unchanged, guaranteeing that if individual's becomes disabled the associated expenses will be covered by the private insurer at a zero cost. That is:

$$\sum_t V(C_t - WTP, H) = \sum_{t=t_0}^T (1-\rho)^t (\pi^{ds} V(C_t - D, H_d) + (1-\pi^{ds}) V(C_t, H_t))$$

(VI.4)

**Conclusion VI.1** The maximum willingness to pay for long term insurance benefits is the maximum premium that if paid leaves the individual well being equal to the expected utility of having to afford in the long run LTC expenses adjusted by time preference.

## **VI. 2.2 Hypothetical determinants of the willingness to pay estimates**

The relevance of setting some of the hypothetical determinants of the LTC values stems from the complexity of the estimated value. Regardless of the hypothetical determinants of LTC insurance, it should first be noted that what we are aiming to value is not the ex - ante coverage of long term expenses. Taking into account this distinction in this section we attempt to describe those variables that may theoretically influence the purchase of LTC. In particular we stress the role of age, moral hazard, disability risk perceptions, attitudes toward the future, family interactions, wealth, substitutes for LTC and the NHS valuation and finally adverse selection and moral hazard effects.

According to Johanesson and Johansson (1995), 1996 and Rosen (1988) WTP increases as age increase. Theoretically, we could hypothesise that the elderly would benefit from LTC more than a non-elderly person and therefore they may be willing to pay a higher

insurance premium. Therefore, WTP varies with time preference and in our case the expected results are those individuals when they get older they start valuing some insurance benefits that were not relevant at all before<sup>x</sup>. However, in this paper we suggest a different pattern of LTC insurance. As we estimate in Chapter V, older individuals are to underestimate their life expectancy whereas young individuals were overestimating its life expectancy. *Therefore, if younger individuals are expecting to live longer, then age should be a negative predictor of LTC insurance.* Moreover an additional argument for this feature is found in the relation between age and the probability of death.

Experimental evidence suggests that individuals usually show very small probabilities of proximate death, although the probabilities rise with age (Reed et al [1998]). Therefore, the elderly, show a reduced need for LTC insurance than non-elderly as they have already survived to an advanced age, which means that the expected costs associated with LTC if disability occurs are to be less than those for the non-elderly. Finally, another argument explaining this pattern is closely related to the life cycle choice. Whereas the elderly may have already saved some income in order to afford the consequences of LTC, the non-elderly should show a higher willingness to pay for LTC.

A second possible determinant of the WTP may be moral hazard and adverse selection and disability risk perceptions. Firstly, the existence of a high correlation between insurance and health care utilisation may induce a high preference for LTC insurance (Sloan and Norton ,1997). If services were covered by insurance then probably, as the price is 0, individuals purchasing LTC insurance would have greater incentives to consume LTC. This could clearly appear when insuring LTC. If this occurs then people would actualise the purchase of expected future care benefits. Moreover, we could hypothesise that those individuals showing health problems show a clear incentive to insure. However, this variable can be alternatively captured by the own disability risk perceptions. Disability risk perception refers to disability perception condition on surviving to a specific age where disability usually appears<sup>xi</sup>.

A third determinant is the *own expectation of the years of disability and attitudes towards the future*. Going further, another important constraint is the years of survival under a chronic health state since individuals generally underestimate the years of survival under a chronic health state and therefore their associated costs. *Attitudes towards the future* hypothetically determine the purchasing of this set of benefit, in particular the traditional variable to be included is education.

*Family interaction* can also influence the decision to insure LTC. That is if an individual lives alone or does not receive any informal help, then no intergeneration wealth transactions could substitute the wealth necessary to cover LTC. The literature on LTC insurance suggests that the provision of LTC displays connected family interaction (see Chapter V). Therefore, there may be a *use value* for those perceiving they would consume LTC, but also there is an existence value for those household members that otherwise they could not afford the expenses of LTC costs. Therefore, if family interaction appears to be significant predictors of the WTP estimates, we hypothesise that the overall value should distinguish those who *benefit directly* (individual insuring) and others that *benefit indirectly* (family members) from LTC<sup>xii</sup>.

Finally other possible determinants may be *social attitudes*. There are social problems such as a shared attitude of some people resulting in keeping their parents at home before receiving before receiving a service from specialised institutions. The existence of *substitutes for LTC* financing are encountered in the financial systems as private pensions systems and other alternative financial products than would permit to cover LTC costs under the assumption of occurrence of this need. Finally, the existence of a social health insurance presumably which provides medical care at zero cost at point of demand ultimately may be also something hypothetically constraints the willingness to pay estimates.

## VI. 3 The empirical methods

### VI.3.1 The willingness to pay: methodological improvements

One of the main problems that health economist currently encounter relies on estimating accurately the economic values of welfare improvements appearing in the long run. Revealed preference provide insufficient basis for obtaining policy-relevant values for this kind of benefits, the major problem is that the existence of universal health systems, beneficence and other institutions induce to misrepresentation of market participants in LTC, therefore expressed preference methods, and especially the willingness to pay approach are being largely used (Viscusi (1991), Propper, (1995), Reed et al , (1998))<sup>xiii</sup>.

Following the NOAA guidelines we employ the WTP rather than the willingness to accept (WTA) approach<sup>xiv</sup> within a closed-ended format<sup>xv</sup>. However, there are other theoretical reasons for using the WTP approach , such as the presence of the *endowment effect bias* (Kanheman and Tversky,1979). The main features defining the relevance of this paper are the following. For the best of our knowledge, the WTP approach has never been applied yet to value LTC. The second novelty is defined by the use of the WTP in the context of health insurance. This approach has been advocated by Gafni (1991)<sup>xvi</sup> and more recently by Johansson (1996) as an appropriate way for eliciting values for health benefits<sup>xvii</sup>. The third methodological feature has been the method of obtaining the bids to be offered in the contingent valuation survey. We have first implemented a small scale focus group experiment in order to obtain previous evidence of expressed preferences and values for short term and long-term care provided by means of an insurance coverage in Catalunya <sup>xviii</sup>. From this reference values a set of 40 different bids where designed in order to compute the willingness to pay<sup>xix</sup> by means of a contingent valuation survey representative (n=400) of the Catalan population.

Despite the fact much research is to be done before the WTP technique becomes generalised, it seems to be an appropriate instrument for this study as far as the object

attempted to value is not a set of extendedly benefits offered by the standard health insurance policies<sup>xx</sup>, but to some extent uncovered benefits that are rather assumed to provide a use and option value for those insured and an option and existence value for uninsured. Therefore, answers in principle should not be bias by the existence of a current private market for health insurance<sup>xxi</sup>. Moreover, although we are using an hypothetical health insurance policy as the payment instrument to estimate the willingness to pay, results are expected to capture the benefit valuation regardless of who will finally provide the health care service<sup>xxii</sup>. However as with other methods a bias could arise form the payment instrument (this would be tested in the last part of the paper).

The basic reference for this study has been *Johannesson and Johansson* (1997). They address the elicitation of the willingness to pay an insurance premium in exchange of a new program extending the expected duration of lives, conditional on having survived until 75 years old<sup>xxiii</sup>. Results from this paper suggest three main features: (i) similarly than in Johannessson (1995), respondents , tend to be pessimistic respect to their future quality of life, that is they perceive a reduced expected quality of life at advanced age and (ii) there is a large correlation between expected life expectancy and the WTP for the purposed programme . Therefore, subject on surviving, the perceived probability of becoming disabled after the 80 is relatively small (about .2). Furthermore, a third outstanding methodological result from the previous is that the insurance question works quite well in order to assess the long term care valuations<sup>xxiv</sup>.

### **VI. 3.2 The willingness to pay empirical model**

In this section we describe the model for a discrete single – bounded WTP estimates based on offering by means of a one period bid( $A_i$ ) a new benefit i.e the LTC coverage at a given price/cost to different sub-samples. Responses – agreements and refusals for payment – are analysed as discrete choices<sup>xxv</sup>.

The WTP to avoid the costs associated with LTC at an advanced age are described as in an explicit risk context. The risk framework is used due to LTC needs are probabilistic in terms of survival. Also, in answering WTP question, people make choices based on perceived risk of disability when they are 80 years old condition on survival.

The perceived probability of becoming disabled ( $\pi^{ds}$ ) and therefore requiring LTC is a function health status ( $H$ ) , life expectancy ( $T$ ) and information ( $I$ ) :

$$\pi^{ds} = \pi(H, T, I) \quad (VI.5)$$

We assume that  $\frac{\partial \pi^{ds}}{\partial H} \leq 0, \frac{\partial \pi^{ds}}{\partial T} \geq 0$ ; that is improving health status reduces the probability of becoming disabled, whereas improving life expectancy increases the probability of becoming disabled.

Consider a household with state dependent utility depending on whether disability occurs or not  $U^d(q^i, Z)$  or  $U^{nd}(q^i, Z)$ . Ex ante the consumer chooses the consumption and its associated expenditure based on the expected utility value of utility given of marketable goods ( $Z$ )<sup>xxvii</sup> and a non market goods consumed when disability occurs ( $q^i$ ) i.e nursing home. Utility functions are additive separable defined for both commodities. The solution to the utility maximisation problem yields to the following indirect (expected) utility function<sup>xxviii</sup>:

$$U(q^i, y, Z, \pi^{ds}, \varepsilon) = V(q^i, y, Z, \pi^{ds}) + \varepsilon_i \quad (VI.6)$$

where ( $y$ ) refers to income<sup>xxviii</sup>. Utility function is unknown, however following Haneman (1984) we can assume a random utility specification where ( $\varepsilon$ ) is a stochastic component with  $E(\varepsilon) = 0$  and  $V(\cdot)$  is the deterministic part of the indirect utility function.

Suppose that LTC is something that individuals derives utility, therefore we define  $q^0$  as individuals who do not face any personal coverage for LTC and  $q^1$  if they face the option of receiving LTC if disability occurs which means that :

$$U(q^1, y, Z, \pi^{ds}, \varepsilon) > U(q^0, y, Z, \pi^{ds}, \varepsilon) \quad (VI.7)$$

The equivalent variation is captured by the WTP approach which equates the indirect utility maximisation for an income decrease for receiving LTC in the future<sup>xxx</sup>. That is :

$$U(q^1, y - WTP, Z, \pi^{ds}) = U(q^0, y, Z, \pi^{ds}) \quad (VI.8)$$

therefore  $WTP = \phi(q^1, q^0, y, Z, \pi^{ds}, \varepsilon)$  is the maximum WTP to forgo LTC expenses.

Since we adopt a "discrete approach " a bid is offered (insurance premium) to respondents in order to avoid the financial consequences of LTC, costing  $A(PTAs)$ , and they are asked whether they are willing to sell the insurance policy. According to the logical assumption of the maximisation process, consistent respondents would answer affirmatively if  $U(q^1, y - A_i, Z, \pi^{ds}) \geq U(q^0, y, Z, \pi^{ds})$ . and therefore the  $\Pr(\text{YES}) = \Pr[U(q^1, y - A_i, Z, \pi^{ds}, \varepsilon) \geq U(q^0, y, Z, \pi^{ds}, \varepsilon)]$  and therefore the probability of rejecting the offer is  $\Pr(\text{NO}) = \Pr[U(q^1, y - A_i, Z, \pi^{ds}, \varepsilon_i) < U(q^0, y, Z, \pi^{ds}, \varepsilon_o)]$ . An equivalent formalisation would be : if respondent says YES then  $WTP \geq A_i$  whereas if the respondent says NO then  $WTP < A_i$ . Therefore  $\Pr(WTP \geq A) = 1 - F_{WTP}(A)$ , where  $F_{WTP}(\cdot)$  is the distribution function of  $WTP^{xxx}$ . The willingness to purchase LTC insurance (YES response) may be written as  $\Pr(\Delta v \geq \eta)$  where  $\Delta v = V(q^1, y - A_i, Z, \pi^{ds}) - V(q^0, y, Z, \pi^{ds})$  is the deterministic component of the utility difference and  $\eta = \varepsilon_i - \varepsilon_o$  refers to its the random component .

If indirect utility function is additive separable in LTC and income then the utility associated with LTC coverage is :

$$V(q^1 = 1, y - A_i, Z, \pi^{ds}) = \mu(1) + \pi^{ds} \mu(1) + \phi(y - A) - \pi^{ds} \mu(0) \quad (VI.9)$$

and without coverage is:

$$V(q^0 = 0, y, Z, \pi^{ds}) = \mu(0) - \pi^{ds} \mu(0) + \phi(y) + \pi^{ds} \mu(1) \quad (VI.10)$$

where sub-utility functions are  $\mu(\cdot) > 0, \phi(\cdot) > 0$ . In addition, three additional specifications hold : the differential utility function  $\Delta v$  will reduce if the premium required increases  $\frac{\partial \Delta v}{\partial A} < 0$ , is expected to increase when income and perceived risk increase  $\frac{\partial \Delta v}{\partial y} > 0, \frac{\partial \Delta v}{\partial \pi^{ds}} > 0$  <sup>xxx</sup>.

Assuming a linear approximation,  $U(q^1, y, Z, \pi^{ds}, \varepsilon) = \alpha_i + \beta_i y + \gamma_i Z + \delta \pi^{ds} + \varepsilon_i$  then the change in the indirect utility function yields to :

$$\Delta v = (\alpha_i - \alpha_o) + (\beta_o - \beta_i) y - \beta_o A + (\gamma_i - \gamma_o) Z + (\delta_i - \delta_o) \pi^{ds} + \varepsilon_i \quad (11)$$

The first term reflects the change in utility caused by changes in *ceteris paribus* LTC coverage, the second term reflect the change in income due to the payment, the third term reflects individual characteristics and the fourth term reflect change due to individual disability risk perceptions.

These predictions are to be tested by the internal validity estimates. Assuming extreme random variables, a logit specification is the most adequate econometric model since



according to Amemiya [1981], the  $pr(YES) = pr(\Delta v + \varepsilon \geq 0)$ , and therefore the acceptance probability is of agreeing to pay a specific amount of money in exchange to the covering LTC expenses is :

$$Pr(YES) = \frac{\exp \Delta v}{1 + \exp \Delta v} \quad (VI.12)$$

the logit model is estimated by maximum likelihood method producing point estimates consistent when the sample size is large, the general form is :

$$\ln L = \sum_{i=1}^n R_i \ln \left( \frac{\exp \Delta(v)}{1 + \exp \Delta(v)} \right) + (I - R_i) \ln \left( \frac{1}{1 + \exp \Delta(v)} \right) \quad (VI.6)$$

where  $R_i$  is an indicator variable taking the value zero or one depending on the acceptance or rejection of the offered bid  $A$ .

Then the expected value of the WTP conditional on the explanatory variables  $H = [y, Z, \pi^{ds}]$  is estimated as :

$$E(WTP|(H)) = - \frac{(\alpha_1 - \alpha_0) + (\beta_0 - \beta_1)y + (\gamma_1 - \gamma_0)Z + (\delta_1 - \delta_0)\pi^{ds}}{\beta_0} \quad (IV.14)$$

since  $\beta_0 < 0$  the WTP is positive.

## **VI.4 Previous experimental evidence**

### **VI.4.1 Methods**

One of the main advances of this study is the use of the focus group in order to obtain some previous evidence to guide further empirical research. The use of the focus group technique is a relevant instrument for improving some of the main limitations of the standard survey-based methods. In this paper we introduce a relatively new focus group approach (at least in economics) for valuing health insurance benefits<sup>xxxii</sup>. In essence, the focus group is a suitable instrument when the issue that the researcher attempts to study shows large hidden information that is difficult to capture analysing the statistical information obtained from a survey-based instrument. Moreover, it may be worth noting that the general criticism from standard welfare economics to the expressed preference approach is based on existence of errors and misunderstandings associated with the survey methods<sup>xxxiii</sup>. Therefore, the focus group approach would significantly reduce these constraints and hence is expected to increase the efficacy of the expressed preference methods.

### **VI.4.2 The Experimental design : a trial study**

The experimental design is based on a small scale focus group experiment - involving two small groups discussion followed by a small scale questionnaire aiming to account for the WTP for a set out of coverage long and short term health care benefits<sup>xxxiv</sup>. This experiment attempts to minimise possible misleading appearing further in the contingent valuation survey. The sample was randomly selected and consisted of a reduced number of participants in two age groups - non elderly and elderly or near elderly-, participants where paid about 4000 pesetas<sup>xxxv</sup> and interviewed during two hours<sup>xxxvi</sup>. During the first part of the experiment they expressed their personal opinions, views and experiences and finally, in a second part they filled out a questionnaire.

The quantitative instrument used to value a set of uncovered benefits was an open ended WTP question asked for a set of different LTC benefits and current out of coverage benefits. Since our intention was to value not the benefits of LTC insurance, we select two different services, the nursing home as used by Pauly (1990) and the Elderly residence. Moreover, we introduce two additional services in order to capture the preferences and values for additional not provided health care by the standard private health insurance policies : dentistry and podiatry services<sup>xxxvii</sup> .

The open ended question framed was the following: *Suppose that you can purchase an insurance policy to cover STC and also LTC (is most likely to be needed when you become disabled). Which is the most you would be willing to pay (per month) for an insurance policy covering .a long(short) term .benefit .?*

#### **VI.4.3 Experimental evidence**

The vast majority of responses to the WTP questions show a large variation with respect to the median, what indicates the presence of outliers (or extreme points). This can be attributed to the use of an open ended format, since it usually increases significantly the range of the individual responses. The WTP was computed using several central tendency statistics ( the geometric mean since variables seem log-normally distributed, the arithmetic mean and the median as usual). Table VI.1 reports the results for a set of health care benefits from the two focus groups carried out<sup>xxxviii</sup> . Results suggest in general term the elderly are willing to pay more for uncovered long terms services than other age groups, this can be explained by a higher risk aversion such as a large disability risk , however we cannot assure that there are independent groups.

**Table VI. 1**  
**Open ended WTP experiment results**

Benefit	Gmean <sup>xxx</sup>	Mean	Median	CI 95%	
Willingness to pay (> 60)					
Dentistry	2493	3757	3000	4628.3	2885.8
Podiatry	704	733	700	835.1	631.6
Nursing home	2659	3250	3500	3936.7	2563.3
Elderly Residence	4391	7100	10000	8559.6	5640.4
Willingness to pay (< 60)					
Dentistry	1261	1560	4000	1984.8	1135.2
Podiatry	584	733	1000	919.6	546.3
Nursing home	1259	1333	2000	1419.6	1246.1
Elderly Residence	3080	4375	10000	5784	2965.2

Note: 1&=250 pts (aprox)

Another relevant hypothesis to test is if there are observable differences between insured and non insured responses, this would suggest a difference in terms of time preference between the two groups. From table VI.1 we may assert there are clear differences in the valuation of LTC and STC benefits. In particular, there is a overvaluation of LTC explained by the above-mentioned effect and the fact there is much more uncertainty concerning the LTC needs what is to wider the results. The "0" response rate<sup>xl</sup> (table VI.2) differs between benefits, although the time horizon of the benefits does not seem explanatory at all. However an interesting result to keep in mind is that the elderly residence benefits is the one that shows a reduced 0 response rate (25%), whereas podiatry seems to show a higher 0 response rate 62%.

**Table VI. 2 Rate of zero response in the open ended WTP experiment**

		<i>Short Term Care</i>		<i>Long Term Care</i>	
		<b>WTPOD</b>	<b>WTPPD</b>	<b>WTPNUR</b>	<b>WTPRES</b>
<i>N</i>	<i>Valid</i>	16	16	16	16
<i>"0"responses</i>		25%	62%	50%	31%

Finally, in order to test the validity of the WTP experiment we carry out a qualitative (content validity) and quantitative (convergent validity) validity analysis. The *content*

validity was mainly carried out prior to the survey, and consisted of a number of meetings with recognised authorities in health insurance and social surveys. Moreover, the "new" approach combining the focus group technique and the WTP method should encourage respondents to *reduce some of the major problems* of the contingent valuation surveys, that is the reliability and consistency problems (Cookson, 1997; see Chapter VIII for detailed concepts). The convergent validity has been tested by means of the standard models applicable according to the data. Since our sample is experimental is reduced to implement a large validity test. However, we have estimated a tobit model including only two explanatory variables: income and the group variable reflecting indirectly the individuals age. We have computed a tobit model since data was left censored due to the high number of zero responses especially for the short term benefits. All estimations were overall significant despite the number of observation was clearly reduced, and therefore the explanatory power is also limited. However, results from table VI.3 show that results seem to be consistent with the ones expected, according to their signs. Even though, there is a significant pattern of some variables, the reduced sample does not permit consider the significance of this results in order to extend them as a general pattern. The two explanatory variables included were significant for LTC benefits at a 1% and a 5% of significance, whereas for short term care benefits results do not seem significant. The basic result that it should be kept in mid is that the WTP estimated follows the expected sign according to the age and income.

Table VI. 3 . Results Tobit Estimates (Open ended WTP).

LWTP	Elderly residence	Nursing home	Podiatry	Dentistry
<i>Income</i>	3.02** (1.4)	6.78*** (2.4)	1.22 (.70)	3.02 (2.29)
<i>Group</i>	9.022*** (2.26)	7.92** (3.26)	6.16*** (1.88)	6.46 (4.87)
<i>Constant</i>	-7.05 (4.63)	-19.2** (7.86)	-.91 (3.8)	-12.2 (11.13)
<i>Pseudo R<sup>2</sup></i>	0.17	0.155	0.11	0.03

Standard errors in brackets.

\*\*\* Significant at a 1% confidence level.

\*\* Significant at a 5% confidence level.

## **VI.5 The empirical study**

The empirical study is based on representative telephone interviews with a random sample of 400 Catalan heads of families older than 18 years. The survey was undertaken in June-August 1999 by a professional survey firm (IRC Consultores). The study area encompassed the four Catalan provinces. The response rate was an 81%.

The *insurance premium question* was phrased in the following way:

"Suppose that you could contract a health care insurance policy covering the services of an elderly residence or nursing home due to physical or psychological disability. This situation would be due to some diseases i.e Alzheimer or senile dementia, generally exhibiting this consequences at an advance age. Would you choose to buy this policy if its monthly premium would be  $A$ , PTAs to be paid form now on? Ye s N o ".

The following 40 bids  $A$ , where obtained form the previous focus group experiment, ranging from 500 PTAs to 17000 PTAs (Appendix II). Two additional follow up questions were worded, the first asking the maximum amount they are willing to pay for the proposed coverage and the second asking those who are responding a zero willingness to pay the reason for its answer. The reason was to identify if there were protest responses and to distinguish form the "real zero responses".

The NOAA (National Oceanic and Atmospheric Administration, 1993) fears that asking the WTP under a hypothetical scenario would overestimate the real WTP. However, this recommendation has been set out for environmental evaluation the hypothetical questions could lead to the moral satisfaction effect. However, the purposed valuation context is the one that clearly the market could offer and in fact LTC market is bot hypothetical at all in Germany or the US. Moreover, we expect an underestimation of the WTP due to a bias

associated with the payment mechanism, i.e some people are not willing to buy any health insurance policy at all, therefore this would lead to a underestimation of the WTP values.

One of the main criticisms of using the contingent valuation is that the resulting WTP is not sensitive to the scope of the benefit offered (Diamond and Hausman [1994] ). Testing tests the impact to the scope in this study if the WTP is related to the perceived disability at an advanced age. The following two questions were asked:

“Do you think you will be disabled at the age of 80 ?.”

In order to capture the influence of the payment instrument, the so-called payment instrument bias, we asked if they currently held or they had purchased in the past any private health care insurance such as their attitude towards the private/ National Health System<sup>1</sup>.

Since LTC insurance is influenced by the presence of substitutes, we developed some question regarding the purchase of life insurance and alternative financial savings instruments (pension plans, investment plans etc). Health and health care variables were asked in order to capture the moral hazard and adverse selection phenomena. Socio-economic variables were taken into account, in particular income, age, education, and professional activity, and sex. This variables are especially relevant in other to test the validity of the contingent valuation question used. If the results are valid, then WTP should increase with age, income and time preference.

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<sup>1</sup> Other relevant question were asked, in particular, for those holding a private health insurance the type of benefits and the number of members covered and for those not holding a private health insurance the reasons for non holding a private health insurance.

## VI.6 Results

There was a 4% non-response rate - respondents reject to answer the WTP question -. 41% of respondents who where offered to purchase the insurance for less than 3000 PTAs accepted the offer, however only 3% accepted the offer at the highest bids (more than 12000 PTAs) (see table VI.4). Those that did not wanted to pay anything, they were asked to state why. The great majority, the 74% provide an economic response "I have no resources for paying this..", whereas a 23% answered "they where no willing to pay for health insurance", what is a priori to indicate that there may be a bias (i.e an ideological limitation) associated with the payment instrument.

Form the WTP we have that that the valuation of the offered is described as a continuous distribution function  $F(A_r) = \Pr(WTP \leq A_r)$  where  $A_r$  is the premium offered. Therefore  $F(A)$  yields the proportion of individuals who are willing to pay no more than  $A_r$  for the offered insurance. The empirical estimation can be fitted by means of a logistic regression according to McFadden (1974) and Hanemman (1984). Based on table VI.5 and the logistic regression estimates the maximum insurance premium with the average respondent willingness to pay is approximately 3390 PTAs (the average age is 53.9 years old). Moreover, the age open ended willingness to pay assuming a 40 year old was 2131 for the total sample and 5578 for those willing to pay something. Contrary to Johansesson (1995), our results show a reduced level of time preference taking age as a proxy variable, that is what is willing to pay for a 45 year old individual is more than that what a 65 year old is willign to pay. In particular, the willingness to pay results increase up to the of approximately 50 where the start to reduce. *Time preference computed does not differ significantly from the interest rates in Spain.* The fact of holding private health insurance does determine the WTP, and therefore there is *evidence of the payment mechanism bias*. Moreover, other variables displaying a strong influence are own risks of becoming disabled increasing the average by about a 56% and the positive influence of living in Barcelona. Moreover, out of these results we should note the *age has a slight*



influence of the disability risk perceptions, the Pearson correlation coefficient is  $\sigma_p = 0.14$ , what does suggest that disability risk perceptions do not widely change when somebody becomes older.

Figure VI.1 Maximum willingness to pay and age

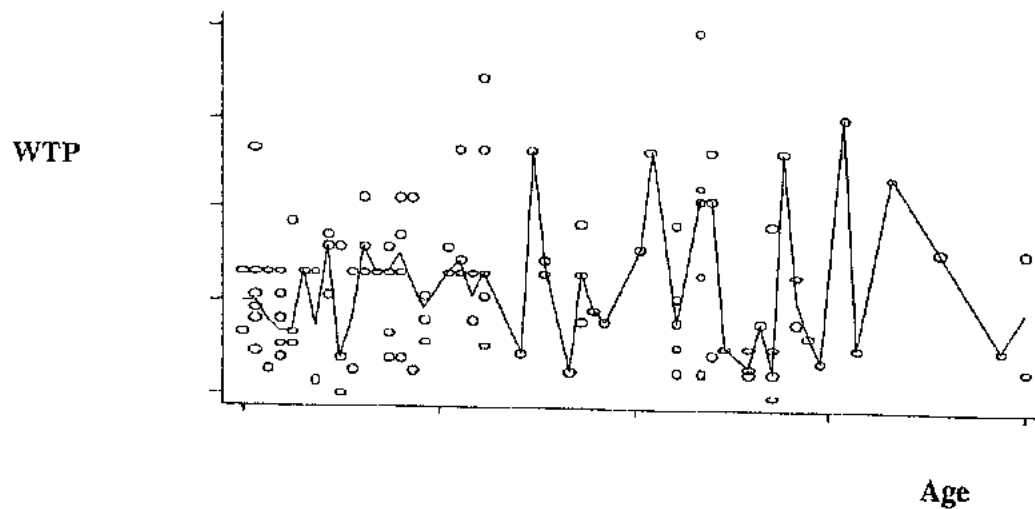


Table VI.4 Bid Design

Bid reference	1-10	11-20	21-30	31-40
500		3000	7000	12000
700		3200	7500	12500
1000		3500	8000	13000
1200		3700	8500	13500
1500		4000	9000	14000
1700		4500	9500	14500
2000		5000	10000	15000
2200		5500	10500	15500
2500		6000	11000	16000
2700		6500	11500	17000
Questionnaire	1-100	101-200	201-300	301-400
Mean Bid	1600	4490	9250	14300
Affirmative	41%	29%	21.33%	16,5%

Table VI.4 . Willingness to pay estimation (logit model)

DWTP (N=400)	Coefficient	T	Coefficient	T
<i>Insurance Premium</i>	-. 000339***	-6.290		
<i>Barcelona</i>	.8504906 **	2.235	.3568741**	1.977
<i>Age</i>	-. 03885***	-3.751	-. 0606347**	-2.088
<i>Age</i>			.0004167	1.513
<i>Own Risk</i>	.5773272*	1.648	.3505385*	1.891
<i>Health</i>	-. 1758188	-1.021		
<i>Sex</i>	.5569865*	1.730		
<i>Intercept</i>	1.651811*	1.650	.5691339	0.801
<i>Log-L <math>\chi^2</math></i>	-129.70444***		-166.145	
<i>Pseudo R<sup>2</sup></i>	0.2693		0.064	
<i>E (WTP) = <math>\frac{-(1.65 + 0.85 * 0.7 + 0.55 * 0.5 + 0.57 * 0.2 - 0.03 * 53.92)}{-0.000339} = 3390</math></i>				

\*\*\* Significant at a 1% or less

\*\* Significant at a 5%

\*Significant at a 10%

Convergent validity can be partially analysed comparing results from the focus group, results from the binary willingness to pay, the follow up and in our case also by actualising the open ended results from the willingness to pay at age 40. Moreover, theoretical validity estimates from a tobit model confirm the role of income as determining the WTP, whereas they suggest the presence of a starting -point bias. From table VI.5 theoretical validity can be investigated. The underlying assumption in the tobit model is that the same stochastic assumption determining participation is the one also determining the WTP. Another possibility is to separate the participation equation from the one stating the WTP. According to Cragg (1971) , Dalmau (1996) and Chambers (1998) this method would be important under the presence of a payment bias . The idea is to estimate a first participation equation as a first handle, if this first handle is passed, then a second handle is estimated to validate the WTP.

The determinants on the level of LTC insurance being consumed are hypothetically to vary with age (Age) , sex (Sex). Income should exercise a strong influence at least for

middle class individuals as can be inferred from Chapter V (Income). This variable has been included by means of five dummy variables in ascending way, the omitted variable refers to the low-income group. In order to test the existence of a payment and starting point bias we can focus on the coefficient of the Insurance and insurance premium offer respectively. Since they are significant, we may conclude there is some previous evidence of the both payment mechanism biases. A regional variable (Barcelona) has been also assumed to be affecting the consumption of LTC in a positive way. Education has been introduced as (Education) dummy variable taking the value 1 if the education degree is higher than primary school. Results from a tobit model table VI.5 confirm the existence of the two bias just mentioned, suggest that results seem to be theoretically valid according to the income and bid signs. Since learning about the future consequences may depend on the education variable, we have also found a slight effect over LTC insurance consumption.

**Table VI.5 . Tobit model (full sample)**

MWTP (N=339)	Coefficient	Std. Err	t	P-value
<i>Alone</i>	-407.1032	1211.322	-0.336	0.737
<i>Insurance Premium</i>	-.256**	.0808693	-3.171	0.002
<i>Barcelona</i>	1582.30*	866.7473	1.826	0.069
<i>Insurance</i>	4336.37***	797.99	5.434	0.000
<i>Risk assessment</i>	1870.448	1748.86	1.070	0.286
<i>Income 2</i>	-2079.433	1592.514	-1.306	0.192
<i>Income3</i>	-2582.33*	1398.393	-1.847	0.066
<i>Income4</i>	-2660.0257	1385.46	-0.476	0.634
<i>Income5</i>	-2435.6607	1359.61	-0.320	0.749
<i>Education</i>	2224.31**	865.5254	2.570	0.011
<i>Health</i>	-477.7327	395.9012	-1.207	0.228
<i>Sex</i>	195.7319	758.7683	0.258	0.797
<i>Intercept</i>	-2936.69	2206.955	-1.331	0.184
$\sigma_u$	5738.72***	436.9213	13.13	0.000
Log likelihood	-1286.3415			
Pseudo $R^2$	0.0266			

\*\*\* Significant at a 1% or less

\*\* Significant at a 5%

\* Significant at a 10%

Table VI.6 Double Hurdle model

N=400	MWTP	DWTP
	Coefficient (t-value)	Coefficient (t-value)
Alone	539.8078** (2.796)	
Insured	387.5041** (4.452)	
Age	67.46912** (4.648)	-.0170372 (-3.900)
Income2	624.9542** (0.718)	
Income3	594.6449** (5.939)	
Income4	918.3237** (2.326)	
Income 5	785.993** (7.617)	
Sex	29.75123 (0.058)	.2158964 (1.442)
Bid	-.9190669** (-4.149)	
Barcino	1019.222* (1.794)	.3803 (2.138)
Education	-1104.918** (-7.898)	
Own Risk		.2463401 (2.004)
Intercept	722.732 (0.859)	-.5606264 (-2.045)
$\sigma_u$	2993.96 (9.96)	
Log-L	-311.64	

Table VI.6 reports the parameter of a double hurdle model, results conform that some similar results as the ones appearing in the tobit model, however the parameters of the participation probability (Own Risk), (Sex) and (Barcelona) are to influence the probability of participating in a positive way with risk and Barcelona, and at a negative

age with age. From those willing to consume LTC, results of the consumption equation suggest that living alone is a variable influencing the consumption of LTC despite in a tobit model with results did not arise. Moreover, the age variables shifts their sign and turns to be positive.

## **VI.7 Concluding Remarks**

This paper has provided a theoretical approach and an empirical estimation of the WTP for LTC insurance. Results confirm the influence of the disability risks perceptions on the willingness to purchase LTC insurance. The implication of these results is that individuals when they shift long term risks seem to behave according to make rational choices. The estimates of the WTP model show in the logit equations that age varies negatively with that the willingness to pay, the pattern is the following increases with age until a middle age approximately 50 years old, after with the willingness to pay starts decreasing. This pattern explains why the willingness to pay estimates takes a negative value in the logistic regression.

Results have been validated by means of a tobit model and a double hurdle model, suggesting there are two huddles underlying the WTP responses, a first handle that determined responses and a second handle determining consumption. Results when a double handle is considered are to display similar implications to the ones referring in the tobit model, however they show that the sign of some variables is shifted. This parameters estimates suggest a feature that should be contrasted with more empirical evidence, therefore any conclusion in this sense would be to some extent speculative.

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<sup>i</sup> The intrinsic uncertainty, the unobserved heterogeneity and informational problems concerning health care display a fundamental effect in the demand analysis of health. The traditional health care problem departs from considering the following nested utility function:  $U(H, Y)$  where  $Y$  refers to a composite good and health is a function of other variables. Moreover,  $H = H(HC, Y, E)$  where  $HC$  refers to health care,  $Y$  to other goods and  $E$  to an environmental variable. Despite consumers can determine  $\partial U / \partial H$  they are unable under a certainty scenario to determine  $\partial H / \partial HC$ .

<sup>ii</sup> The insurance mechanism permits risks shifting by means of an exchange that implies that individuals make regular payments to some risk pooling agency in return for guarantees of some form of reimbursement or access to services in the event of health care need.

<sup>iii</sup> Whereas short-term health related care is extendedly offered, long term care is clearly under-supplied both by the market and non-market institutions

<sup>iv</sup> Support for this argument can be founded in Chapter V.

<sup>v</sup> According to Johanesson (1996) *ex-ante* and expected willingness to pay would coincide if individuals are neutral respect to income and the marginal utility of income is the same in all health states. However since individuals are usually catalogued as being risk averse respect to income - if marginal utility of incomes varies with health status or if the treatment (i.e LTC) does not restore the individual to full health - then is possible that the expected WTP would exceed the *ex ante* WTP. This idea would confirm the theoretical validity of the insurance perspective.

<sup>vi</sup> It seems reasonable that people should display some kind of experience with the payment system used. People in this case show some knowledge on the insurance mechanism. Actually, 77% have a car insurance, the 23% are insurance against acute illness (private health insurance), whereas only 2.35% hold some kind of life insurance.

<sup>vii</sup> There are many ways for conceptualising the demand for LTC in terms of the WTP. A first way would be conceptualised as a marginal change of the span of life. It is feasible to assume that LTC would increase the span of life despite the last days of the individual life would be under a disability or chronic health status. A second alternative would be to consider LTC just as a service that is received in the long run, and therefore there is no change in probability of dying.

<sup>viii</sup> Cardinal to any affine transformation.

<sup>ix</sup>  $EU_{t < t_0} = (1 - \pi^s)U(C_t, 0) + \pi^{ds}U(C_t - D_t, H_d) + (1 - \pi^{ds})U(C_t, H_{ind})$ . However if  $U(C_t, 0) = 0$ , then may be simplified.

<sup>x</sup> Johanesson (1996) argues regarding health care programmes that there are two main different views, the first view is to assess the willingness to pay for current users (of health insurance) and to adjust the willingness to pay by the probability of purchasing a health insurance, and a second is to value the *ex-ante* willingness to pay among potential users

<sup>xi</sup> Financial costs are not just differed in time (people pay for the service across a large period), since survival probability ( $\pi^s$ ) acts as a constraint i.e an individual could expect not to survive until a determined age. Therefore, since a reduction of the survival probability reduces the expected utility increase for insuring LTC, this could lead to a sufficiently reduced utility offsetting the insurance premium costs.

<sup>xii</sup> Moreover, there may appear also an option value for those that despite they are not consuming LTC they are assuring future consumption by the purchase of a LTC insurance.

<sup>xiii</sup> Contingent valuation such as other state preference methods studies deal with eliciting preferences under hypothetical conditions. These methods usually display a large flexibility in defining money /risk trade-offs because are not constrained by the available market data. Examples

of this approach analysing health and safety have been recently largely developed in health economics. The basis of the CV approach is to describe in detail a policy scenario asking how much respondents are willing to pay/accept (by means of a dichotomous choice, referendum or open ended format etc) for a particular benefit improvement.

<sup>xiv</sup> Empirical findings demonstrate that the WTA estimates exceed the WTP estimates, since WTP measures are usually bounded by the individuals budget constraint.

<sup>xv</sup> The main advantage of this method is that its approximates to the *real daily market purchases*, since there is an interviewer acts as if supplied a good at a reference price and the respondent acts as if demanding this good, accepting or rejecting the offer. Moreover avoids the *starting point bias* usually appearing in the open-ended questionnaires, since there is a unique price offered. The main problem of this method is that requires very large samples since the main sample has to be divided into different sub samples where the individual is offered a different price. For a good survey see Hanbeman,[1994] or Puig and Dalmau,[1999] for a good Spanish revision.

<sup>xvi</sup> "The willingness to pay should be asked in the context of hypothetical insurance purchasing. A respondent should be asked about the *maximum amount the he or she is willing to pay as an insurance premium* such as a given service will be available if never is needed" (*Med Care*, 29, page 1248).

<sup>xvii</sup> Despite there is some evidence that people would like to allocate more health care resources to young rather than to old population, within a perfect insurance market, people could allocate their resources over the life span, purchasing an insurance covering a set of expected LTC care needs in the future

<sup>xviii</sup> This experiment tests how two different age groups allocate their resources to different health care alternatives

<sup>xix</sup> The most extended methods for computing the offered bids are (i) computing random numbers within a defined scale (Johanseson et al 19996), (ii) sequential experiments to find bids that provide the maximum possible information about the parameters of the WTP distribution (Dalmau, 1998).

<sup>xx</sup> In fact in Catalunya there are some just a small amount and relatively unknown health insurance policies covering odontology and LTC benefits.

<sup>xxi</sup> That is if there is a market for this benefits, then individuals would be willing to pay its price.

<sup>xxii</sup> Although, the willingness to pay can be used for both private and public decision making purposes, since in general direct WTP expressed in monetary terms displays the trade-off between a particular benefit and money (say euros) that the consumer forgoes and therefore could assign to other alternative goods .

<sup>xxiii</sup> Since LTC such as the hypothetical programme purposed in the former paper are both increasing the quality of life at an advance age

<sup>xxiv</sup> We expect that in our framework the insurance question should work at least as well since there is no market for LTC insurance and public coverage is quite limited, therefore ideological biases could be reduced.

<sup>xxv</sup> Note that this is to reproduce the tradition market transaction for private goods . The idea is to confront different sub-samples with different bids, and the results are then analysed by means of logit and probit models (Johanesson et al ,1989).

<sup>xxvi</sup> It also reflects the attributed of the market goods and the attributed of the individual.

<sup>xxvii</sup>  $Max_z \pi^{ds} U^d(q^i, Z) + (1 - \pi^{ds}) U^{nd}(q^i, Z)$

$st \ pZ \leq y$

<sup>xxviii</sup> Usually this attributed are age, sex, income, time preference, ect.

<sup>xxix</sup> Here WTP refers to an option to avoid worse conditions, see Loehman et al (1994).

<sup>xxx</sup> An equivalent formulation can be found on Haneman (1984), and Dalmau (1998).

<sup>xxxi</sup> We assume that marginal utility of income is positive but diminishing with additional income.

<sup>xxxii</sup> One of the seminal application of this technique in economics was Cookson (1997).

<sup>xxxiii</sup> For additional references on this argument consult Broome (1981), Arrow (1982) and Griffin (1996).

<sup>xxxiv</sup> Moreover, a set of questions were framed concerning whether participants have any private health insurance, which was its coverage level and how much they pay for their own and other family members private health insurance policies.

<sup>xxxv</sup> (1€=250pts aprox)

<sup>xxxvi</sup> A first group of individuals between 30-60 years  $n=8$  old and a second group of more than 60 years old individuals  $n=8$ . This is a reduced sample according to the general empirical analysis, however it was an adequate sample for our experimental purposes. <sup>xxxvi</sup> Laboratory experiments are usually involving a reduced sample in order to test defined theoretical issues. They have a large number of advantages over traditional methods of empirical investigation, however they do not try to substitute empirical research.

<sup>xxxvii</sup> Since individuals were informed about the coverage and premiums of private health insurance they face no significant problems when assessing the willingness to pay, however the response time was quite large, 10 minutes so they could reason about what they could be willing to pay.

<sup>xxxviii</sup> As expected the elicited WTP for LTC is higher for the elderly group than the non elderly showing an increasing pattern with age. However, there are no significant differences between age groups in short term benefits. In some way this result was also expected since they are not cognitive restrictions.

<sup>xxxix</sup> Data appears to be lognormally distributed, since its distribution was asymmetric to the left.

<sup>xl</sup> That is the percentage of participants attaining a zero WTP.



**Quarta Part**  
Social rationality and  
collective choice  
mechanisms



*"Reasearchers are still searching to improve upon their methods and trying to derive the best possible ways the contingent valuation method in health care resource allocation decisions".*

Dienner, A; O'Brien, B and Gafni , A (1998). *Health care contingent valuation studies: a review and classification of the literature*. Health Economics, 7:313-326.





## **Capítol VII.**

Eliciting social preferences for health system benefits: the willingness to assign approach



## **ABSTRACT\***

Because of budgetary constraints, setting priorities and trade-offs for a wide set of health programs emerges as a necessary task to undertake under collectively financed health systems. However, prior research in this field does not provide a clearly preferable methodology to be applied in this context. This paper addresses the question of how to elicit relative preferences for health programs in order to guide health system priority setting. A contingent valuation method (willingness to assign) is outlined restricting to guide public priority setting enhancing respondents to behave as decision makers. Therefore, deals with setting relative preferences and trade-offs for health programs rather than obtaining absolute monetary values as other alternative methods do (standard willingness to pay). As WTP methods, we capture the wide dimensionality of health system benefits rather than purely health gain, by means of a societal hedonic approach. This paper provides a theoretical discussion of this issue and reports some evidence from a small-scale choice experiment. Results suggest that people are able to act as decision-makers. The instrument proposed seems to reveal consistent preferences according to the Spearman correlation analysis, and since no payment instrument was required the method overcomes bias appearing under a willingness to pay tax approach. Other dimensions of health system benefit rather than health gain emerge as relevant. Evidence obtained from the choice experiment suggests there are clear differences between a cost-benefit and a collective choice approach when programs are to be linked with distribution concerns.

*Key words:* health system benefits, willingness to assign, hedonic models.

*JEL classification:* D70, I18, H43, D63.



## VII.1 Introduction

Widespread research has been undertaken for valuing particular health care benefits on the basis of large scale samples, mostly concerning the economic evaluation of health gains (Johannesson et al 1996) and reducing health risks or saving lives (Jones-Lee et al, 1985). Some of these methods have proven a large applicability for individual, patient related medical decision making as well<sup>i</sup>. However, there has been small experimental research focusing on a *broad health system decision making* despite its potential importance in collectively financed health systems<sup>ii</sup>. An explanation of this absence may come from the underlying complexity of health care. Defining coverage in public health system decisions may be seen as a choice among a set of independent predetermined programs, each one achieving large-scale benefit dimensions, subject to a fixed budget constraint limiting its funding<sup>iii</sup>. Under this scenario health-based measures would partially capture public trade-offs, as far as they rely exclusively in one dimension of health care outcome. Furthermore, regardless money metric measures as the willingness to pay may be adapted for this valuation context (Olsen and Donsaldson, 1997), they have to overcome the bias concerning the payment instrument used. In particular, a protest bias may emerge, as some people may not be willing to pay any extra taxes. Therefore, alternative instruments may be performed in order to improve health care decision-making.

This paper develops a "new" contingent valuation instrument for eliciting preferences for health programs taking into account the health system budget constraint<sup>iv</sup>. The instrument analysed in the willingness to assign (WTAS) asking to a small sample of individuals to assess a definite budget increase to a set of new health care programs. The main purpose is to obtain through the WTAS values, an assessment from the community about their strength of preference for alternative programs. That is, capturing the trade-offs people perceive from a wide set of programs hypothetically offered. For comparative purposes, this instrument is compared with the a willingness to pay approach - simulating a market transaction where individuals are to decide whether to pay taxes in order to finance a new health program -.

The rationale of this research relies on the need to rank collective priorities to guide health decision making. The rationality of decision in this context is assumed to refer to the need to consider the nature of individual preferences. In particular, there are two alternative approaches to be considered. A first approach would be the user rationality. We are compelling individuals to participate in a political market rather than a "conventional market" usually lined with WTP instruments. Therefore, a second approach could be conceptualised as the "citizens rationality". In a political market individuals are supposed to follow an expressive behaviour (Common, 1997), therefore they concern in on the social impact of different health programs rather than the individual gain. A rational decision in this context is seen as the interaction between public preferences and societal welfare judgements underlying individual resource allocations.

In a political market, respondents are compelled to elicit their preferences as hypothetical citizens involving therefore altruistic concerns. Thus, individuals are free to value a wide range of dimensions concerning health system benefits. The idea derives from a general discussion held by Common (1997) on valuing environmental benefits. He suggests that when "socially wider benefits" are valued, individuals despite they are answering a contingent market question format, as citizens answers actually do. Similarly, Kanheman and Ritov (1997) find that WTP measures are to elicit the willingness to contribute rather than individual preferences in a public priority setting scenario. Therefore, according to this evidence, the citizen approach is to be the adequate scenario for expliciting public trade-offs.

The *theoretical perspective* is closely linked with welfarism, since we define health system benefits as any benefit that increases social welfare<sup>v</sup>. The importance of this issue relies on the assumption that priority setting requires an understanding of what is to be maximised, and ultimately which are the citizens and the policy maker's objective function for health service? Its purpose is double; first to make explicit the

health policy goals and trade-offs in order to assess the public health care resources to health care needs (benefits)<sup>vi</sup>.

The aim of this paper is twofold. First, it attempts to test a "new" method - clearly linked with the standard contingent valuation methods<sup>vii</sup> - aimed to *eliciting relative preferences and values for a wide set of health care programs* taking into account the existence of a budget constraint<sup>viii</sup>. Second, we argue that health programs, are in ultimate term dealing with a set of underlying benefits<sup>ix</sup> - perceived by citizens from the existence, use or having the option to use health system programs -. A relevant instrument to link benefits and programs is the hedonic valuation approach.<sup>x</sup> Even though this instrument permit the assessment of a quantitative valuation to health system benefits under this approach the method is outlined and hedonic regressions have been estimated, however due to the limited range of the sample used we have not computed the benefit value. The basic question we answer is how health policy makers may select which programs (benefits) should be improved?<sup>xi</sup> We justify and illustrate the use of the willingness to assign approach (WTAS) for collectively financed goods.

We focus our analysis on a multidimensional concept of health system benefit that includes not only the health gain dimensions i.e QALY approach but other dimensions such as process utility, equity, justice and social cohesion<sup>xii</sup>. That is, our concern relies on going beyond QALYs . We follows the suggestion first set out by Mooney (1994) that there are other aspects rather than health change that affect individuals social welfare when health care benefits are prioritised there is clearly something more than just health gain to be maximised. Nord, Richardson and Street (1993) have provided evidence confirming this statement. They found through a self-administered postal questionnaire that there was very little support for a policy following a QALY maximisation rule irrespective of how the gains are distributed.

The remainder of the paper is as follows. Section 2, introduces the conceptual background, discusses the further methodology and the some recent theoretical developments that should be taken into account. Section 3 contains a



multidimensional utility model trying to capture the different dimensions of benefits included in health care systems. In section 4 an experimental analysis is reported and finally section 5, the basic results are presented and finally in section 6 are discussed.

## VII.2 Theoretical background

### VII.2.1 Going beyond the QALYs

The measurement of health has being mainly carried out by the use of the Quality Adjusted Life Years (QALYs) and other related measured of health gain as the Healthy Years Equivalents (HYE). Nevertheless, even though the use of a *priori* measures has larger advantages, its justification comes from accepting that nothing matters besides health gain. However, perceived benefits might be largely heterogeneous (Olsen,1997) and people may respond equally to different health elicitation mechanisms. Therefore, the use of a narrow measure of health as computing health system benefits, may not capture the idea of health system benefit and therefore is to be a certainly restrictive assumption. As they may be other dimensions of benefit it may imply rejecting the multidimensional nature of the individual utility functions (Cadman,1986;Torrance et al,1992;Freeneey,1994).

It has been argued as well (Nord,1994) that health state valuations do not constitute a societal value for health care, they usually refer to individual-based measures of health production valuing health states and not health improvements, as they do not capture distribution and process utility arguments inherent in societal values (see Nord et al,1999). Furthermore, although it is possible to introduce societal concerns in the QALY approach, such as the fair innings argument (Williams, 1997) and the severity of illness and the limitations in potential health ( Nord et al , 1999) there may be process utility benefits and other possible non-conceptualised dimensions of benefit they can be hardly incorporated into the QALY framework.

Accordingly, the methods for eliciting preferences in health care should not a priori contain any dimensions of benefit . Instead, we suggest that individuals should identify the underlying benefits they perceive from health systems. This approach was also followed by Nord et al (1999) for eliciting societal values for health care interventions<sup>xiii</sup>.

**Conclusion a VII.1.** Since health system benefits may go beyond health gains, instruments assuming an a priori dimension of benefit may be misrepresenting individual preferences as these may include a large set of benefit dimensions perceived by individuals from health care programs.

### **VII.2.2 The group decision-making problem**

Since the problem this paper examines deals with the social decision making, we consider the decision making unit as being held by small groups ( $n_i$ ), representative of a societal profile ( $N = \{\sum n_i\}$ ). Let us assume an hypothetical health system resource allocation problem carried out by a public health agency (i.e the Catalan Health Service (CHS) in Catalunya). The CHS has planned a 4000 million PTAs capital budget increase, to be devoted to the finance of some possible set of "new programs"<sup>xiv</sup>. According to the revealed benefits, decision makers have to evaluate a number of programmes (i.e 10 programs) which have been proposed for funding. The total cost of those programs is in excess of the fixed capital budget therefore some programs may not be funded. The decision problem is to select a set of programs, within a budgetary constraints which best meet the perceived health system benefits. We assume the existence of multidimensional benefits people perceive from health systems. Therefore, a multidimensional utility model would be a clear foundation explaining the decision process.

The theoretical instrument for assigning values to health programs is formalised as a social evaluation function. A Social Evaluation function is a numerical representation of an individual social welfare judgement over some courses of action, such a health care programs presumably embodying the welfare value judgements of society over health system benefits<sup>xv</sup>. Let  $Y = (Y_1, \dots, Y_n) \in R^n$  be an allocation set of possible health programs each one showing a particular dimension of health system benefits  $X = (X_1, \dots, X_n) \in R^n$ . Therefore, for all social states  $S$  is a measurable subset of  $Y$ ,  $Y(X)$  is a monotonic transformation of  $X$ . The assumption of this paper is that each

individual values each  $Y$  according to a social welfare judgement as if s/he was a decision maker that should care about the overall social welfare :

$$V_i(Y(X)) = W^i(v^i(X_1), \dots, v^i(X_n)) \quad (\text{VII.1})$$

where  $v^i(X)$  is the value function , that is a numerical individual welfare judgement according to a sufficient information to be assessed for every programs .We do not assume that all individuals arrive at the same judgements among society whilst we assume that inside every group there would be a high consensus on which benefits are valued higher.

Health system benefits in this study where identified and classified according to a five-dimension system shown in Table VII.2. Each dimension is subdivided in terms of concrete benefits such that every dimension can classify all benefits revealed by the population. A social evaluation function is implied over the different dimensions of health system benefits. For simplicity we adopt the additive utility function and therefore we assume additive independence. The multidimensional utility function is as follows:

$$v(X^i) = \sum_{j=1}^5 k_j v_j^i(X_j) \quad (\text{VII.2})$$

where  $k$  reflects the relative valuation of the utility of the benefit  $X_j$  in the total individual social value function of individual  $i$  , where total value is restricted by the budget constraint as follows:

$$\Delta V = k_1 \Delta v_1^i + \dots + k_n \Delta v_n^i \quad (\text{VII.3})$$

Therefore, if a program  $Y_1$  is socially preferred to a program  $Y_2$  , then  $v(Y_1(X)) \geq v(Y_2(X))$  .

### VII.2.3 The willingness to assign model

Although the decision making context is clearly of an hypothetical nature , it tries to improve realism compared to other contingent valuation methods .Therefore, a relevant question is if there is an elicitation instrument (i.e WTP) valid in all possible contexts. We argue that clearly not. Therefore, for all contexts methods purposed ( as later discussed), should capture the main essential/ relevant dimensions of the decision making context. In this paper the context is health system decision making. This context, may be seen as involving different dimensions rather than a clinical decision making. Therefore, despite willingness to pay (WTP) may be used in both cases, the perspective is to a considerable extent widely different. Although, theoretically respondents to WTP questions should take into account may consider the possible existence of an implicit budget constraint when eliciting their WTP, s since it make explicit a public budget restriction that is of an remains implicit in the WTP elicitation methods<sup>xvi</sup>.

Let us consider a citizen acting as a decision maker that has to assess an amount of monetary units as a result of a budgetary increase to a set of health care programs  $Y = (Y_1, \dots, Y_n)$  each one displays a particular dimension of health system benefits  $X = (X_1, \dots, X_n) \in R^n$ . The initial health care programs available within a system are known  $Y^0 = (Y^0_1, \dots, Y^0_n)$  while their associated budget is  $M^0 = (M^0_1, \dots, M^0_n)$ . A health system reform is viewed as an extension of the former programs  $Y^* = (Y^*_1, \dots, Y^*_n)$  that has an associated budget of  $M^*$  that should be assessed according to its benefits. Then the willingness to assign approach tries to determine the amount of monetary units that independent of costs every participant would assign according to their social welfare gains. This can be formally represented as the difference between two social expenditure functions as follows:

$$WTAS = E(V^*, Y^*) - E(V^*, Y^0) \quad (VII.4)$$

where  $V^*$  reflects the final welfare value .

## VII. 2.4 A social hedonic model for Health Benefits

The value for characteristics and health benefits implicitly remaining under health programs is not directly observable. However, valuation for health system benefits can be estimated by means of an hedonic model where the magnitude of benefits differ *ceteris paribus* among health programs. Indeed, what is determined under this approach is the incremental valuation of health system programs by means of increases of health benefits <sup>xvii</sup>. This can be defined from the following statements. Lets assume that the value function of a particular health program is reflected by a set of defined benefits  $X_{ij}$ , then :

$$V_j = \phi(X_{1j}, \dots, X_{mj}) \quad (\text{VII.5})$$

where  $i$  refers to the benefit and  $j$  to the program. The overall valuation should reflect the hedonic value of all health system benefits. The set of benefits considered would be directly elicited by individuals in a qualitative open approach. If these benefits are considered as positive, then they are to add positive valuation to a health programs, however negative benefits detract value from them.

Implicit valuation of the health program benefits can be then obtained by taking the first derivative of the hedonic function:

$$\partial V / \partial X_{ij} = B_i \quad (\text{VII.6})$$

where  $B_i$  indicates the valuation to obtain another program dealing with an additional unit of the benefit  $X_i$ . Its assumed that there sufficient differentiation between health programs to deal with a large set of programs assigning different health benefits.

## **VII.3 Experimental Design**

### **VII.3.1 A new valuation approach**

In this study we have designed a new methodological approach especially relevant for health care decision making. Since we assume a multidimensional dimension of health care benefit, the quantitative instrument that enables the comparison of values is of a money metric nature. The system of policy decision-making was explained to respondents as involving a set of programs to be implemented up to the available budget disposable. Subsequently, participants were asked to attach their willingness to assign under a hypothetical budget increase hypothetically collectively funded by taxes. Participants were asked to act as if they were advisors of the Catalan Health Plan – in order to improve realism a summarised public health system budget was provided – . Within the questioning, participants were reminded that the amount assigned to every program has been partially paid by their taxes and in future they will continue paying an undetermined proportional amount by means of the current financing mechanisms<sup>xviii</sup>. They were asked to imagine that the proportional taxes paid to the public sector have been returned and they are participating in the re-assessment of a hypothetical budget increase. However, since they are asked to act as decision-makers, altruistic concerns were in fact inherent in their responses.

One of the potential problems with this experiment may be that it may involve complex decisions requiring a large reasoning process. Because of this, we do not use a survey base method but a focus group approach (consult section VII.2.2). Moreover a second problem could relate to the framing format. Since individuals may have small experience on allocating public funds, they could find the experiment difficult to be performed. In order to overcome this possible limitation a choice scenario was defined in a simple way. Participants should reason as if they as a group could collectively buy some health programs in a hypothetical political market.

The implementation procedure required in many cases an effort for helping responses, i.e some people were reminded to think as if they had to purchase the weekly food for

their family in the market and they have a fixed amount of money to buy them. Moreover, they were not required to expend the whole budget, if they do not then this money would be assigned to other public sector benefits<sup>xix</sup>.

Honestly, we should recognise that this approach is not isolated issue, since it captures some of the main doubts surrounding the application for the willingness to pay approach for valuing public goods<sup>xx</sup>. Furthermore, the use of a focus group instead of standard surveys constitutes a novelty with respect to the longstanding pattern in health decision making<sup>xxi</sup>. The focus group method has shown successful results in Cookson (1997). Cookson introduces a new approach for placing values on health and safety by combining the focus group as a research method and an open willingness to pay as an elicitation instrument.

The new approach is based on the use of the focus group qualitative technique instead of the standard questionnaire approach and the quantification of values by means of a contingent valuation instrument. This methodology, although has been designed for evaluating health policies, can be applied to any area of public policy for engaging priority - setting<sup>xxii</sup>. This technique sacrifices the large sample of alternative techniques, but gains a great depth of information, though maintenance of survey design, rigor etc<sup>xxiii</sup>.

The basic aim of this approach is to ask very precise but general questions to a small-scale sample hypothetically representative of a social group. Thus, the basis of the sample is a set of individuals classified according to their socio-economic status. Moreover, participants should be given an information-processing task that they are capable to undertake -according with its cultural and educational level-. Correct understanding is essential in order to eliminate possible bias in the final results. Probably the main advantage of this method is the possibility to discuss the answers and to arise at a consensus that permits further group aggregation results. The standard value elicitation survey does not permit improvement of reasoning and solve apparent contradictions of answers, checking after a discussion the former answers.



Therefore the preference and values obtained by using this method are expected to express more precisely real decision-making in any field<sup>xxiv</sup>.

**Conclusion VII.2.** When a large set of health programs are to be prioritised, reasoning requirements do limit the application of standard-based surveys. Therefore, small-scale experiments, and particularly the focus group approach emerge as adequate methods to be applied in this context.

### **VII.3.2 Experiment implementation**

The experiment has been split up into six groups (see table VII.1) in three different exercises separately in three different sessions, between December and June 1998<sup>xxv</sup>. It consisted essentially of three different parts (described in figure VII.1). A focus group or identification phase (in order to obtain health system benefits ). A *benefit assessment* phase (in order to classify the health system programs in terms of the hypothetical benefit improvements). Finally, a program *valuation phase* was undertaken. This last phase, has been implemented by means of a participated survey<sup>xxvi</sup> (in order to quantify the qualitative results) by means of cards where every program to be valued was briefly described following a discussion about its possible benefits (table VII.4). Sessions lasted about two hours and participants were paid in each group. Before every session, participants were requested to fill up a personal questionnaire about themselves (see Appendix VII.1).

### **VII.3.3 The groups selection and pre-tests experiments**

All the socio-economic information about ages, health care interventions, and professional active and residence was considered in order to segment the population. The groups were selected with the advice of two social researchers. When selecting the groups time availability was considered such as the willingness to participate. Therefore, the interesting group profile should be one that accomplish with some active mobility conditions considering the interpersonal social relationship network

and the sufficient extent number of people (6 to 15). As a result, the groups selected for the pilot experiment in Barcelona city were six (see table VII.1).

**Table VII.1**  
**Participants in the pilot experiment.**

	Segmentation criteria	Educational level	Group Extension
G1	Middle Income	Retired workers with lower studies	8
G 2	Low Income	Undergraduate Students	13
G 3	Middle High Income	Skilled workers	8
G4	Middle -Low Income	Industrial workers	15
G5	Middle Income	Rural workers	9
G6	Middle - High Income	Post graduate students	13

In order to prepare this part of the experiment ,a reference guide was used containing the basic aims and criteria adopted , the identification of the moderator an other collaborators , the kind of predetermined dynamic conversation, the practical and operative rules, the role of every participant, resources and additional material etc. At the same time, the basic questionnaire of the experiment was prepared and mailed to a spokesperson of each group.

#### **VII.3.4 The health system benefit identification**

The first exercise, aims to identify by means of the focus group the benefits people attach to the Catalan health system. Every participant contributed to the discussion with its opinion and arguments<sup>xxvii</sup>.The first outcomes of this exercise where a two hours (typed) recorded conversation, that was finally converted into text .

The concept of health system benefit is defined in a broad sense as any welfare increase as a result of the application of a new health care programme. However despite a wide measure of benefit may be seem as adequate for a health system priority setting it has the disadvantage of relying in a such problematic concept as welfare. Therefore, the benefit identification relies as the main phase to determine what is the health systems assumed to pursue.

The identification of health system benefits tries to reflect in a simplified way the basic dimensions of outcomes. The outcomes that every participant reveal can be positive, that is benefits for the health care system, or negative, that is shortages of health care systems. In order to consider this perception, health system benefits present a positive (+) remark and health system deficiencies a negative (-) remark. This is probably one of the advantages of the methodology. The researchers do not define the benefit dimensions, but respondents considered in terms of social groups do. After the identification of health system outcomes the first part of the experiment is completed (see table VII.2). However, since benefits are not directly offered by the health system, we had to convert them in terms of an available set of alternatives. The practical implementation was to design a set of health programs with the assistance of some Catalan Health Plan managers. A set of ten programs was designed (see table VII.4 for an example) and benefits were classified in terms of five dimensions: Coverage, Accessibility, Quality, Public Health and Social Dimensions (see table VII.2).

#### **VII.3.5 The health care program design**

In order to design a realistic health care programme choice scenario, we required advice from CHP managers. They designed according to some selected benefits identified outcome considered, a "new" but applicable health care program that was supposed to increase the set of the status quo health system coverage. Furthermore, they assigned to every program an approximated cost computed according to the basic direct and indirect costs that they could yield. Thus, the experiment attempts to be a realistic public policy scenario in order to capture the attention and interest of the participants in the choice experiment. When selecting the number of programs, the results from a focus group experiment were taken into account as this part of the experiment has been viewed as a continuation of the previous one. Additionally, in order to elicit relative valuations across outcomes the magnitude of public risk reduction was considered implicitly for participants, but not as an objective

measure. Every program ( health care system improvement) was briefly described to respondents on separate information cards with no preliminary order, one of which is reproduced in figure VII.2.

**Table VII. 2**  
**Multidimensional health system benefits classification**

- 1. Coverage ( $X_1$ )**
  - 1.1 Indemnity (+)
  - 1.2 Education/ health information (+,-)
  - 1.3 Periodic Revisions( check up) (-)
  - 1.4 Dentistry/Odontology (-)
  - 1.5 Pharmaceuticals (-)
- 2. Accessibility ( $X_2$ )**
  - 2.1 Waiting Lists (-)
  - 2.2 Access directly to specialist's (-)
  - 2.3 Knowledge about the administrative process (-)
- 3. Quality ( $X_3$ )**
  - 3.1 Inputs
    - 3.1.1 Quality and professional ethics(+)
    - 3.1.2 Technological Equipment level (+)
    - 3.1.3 Comfort and Appearance of facilities(+)
  - 3.2 Process
    - 3.2.1 Clinic information systems (+)
    - 3.2.2 Equip. working (+)
    - 3.2.3 Personal medical work (+,-)
    - 3.2.4 Patient information (-)
    - 3.2.5 Personal Treatment (-)
  - 3.3Outcome
- 4. Public Health ( $X_4$ )**
  - 4.1 Health Education at School(+,-)
  - 4.2 Food and control hygiene(+,-)
- 5. Social Dimensions ( $X_5$ )**
  - 5.1 Equity/ privilege (-)
  - 5.2 Consumer Sovereignty/ User freedom (-)

Note: this benefit classification is the result of a set of focus groups where participants were asked to establish the benefits they perceived from the Catalan Health System.

### VII.3.6 The benefit assessment experiment

Multi-dimensional utility analysis (MDUA) in this context, deals with preferences and values for health care programs as that are to be affected by the different dimensions of benefits<sup>xviii</sup>. Each dimension is subdivided in a number of concrete benefits such that all benefits revealed by the population can be classified into one dimension.

Benefits are defined as in terms of social goals inferred from a previous qualitative identification process and contained in every health care program considered in the same effectiveness levels. Although this could be a restrictive assumption, we may assume the existence of a weight variable for every program in order to take into account different degrees of health benefit perceived.

In a second experiment participants were asked to link the set of health programs designed with the perceived benefits. Moreover, they were also asked to identify the in terms of a 1 to 7 scale the degree of benefits from each program such as the for the whole health system. The method used to do so is a small scale questionnaire split into four different groups selected randomly according to its location and socio-economic characteristics. The use of this small scale method is the way seen as the unique way for dealing with our aims, since the need of conceptualisation requirements make the exercise too complex to implement standard survey methods.

We select seven categories of perceived health system benefits revealed by means of a focus group in the first stage. In particular seven benefits were considered : access to health care, health care quality, coverage, social dimensions , resources available, results aiming to relate to health gain and finally public health. Every health programs such as the whole health system is subjected to valuation within this survey. The questionnaire was designed and implemented two four groups following an extended discussion so as to get rid on any possible misunderstandings<sup>xxix</sup>. The implementation lasted about two hours and there were no significant problems arising. During the implementation researchers put strong effort on explaining the meaning of every category of benefit, explaining some examples in order to help conceptualisation.

#### **VII.4.4 The priority setting exercise**

The second part of the experiment is the prioritisation and valuation of health care benefits. In order to design this part, the possibility of using public policy scenarios in order to encourage participants to come to an appropriate understanding of the

policy situation in which their expressed valuations might be ultimately used (Cookson,1997). However, since our aim was not to value scenarios, but to elicit priorities of benefits perceived from health systems, it has been undertaken an indirectly outcome elicitation while the scenarios approach will be tested in future studies. That is, instead of eliciting outcomes, outcomes have been elicited in terms of health care programs assuming that every program relates to a concrete outcome and the magnitude of outcome that rises from every program is the same and constant (see table VII.3)

**Figure VII.2. Example of the Breast Cancer Program.**

<b>Program : BREAST CANCER</b>
<b><u>Expected Outcome</u> :</b> Mortality reduction in a 15%
<b><u>Description:</u></b> Extension to the risk population of a program to eradicate the breast cancer. It will be implemented by a mailing quotation in order to realise a biennial mammography to all the women between 50 and 65 years.
<b><u>Actual coverage</u> :</b> Currently it covers the 15% of the population.

Questionnaires were mailed with a program description to the participants before the elicitation experiment. A reference guide was prepared with similar contents as the one prepared for the former part of the experiment explaining the participating survey technique. This is similar to focus group in the sense that it permits respondents to change their answers after a previous discussion, but differs in the answering method, because respondents should answer in a determined sheet .

Table VII.3

Health care reference programs listed in advisory of the Catalan Health Service

Program	Expected Outcomes and Costs (millions)
1. Breast Cancer : (Biennial Mammography to all the women between 50 and 65 years old )	(Coverage 1.3 ) Mortality reduction in a 15% <u>Cost : 150</u>
2. Coordination between primer and specialized attention ( programmed meetings between Primer Attention Centers and specialist's )	(Quality 3.2.2 ) Improvement of quality attention due to a major integration and coordination of patient attention . <u>Cost : 100</u>
3. Program for Professional Immediate Access to Clinic Historical Information ( Computational System to obtain clinic information of patients immediately all over the system)	(Quality 3.2.1 ) Improvement in the efficacy and quality of attention <u>Cost : 500</u>
4. Attention and User Information (diffusion champagne on the existence of user attention units)	(Accessibility 2.3) Improvement in the access , information and user's satisfaction. <u>Cost: 100</u>
5. User Treatment (Formation program with courses till 30 hours for the whole administrative personnel with public treat.)	(Quality Process 3.2.5 ) Improvement in patient satisfaction <u>Cost : 300</u>
6. Medical Revision ( Volunteer medical revision for the whole population one every three)	(Coverage 1.3 ) Precocious detection and health consultation about hypertension, alcoholism, gynecological revisions, ect <u>Cost: 500</u>
7. Waiting Lists (Plan for reducing accumulated waiting lists in non elective surgery )	(Accessibility 2.1 ) Reduction of the waiting time of 240 to 120 days <u>Cost: 700</u>
8. Life styles (informational program on habit's and healthy lifestyles formation addressed to scholar's parents	(Public Health 4.1 ) Promotion of healthy life styles, improve scholar's communication and collaborations between parents and child's. <u>Cost: 100</u>
9. Odontology ( Free provision till 12 years of odontology services, currently only extractions covered )	(Coverage 1.4 ) Improvement of dental health <u>Cost: 2000</u>
10. Medicament Bonus ( Possibility for acquisition an annual bonus per worker in order to avoid co-payment. This will be implement with a system related to declared income on the personal income tax.	(Social Dimensions 5.1 ) Improvement in equity . Nobody would pay more , but people with less income could be benefited. The actual situation is : people should pay the 40% of the medicament price while chronic illness a 10%. <u>Cost : 2000</u>

With regard to the value elicitation methods (exercises) , the three different instruments used were finally compared with a forth instrument, the willingness to pay taxes. The methods were the following <sup>xxx</sup>:

**Program Ranking** . This was a simple method to rank the different health care programs considered . The resulting valuations are a rank order of priorities, that is the ordinal utility of the different programs (and hence considering monotony, the outcomes). After a description of the health care programs. Participants rank the programs on a numerical scale 1-10. This elicitation exercise tried to capture the ordinal preferences of participants for every program . After the elicitation the results where published and every group arrived at a consensus about the priority setting.

Question (1): *Please could you rank every programs ( after every single programs was explained and comprehension was ensured) from 1(the less preferred) to 10 (the most preferred)?*

**Willingness to Assign (WTA).** This was an open ended valuation question that considered hypothetical budgetary increase ( that is no previous dichotomic question was required and responses where restricted not by a personal budget but by an indirectly personal budget, that is the public budget). Respondents where asked to assign from a fixed remaining budget, the amount of public resources they were willing to devote to each program. The idea underlying this methods is the one of relative values and trade-offs valuation, therefore any budget size variation according to the monotonicity criteria should not affect the preferences elicited, as they were considered in terms of relative values.

Question 2: Imagine the possibility of setting yourself the priorities of the health system as if you were the decision maker. Imagine you have 4000 million PTAs ( think in 4000 for simplicity) and you were asked to assign them to each health program the system offers you (you may not exhaust the hole budget, they this would be interpreted as devoting resources to other sectors. How would assign as a "citizen" public resources.

**Cost - Priority.** This is a method aiming to elicit the respondents sensitivity to the cost of every program. That is after revealing the cost of every program the first ranking exercise was repeated. The hypothetical cost amount was calculated



according to the addition of the whole programs costs, that is the total set of programs should not be totally covered by the budgetary increase.

Question (3): *Please could you rank every programs ( after every single programs was explained and comprehension was ensured) from 1(the less preferred) to 10 (the most preferred) after knowing that the cost associated with each one id the following ( cost was revealed)?*

However, for comparative purposes a willingness to pay tax approach was applied to a group of 28 students of the University of Barcelona.

**Willingness to pay taxes.** The scenario relied on the basis of an hypothetical context of imagining being an individual displaying an annual wage of 2000.000 PTAs (equivalent to 1300 US\$) and paying a 20% of tax revenue, assuming a flat tax. The question framed was :

*How many extra taxes are you willing to pay for the program X ?*

**Table VII.4 Elicitation Methods**

<i>Method</i>	<i>Description</i>		<i>Nature</i>	<i>Objective</i>		<i>Assumptions</i>
1.Benefit Ranking (BR)	Numerical Ranking	Priority	Ordinal 10-1	Direct Benefit Order		Just benefit matters
2.Willingness to Assign (WTAS).	Distributive metric measure	money	Cardinal 0-4000 pts	Relative preference of Benefits		Hypothetical Budget increase
3.Cost - Priority Ranking (CPR)	Numerical Ranking	Priority	Ordinal 10-1	Cost-Benefit Order		Cost is a relevant dimension
4. Willingness to pay taxes	Purposive metric measure	money	Cardinal (no real restriction)	Absolute preference		Benefit valuation

The different methods used ,show clearly different aims. The first method has permits to contrast the consistency of the WTAS results, since ordinal preferences should show a significant association with the cardinal measures. The WTAS results try to elicit the individuals trade-off between the different useful methods of benefit valuation. he third cost priority question tries to provide some idea of the individual

economic rationality, since cost is a negative dimension , should enhance a reduction of the priority strength people assign to every program. Finally, the forth question (the WTP taxes)] plays a relevant role in setting the extent of which the WTAS instrument improves the remaining elicitation methods.

The format of this second part began with a explanation of the program and a brief discussion supervised by a co-ordinator which lasted about 40 minutes. Following the explanation, subjects had about 30 minutes to answer the priority setting questions. The WTAS exercise was answered in 20 minutes and results were discussed in about 10 minutes. Finally, the cost – priority exercise was answered without any discussion. The total time was about two hours. Since this is mainly a pilot study to test the applicability of a new method, not all elicitation methods were completely applied to all groups. Table VII.5 summarises the methods implemented in each group

**Table VII. 5**  
**Methods Implemented**

	<i>Preference Ranking</i>	<i>Willingness to Assign</i>	<i>Cost Priority</i>
Group 1	X		X
Group 2	X	X	X
Group 3		X	X
Group 4		X	X
Group 5		X	
Group 6	X	X	X

\* X designates method implementation. As time available was 2 h and arithmetical ability required for undertaking the exercises is considerably high, some groups could not complete the full exercises.

## **VII.5 Results**

This section presents the results obtained in the experimental part of this study. We analyse the results obtained to test the applicability and consistency of the WTAS in predicting values and preferences for health system benefits. As the number of participants was considerably small, the results were not analysed with the size of the group in mind. That is, we try to analyse how well the methodology measures the values of the sample population considered. The final results have been estimated in arithmetic means according to Jones Lee- Lomes (1995), however other central tendency statistics have been considered for the standard deviation and the median. Moreover, not all groups could fill up the three exercises, as we show in table VII.5, the exercise performance varies considerably according to the reference group.

### **VII.5.1 Consistency results**

Since this paper deals with investigating the feasibility of a new method for eliciting preferences for health system programs we provide first the results from the validity tests implemented. The hypothesis on which we base consistency test on the assumption that if WTAS captures preferences over health system programs then the preference ranking implemented in the first phase should not change significantly from the WTAS responses implemented in a second phase. That is if somebody prefers an outcome to another, then the monetary metric value should be higher. Additionally, if participants do not reflect any variation in their results when cost is given, the result could be inconsistent.

In general terms, the responses were consistent among the participants and within every group. Since our data is ordinal the best way to test the validity is to test the consistency of rankings. In order to do so we apply the Spearman correlation coefficient. The assumption is that observed ranking can be expressed as follows :  $R = V + e, E(e) = 0, Var(e_{ij}) = 0$ , that is the ranking of a group can be understood as an addition of a "real" ranking plus a random error, with zero mean and constant variance. The null hypothesis is that there is no correlation between the rankings and

the random errors, such as between the random errors. From this assumptions the

Spearman coefficient is :  $\sigma^2_{xy} = \frac{\sigma_y^2}{\sigma_x^2}$ , that is to vary between -1 and 1.

We have computed other alternative correlation measures for comparative purposes. As is noticeable from table VII.4 there is a high degree of association between the implicit WTAS rankings and the preference rankings assumed to be the real rankings. However, WTP estimates display a reduced correlation coefficient, what can be explained from the different nature of individual preferences when they are thinking as citizens and as taxpayers. That is, the willingness to pay taxes approach do not just display problems concerning the large number of reject questions, but also individuals seem to change broadly the perspective of responses , they do not seem to answer as citizens.

**Conclusion VII.3** The WTAS estimates are to a large extent consistent predictors of individual preferences<sup>xxx</sup>. Results obtained from a rank correlation analysis in this context indicate that the WTAS is a best predictor of individual preferences than the WTP taxes.

**Table VII.6. Association Measures between preference rankings WTAS vs WTP**

	WTAS (N=58)			WTP(N=28)
	Group2	Group6	Total	Total
Kendall tau	0,764 (6.7)	0,66 (3,5)	0.73 (4.74)	0.29 (6.2)
Speraman rank correlation coefficient	0.9 (5.8)	0.745 (2,2)	0.855 (4.6)	0.34 (3.9)

\*t-value in brackets.

Table VII.7 Summary of Results WTAS experiment (N=58)

Preference Ranking				Willingness to Assign			Implicit rankings		WTAS Cost priority rankings			
	Mean	s.d	Median	Mean	s.d	Media n	Mean	s.d	Media n	Mean	s.d	Media n
Attention	3.65**	2.40	3.00	235.58	145.38	200.00	3.31*	2.38	2.50	4.20*	2.32	3.00
Styles	4.47**	2.81	4.00	311.78	215.85	250.00	4.46*	3.02	3.50	4.60*	2.64	4.00
Treat	3.50*	2.15	3.00	263.62	244.18	200.00	3.58*	2.16	3.00	3.42*	2.16	3.00
Bonus	5.65*	2.19	4.00	500.00	296.02	400.00	4.27*	2.18	4.00	3.68*	2.66	3.00
Odontology	5.74*	1.96	5.00	500.00	307.23	450.00	5.81*	1.92	5.50	5.33*	2.30	5.25
Co-ordination	5.65*	2.79	6.00	359.15	226.72	300.00	6.27*	2.66	6.00	5.67*	2.42	6.00
PPIHCAI	5.18*	2.95	4.00	368.73	248.61	340.00	4.65*	2.87	4.00	5.05*	2.53	5.00
Lists	7.24*	1.89	7.50	640.44	339.22	600.00	6.96*	1.93	7.50	7.16*	2.26	7.00
Cancer	7.85*	1.91	8.00	708.00	381.33	700.00	7.85*	1.93	8.50	7.99*	1.97	9.00
Revision	7.88*	2.77	9.00	697.88	337.93	700.00	7.73*	3.00	9.00	7.92*	2.50	9.00

Ratings range from 1(less preferred) and 10 (most preferred)

### VII.5.2 Controlling the hypothetical bias

The hypothetical scenario defined in this study was fully understood after some discussion to the reduced number of students . Since, they undertook a first exercise based on ranking a set of health care programs, they start defining their preferences which was expected to reduce misunderstandings . The willingness to pay taxes however, displayed a relevant number of refusals protest responses, since 20% of participants just answered that they would pay any kind of extra tax for additional funds. The wider set of health care programs was something that did not caused very large arithmetic problems since they just had just to select which of the purposed program's they ought to finance, however they were unable to think in terms of the percentage of the tax revenue they were willing to pay.

### VII.5.3 Preference results

Results from the choice experiment are shown in table VII.7. They are shown in a descending order of preference. The aggregation matter has not been considered in this chapter since chapter VII deals explicitly with this issue.

**Table VII.8 Results willingness to pay taxes (N=28)**

Variable	Priority Ranking (*)			Willingness to Pay		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Cancer	28	8.13	1.35	20	13722.22	12768.55
Coordinat	28	5.59	1.84	15	7553.846	10280.45
Historial	28	4.45	2.28	15	2584.615	2683.544
Attention	28	3.45	2.28	14	5170	5906.691
Treat	28	2.40	1.96	10	2125	1706.082
Revision	28	8.81	1.70	15	10647.06	9694.981
List	28	7.40	2.03	17	9093.75	11983.63
Styles	28	3.77	2.72	9	7111.111	8866.291
Odontology	28	5.22	1.90	17	5085.714	3989.767
Bonus	28	5.54	2.68	15	9642.857	7771.814

(\*) Rankings range from 1(less preferred) and 10 (most preferred)

#### **VII.5.4 The cost sensitivity and the net benefit estimates**

Regarding the use of cost priority exercise, we have estimated the cost sensitivity individuals when cost information is revealed. If a benefit is to be perceived as a benefit then  $\frac{\partial U}{\partial X_i} \geq 0$  and whereas is it refers to a cost then  $\frac{\partial U}{\partial C_i} \leq 0$ . Thus, when introducing the cost of the programs as additional information and then participants are asked to order the programs again one should expect the following results : a) No changes in ordering. That would mean that respondents are not sensitive to costs although not necessarily irrational, since differences in cost may not be perceived as to be large enough to overcome differences in benefits. Alternatively, it might be also the results of a lexicographic order. b) If there are changes in the order, then we should expect these changes to take place in the following way : assuming that people show some previous idea of the costs associated with every program, we try to capture how responses vary when cost information is provided. Results (reported in table 8), suggest that those programs displaying a reduced cost, when cost was revealed improved their final ranking, whereas those programs where cost was high , reduced their final ranking. From this results we could conclude that individuals seem to be cost sensitive. Furthermore, for the analysis of individual responses we can conclude that there is no evidence of an overall lexicographic order at a group and individual level<sup>xxxii</sup>.

From the traditional economic evaluation criteria we can compute a measure of net benefit for the different programs considered in the analysis. Since the Pareto criterion is too restrictive in order to guide the social desirability of a health program (Breyer and Leidl,1997)<sup>xxxiii</sup> , in such cases the Kaldor criterion is the one implemented. The idea is that the welfare gain would arise from a health program if those who benefit could hypothetically compensate those who loose. Empirically, this idea is tested when using a cost-benefit analysis as computing the difference between benefits and costs<sup>xxxiv</sup>.

**Table VII.9**  
**Relative monetary social net benefit (SNB) estimates**

	Group 2	Group 3	Group 4	Group 5	Group 6
Attention	1,25	3,42	2,68	2,5	2,3
Styles	1,42	4,8	3,49	2,8	3,37
Treat	0,53	1,16	1,14	1,17	1,23
Bonus	0,23	0,35	0,2	0,14	0,33
Odontology	0,25	0,22	0,23	0,29	0,18
Coordination	2,94	2	2,95	3,8	4,5
PPIHCAI	0,72	0,35	0,92	0,53	0,67
Lists	0,82	1,46	0,95	0,74	0,72
Cancer	5,58	3,44	3,82	5,37	5,24
Revision	1,41	1,27	1,23	1,65	1,54

\* Computed in relative terms as the mean WTAS/Cost . Measures the amount of benefits for every unit of program cost. The shadowed programs would be clearly financed whereas the other programs would not.

Therefore, considering the absolute monetary values the WTAS results can be compared with the real costs of every program. The resulting values reflect the net social benefit of every program, commonly obtained in a cost benefit analysis in order to evaluate health care programs. From table VII.9, we find that results reported differ considerably from those results obtained from the preference ranking or the WTAS results where cost was not weighting benefits. One reason may be that when cost is high it may weigh benefits in order to determine preferences, if cost differs considerably from every programs then the final results obtained are not to reflect the social preferences. Analysing the reported results we can assert that those programs dealing with non health benefits since are usually more expensive are to appear as less valued. That is there would be a cost reason in order to avoid dealing with some non health benefits aims.

However, a wider implication of this results is that : since programs dealing with equity usually involve large costs", despite priority setting results show that people rank these programs in a reasonable place for the 1 to 10 scale, they are not willing to pay them. This issue is discussed in Chapter VIII as an application of the preference reversal phenomena.



### VII.5.5 Identifying the perceived dimensions of health system benefits

#### *a) Health System Benefit Dimensions*

The appropriate statistical analysis in this case is the item factor analysis following a principal components methodology<sup>xxxv</sup>. Responses were recorded on a seven point scale 1-7. Results from the factor analysis show that these dimensions clustered on three explaining the 81% of the variance. We use a 0.6 factor loading as the cut-off point to assess whether or not an item is used to construct a factor. The validity indicators displayed acceptable results - Determinant = 0.0056 and Bartlett's tests of sphericity = 369 (0.017) and the KMO index 0.56 - (see table VII.10). The three dimensions have been conceptualised as health gain, process utility and equity according to the underlying coefficients.

#### *b) Health programs dimensions*

Health system dimensions were identified within an hedonic price model. The reference paper for doing so was McDougall (1976) which deals with obtaining the demand for public goods by means of an hedonic regression approach. In this section we relate every health system programs designed with its intrinsic benefits or characteristics by means of an hedonic price estimation following a semi-logarithmic functional form as follows :

$$\text{Log}(WTAS_i) = \alpha + X_1\beta_1 + \dots + X_7\beta_7 + u$$

therefore  $\frac{\partial WTAS}{\partial X_i}$  should reflect the contribution of every characteristic to the overall value. The main limitation is that since benefits are computed in terms of ranking rather than by means of a cardinal measure, results do not show a large sensitivity to benefit variations, and therefore this is to limit the explanatory power of the regression results. Therefore, we just set out which are the benefits significantly associated with the overall value without computing the implicit value of its

characteristics. However, this results should be analysed with caution since the explanatory power of the regressions is not large at all, despite the nature of the data . The programs of cancer and revision do show significant health gain benefit dimensions, whereas life styles bonus and odontology show a positive coefficient for non health benefit dimension , and in particular dealing with equity benefits. Finally, another co-ordination set of is clearly associated with process utility . Results suggest that health programs designed are to some extent reproducing the main health system benefits initially attached in a previous classification. However, some programs may include other dimensions of benefit that in an initial experiment design where not considered as relevant.

**Table VII.10**  
**Health System dimensions**

Rotated Component Matrix *			
	Component		
	HEALTH GAIN	PROCESS UTILITY	EQUITY
ACCES	.125	-.736	.453
QUALITY	.861	.223	-.9289E-02
COVERAGE	-.826	6.835E-02	-.6171E-02
SOC.DIM	-6.136E-02	-7.443E-02	.882
RESOURCES	.118	.906	.138
RESULTS	.705	-.152	-.379
PUBLIC HEALTH	-.778	-5.427E-02	.659

Extraction Method: Principal Component Analysis.  
Rotation Method: Varimax with Kaiser Normalization.  
\*. Rotation converged in 5 iterations.

**Conclusion VII.4.** Results from a factor analysis of perceived health system benefits support the idea of a three dimension of benefits (Health gain, equity concerns and process utility). Results from hedonic regressions results suggest that despite the main benefits associated with every program show some degree of consistency there are some dimensions of benefits that decision makers do not directly associate with each program. This results suggests that the health system benefit identification should be carried out by individuals rather than defined a priori by decision makers.

Table VII.11 Regression Results (N=58)

	Revision			Health Styles			Cancer			Clinical H.			Odontholog y		
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	t-value
Benefit	.23*	1.68	.06*		1.76		-.06		-.063		.07		-.02		-0.01
Coverage	.55**	2.69	.49		0.10		.10		0.69		.14		.34		1.54
Access	.08	0.46	.53		1.45		.04		0.39		.21		.12*		1.71
Quality	.37**	2.46	-.02		0.23		.32**		2.13		.21		-.06		-0.60
Results	.48*	2.25	-.09		0.24		.19**		2.97		.03*		-.02		-0.10
Public Health	.47	1.28	.49**		3.11		.03		0.33		-.08		.01		0.02
Social dimensions	.05	0.25	.63**		2.76		-.16**		-2.25		-.005		.43**		2.69
Intercept	4.74***	6.26	5.86***		8.42		6.29***		8.44		4.86		6.47***		13.32
R-squared (Adj)	0.54		0.5853				0.3675				0.1436		0.26		

	Bonus			Attention			Coordinat			Treat			List		
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	t-value
Benefit	.087**	2.16	-.096		-.08		.14		-.047		.25		.17**		2.28
Coverage	.020	.25	.22		.11		.30		.162		.27		.13		.20
Access	-.12	-0.86	-.06		.18**		2.89		-.03		0.84		.26		.21
Resources	-.13	.16	.35		.16		.21		-.16		.22		.35		.16
Quality	.41*	1.70	.09		-.10		.23		-.03		.36		.11		.18
Results	.10	0.54	-.31		.12		.17		.26		.25		.13		.15
Public Health	.11	.086	.01		-.006		.17		.10		.19		.15		.19
Social dimensions															
Intercept	5.24**	6.86	5.55	1.04	5.08**		2.77		5.85		.74		4.44*		1.84
R-squared (Adj)	0.2795		0.17		0.1543				0.1736				0.3278		

\*\*\* 1% significant, \*\* 5% significant and \* 10% significant.

## **VII.6 Discussion and policy implications**

This paper proposes an adequate alternative to implicit rationing in health care. Moreover, states a way to obtain implicit trade off between health care programs, and therefore improving the task of approximating some estimations of an empirical health related social welfare function. Another clear application of this approach is to improve public participation and democracy in health system decision making. Health is sometime considered as a "merit good", that is its socially highly prioritised respect to other goods. Therefore, even though social participation may be contemplated as important in many fields, in health care is decisive as concerns to an essential part of the organisation of welfare states in Europe.

This paper describes a study dealing to develop a method for health priority setting that offset some of the main limitation of the remaining instruments. That is, a method that includes all possible dimensions of health system benefit and captures the perspective and the context of the decision making problem. It is the initial part of a global research that will be applied to the whole Spanish population.

The methodology proposed tries to test the population capacity to answer questions concerning to priorities and valuations of health and welfare. On the other hand displays an alternative methodology to identify perceived health system benefits, and ranking them according to theoretically consistent indicators. The main advance of this methodology is the large definition of health system benefit, what permits the integration of a wide social dimension of benefit including equity as a benefit itself and thus trade-off between equity and efficiency could be taken into account.

The results from a small scale experiment show a large level of association between individual priorities and values, what can be understood as capturing the decision making problem perspective. Therefore, results seem to be internally consistent despite the reduced sample extension and the responses are to be rational. Moreover, concerning the research methods used, the use of the focus group approach could have

reduced some of the problems concerned on the misunderstanding of the questions due to the possibility to discuss the advantages of every program.

Regard to the use of the WTAS, tries to adequate the hypothetical answers to real elicitation's. Furthermore, we could assent that in this context its theoretically better than other alternative techniques. For instance, the use of willingness to pay taxes is sensible to the financing instrument, that is the type of taxes used and such as aggregation of results would presents a large number of bias due to that fact. Moreover, the use of willingness to pay, is difficult to implement when health public sector provides health services where there's not a clear price. It seems therefore an appealing alternative to the traditional techniques usually implemented in health care.

We support the idea that this instrument, - such as in some contexts WTP instruments<sup>xxxvi</sup> - are essentially capturing individuals relative valuation (relative preference) for a single health system improvements. We have found evidence that this is an appealing method for explicting social trade - offs and preferences between the range of operative health system programs. Despite one could ex - ante argue that is a too complex method, evidence suggests that in fact it is not. This method has been applied to six different groups without elevate skills there were no framing problems arise<sup>xxxvii</sup>. Therefore, participants adopt a broad perspective on the hypothetical health policy scenario.

One of main difficulties that have been considered, is how to translate health system outcomes in terms of health programs, while in theoretical terms is simple, in terms of an experimental analysis is quite difficult to approximate. At the same time, it should be assessed which proportion of outcome contains every program, this tool also can be theoretically solved by considering an approximate proportion by taking into account the results from the heeding price regressions. Hence, more research should be done in this matter.

Even though we do not to provide large qualitative analysis, the experiment performance succeed the objectives purposed, and the methodology has been

implemented without any significant problems. Participants have been apparently motivated despite the hypothetical nature of the experiment. Moreover, the interest and seriousness of the responses has been guaranteed in all moment and frequently tested as participant's were able in every moment to justify its responses when it was required.

However, we may expect that in a real rather than hypothetical experiment the motivation would be higher. In general terms, the exercises purposed where easier enough to de applied and participant were satisfied to collaborate in the research due to "ultimately they were helping themselves " in their own words .

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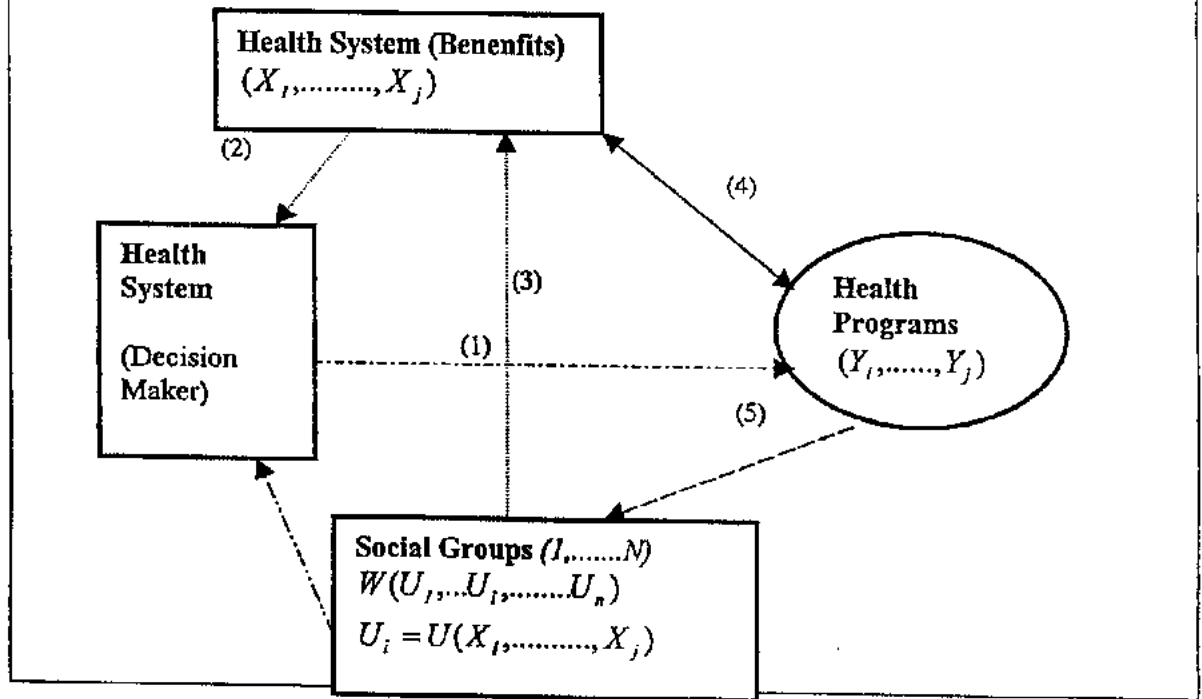
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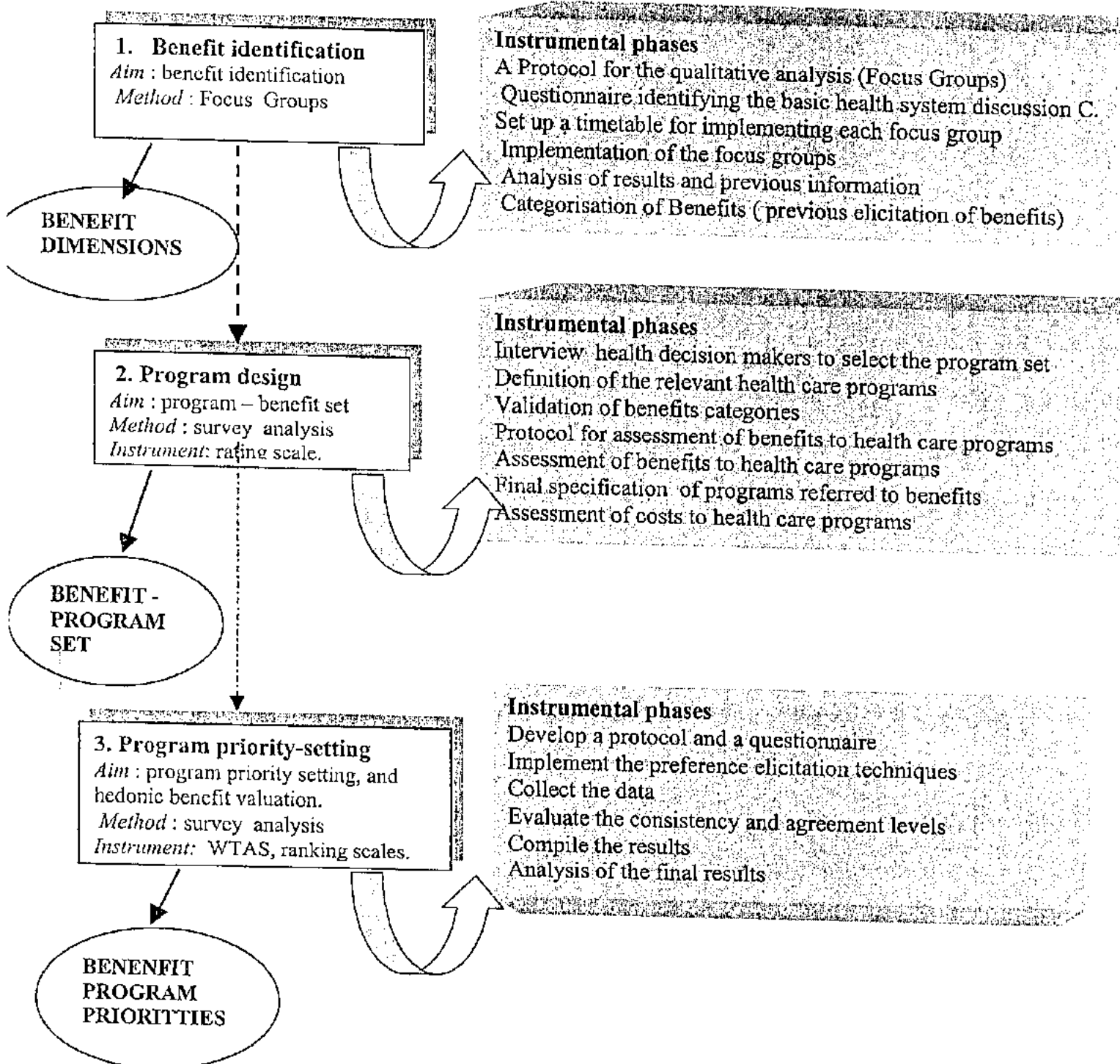
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**Figure 1**  
**The Collective Choice Mechanism**



## Appendix VII.1

### Methodology design scheme ( results in a circle and exercises in squares)



\* Former versions of this paper were presented in the XVIII Jornadas de Economia de la Salut, Vitoria-Gasteiz June 1998, the Economic Science Association Meeting celebrated in Mannheim, June 1998. Financial support was received from the European Commission Program INCO and the Escola d'Administració Pública (Generalitat de Catalunya, 1998).

<sup>i</sup> For instance, some methods are applicable to compare the social efficiency between two alternative treatments, using clinical trials results, etc.

<sup>ii</sup> Usually willingness to pay measures, conjoint analysis such as the traditional QALY approach leads to evaluate a particular decision in order to fund or not a program, however this approach often does not capture the complementary and exclusivity of health care programs.

<sup>iii</sup> This is clearly suggested by o LeGrand (1990) applied in a broad sense: "The idea is that in making social evaluations people might be indifferent between various combinations of objectives or principles, just as making their consumption decisions they might be indifferent between various combinations of goods".

<sup>iv</sup> The difference between considering or not a budget constraint relies on the fact that under a budget constraint, resources assigned to a program can be seen in terms of the benefit forgone from non having those resources available to fund other programs.

<sup>v</sup> Wefarist's approach accept the theoretical hypothesis of the so-called health related social welfare function as a method of reasoning. Hence, health care programs designed by public agencies are supposed to guide the performance of health care systems in order to lead to some of the benefits that are supposed to be implicitly included in this function. However, making the approach of measuring benefits operational is a complex task

<sup>vi</sup> Accordingly health care research should tend to develop a clear methodology that permits setting priorities and public views in order to guide the monitoring of the complexity of health policy. In this sense the CHP, identifies the need for developing studies that report a better knowledge of the public preferences of health services and health policies.

<sup>vii</sup> Despite it withdraws in some relevant features however therefore there are clear similarities with some methods used even though the theoretical foundation underlying the decision process is considerably different

<sup>viii</sup> Health programs are assumed to improve the current (health system) *status quo* involving a wide concept of health system benefit

<sup>ix</sup> An alternative theoretical view is that we are trying to obtain values for those implicit arguments usually attached to an hypothetical health related social welfare function.

<sup>x</sup> Health state-preference methods are ultimately based on an hedonic principle (Reed et al, 1998) that is, commodities have value because of their attributes or benefits. People generally have preferences among benefits and are willing to accept tradeoffs among them. For example, a health service may have value due to the quality of the professionals participating, the health technologies applied, the time lost waiting to the physician, etc

<sup>xi</sup> According to Williams (1996) : "*The counter argument is that priorities are set by the whole society and that, if what would give an individual satisfaction clashes with what society requires of the system, then its the social norms which should prevail*".

<sup>xii</sup> Olsen (1991) provides some insights to this issue

<sup>xiii</sup> The Nord et al (1999) model suggest computing the societal values as a multiplicative composite of three different parameters : utility gain (dU), severity (SW) potential for health (PW).

<sup>xiv</sup> A new program implies an increase in the health system coverage, An increase in the sense than improves the remaining set of benefits the system tries to deal with. However, alternatively we may consider the opposite decision making problems, that is a reduction of a health system coverage. The problem between considering one or other decision making context is the same as that may change results considerably. This is to some extent, the same problems as having to decide between the willingness to pay and the willingness to pay, people may be willing to accept more for a benefit reduction rather than what they are willing to pay for an equal benefit increase.

<sup>xv</sup> According to Harsanyi (1955) a social preference can be stated over a set of uncertain prospects, and under specific conditions that can take the form of a weighted sum of individual utilities

<sup>xvi</sup> Notice, that the WTP respondent is assumed to maximise its value function subject to its personal budget constraint.

<sup>xvii</sup> This idea is clearly captured in Sen (1987) stating that "when there are several objects of value, an alternative course of action may be more valued in one respect and less in another". Therefore, it is not clear that there are always trade-offs between composite objective, the trade-offs emerge in the underlying benefits.

<sup>xviii</sup> We did not want to describe accurately the payment mechanism since then "protest bias" could arise, we simply said that will be collectively financed. The advantage is that prevents from strategical behaviour, since the individual participation in this health care "reform" is not defined. Attitudes like free rider behaviour (Bohm, 1992) are captured also. The disadvantage is that probably there could more feasible arise a moral satisfaction bias.

<sup>xix</sup> Since many participants feel that the public health sector is under (see results).

<sup>xx</sup> Before implementing this approach we review the applicability of alternative methods, such as the willingness to pay taxes, however finally we opt for this method, despite we test the possibility of a tax payment mechanism.

<sup>xxi</sup> Moreover, there are some connected methods such as citizens juries (Lenaghan, 1996), and finally the Local voice initiative in the UK (1992).

<sup>xxii</sup> The focus group technique consists on a semi-structured group of individuals—commonly between 6 and 15—, co-ordinated by a manager who tries to capture information about personal experiences and feelings concerning to a determined issue (health care systems) by a discussion of some delimited questions. The discussion group should be active, and participants can answer a list of questions requested from the co-ordinator, or even ask for other questions related to the general topic research.

<sup>xxiii</sup> This experimental methods is characterised for its high efficacy for obtaining rapid information specially interesting to interpret the qualitative motives of quantitative responses, improving therefore individual expressed valuations

<sup>xxiv</sup> By contrast, the traditional standard questionnaire approach lies on the design of precise and concrete questions to a large sample of population. The precision level is fixed and usually is high representative, however there's a great loss of information due to the method do not permit to improve the depth level fixed in the amplitude of the questionnaire design, despite the simplicity for further quantification of final results.

<sup>xxv</sup> The experiment scheme designing required two months investigating the different alternative techniques and the possible bias that could appear. Finally, due to the experiment aims the design has been set up as follows. The pilot experiment has been developed in close consultation with two social researchers that were familiarised in the field of social investigation and anthropology

<sup>xxvi</sup> The participated survey in a social research instrument very close to focus group, where participants after an acceptable understanding of the objectives of the research, due to a pre test discussion, and the meaning of every rule and exercise of the experiment, have to fill up a written survey by reasoning their answers.

<sup>xxvii</sup> Since the intervention of the moderator was active, any participant contribute significantly more than others, thereby the results can be considered as the reflection of the group as a one member opinion

<sup>xxviii</sup> Multi-dimensional utility analysis (MDUA) it has been adapted from the multidimensional utility theory (MAUT) and is concerned on eliciting preferences and values of health care programs outcomes, as reflecting predetermined health system benefits (see Belton, 1985).

<sup>xxix</sup> The experimental phase was developed by a social researcher of the University of Barcelona.

<sup>xxx</sup> The first and third elicitation method are simple and widely used however the WTAS method is a new method especially design for the purpose of this study as a deviation of the willingness to pay (WTP). People in general terms, felt comfortable with this exercises, despite

the large amount of programs led to some difficulties , and in two cases people did not understand the "citizens view" , and they answered as "if they were users". Also, the use of a budgetary exercise relative to WTAS caused arithmetic difficulties, that were finally solved by accepting that results could be provided in relative terms – that is in percentages-.

<sup>xxx</sup> Compared with the results obtained by Bleichrot (1995) for the SG, TTO and RG this results seem more sensible , however we should carry out much more experimentation before doing such kind of assertions.

<sup>xxxii</sup> If we would be interested on analysing a representative survey, then a clear task would be to analyse individually the possible existence of a lexicographic order and exclude those observations for our sample.

<sup>xxxiii</sup> According to this criteria the choice of a program alternative is desirable for the societal perspective if at least increases the utility of one individual while the utility of other members of society does not decrease.

<sup>xxxiv</sup> The main problem of the net benefit criteria is that theoretically is not a sufficient condition to meet the Kaldor compensation principle.

<sup>xxxv</sup> The essential idea of this method is to describe the variation of a set of multivariate data in terms of a set of uncorrected variables each of which is a particular linear combination of the original variables

<sup>xxxvi</sup> When the willingness to pay is elicited at the same time for more than one programs.

<sup>xxxvii</sup> The idea was to imagine that they have an amount of money for "buying" a broad benefit from health programs - use, option to use and the existence value - ..



## **Capítol VIII**

### **Assessing rationality in contingent valuation experiments**





### **ABSTRACT<sup>1</sup>**

Preference elicitation methods and especially contingent valuation methods essentially deal with eliciting public preferences values for alternative resource allocation sets i.e health programs. If respondents to contingent valuation follow adequately fir with its objective, preferences elicited from rational individuals should encounter the relative valuations for difference programs offered to be valued. However, empirical evidence from contingent valuation suggests that some bias emerge as a result of a cognitive process of reasoning no always consistent with real market transactions. In particular, a large number of bias have been identified in the literature and not always accomplish some predetermined criteria of ex -ante rationality – linked with reasoning – such as less restrictive assumptions of ex -post rationality – validity and reliability-. This chapter draws attention to some methodological aspects concerning the application of the contingent valuation, as a method for revealing preferences for non-marketable goods. We suggest that sometimes, the valuation instrument may bias the results, and we test experimentally this assumption by comparing the WTAS methods – consult Chapter VII- and the open ended WTP method, in terms of the accomplishment of some rationality assumptions. In particular, we shed some light to three questions: which is the nature of preferences underlying individual priority -setting, do these preferences and values reflect “reasoned preferences”, and finally which are the criteria to be implemented for testing the rationality assumptions. From this approach, the concept of “reasoned preferences” is set up to base the elicitation mechanisms applied to resource allocation in health care.

*Key words:* reasoned preferences, rationality, validity and consistency.

*JEL classification:* D72, I19, D63.



### **VIII.1 Introduction**

The elicitation of social preferences and values of publicly provided goods is currently a research tool widely used on the grounds of democratic principles in social administration, as well as a mechanism to improve to some extent the social efficiency of public decision making. The basic purpose of its implementation in the social policy context is to reveal public preferences for the goals that public policy should hypothetically achieve<sup>ii</sup>. With this in mind, recently the number of papers eliciting preferences for public provided goods has increased to a great degree<sup>iii</sup>. Even though the large number of possible methodologies to implement (see table VIII.1)<sup>iv</sup>, the vast majority ultimately deal with measuring or identifying the idea of "public preferences" under virtually different hypotheses and decision making scenarios<sup>v</sup>. However, the assumption underlying all these methodologies and ensuring their validity and reliability, is that respondents show *rational preferences*.

This chapter aims to provide some insights into clarifying the idea of rational preferences under the social decision making context. Our approach is based on the idea of reasoned preferences as an approximation to the concept of "true preferences" that ought to capture the different elicitation techniques. This chapter draws attention to some methodological aspects concerning the application of the contingent valuation, as a method for revealing preferences for non-marketable goods. We suggest that sometimes, the valuation instrument may bias the results, and we test experimentally this assumption by comparing the WTAS methods – consult Chapter VII- and the open ended WTP method, in terms of the accomplishment of some rationality assumptions.

Table VIII.1 Main preference elicitation methods

Methods	Instrument	Sample	Outcome	Purpose
<b>1. Qualitative (discussion)</b>				
<i>1.1 Citizen juries</i>	Large discussions	Representative	Verdict	Reasoned preferences
<i>1.2 Citizens panels</i>	Short discussions	Not representative	Consensus	Views underlying choices
<i>1.3 Focus groups</i>	Short discussions	Not representative	Values	Reasoned preferences
<i>1.4 Public forum</i>	Short discussions	Representative	Public opinion	Public participation
<b>2. Quantitative (survey based methods)</b>				
<i>2.1 Willingness to pay</i>	Asking the maximum willingness to pay	Representative	Absolute and relative preference	Money metric preference
<i>2.2 Ranking scales</i>	Rank on defined scale	Both	Mean ranking	Ordinal preference
<i>2.3 Conjoint analysis</i>	Ranking or rating scenarios	Both	Relative preferences	Valuation of a good attribute
<i>2.4 Visual analogue scale</i>	Place the desirability of a health state in a rating scale	Not representative	Relative preferences	Valuation of a health state
<i>2.4 Time trade off</i>	Paired comparison on two certain prospects involving time and quality of life.	Not representative	Preference for health states	Valuation of time to give up to be in a specific health state
<i>2.5 Standard Gamble</i>	Pair comparison between a certain and an uncertain outcome	Not representative	Preferences for health states	Estimated probability of an uncertain outcome
<i>2.5 Personal trade off</i>	Pair comparison between patients in different health states	Not representative	Preferences for health states	Valuation of people in one health state equivalent to persons in other health state
<i>2.6 Budget Pie</i>	Distribution of a fixed budget	Both	Relative preference	Money metric preference

The questions that this chapter aims to address which is the nature of preferences underlying individual priority -setting?, do these preferences and values reflect "reasoned preferences"?, and finally which are the criteria to be

implemented for testing the rationality assumptions?. We suggest that some problems of preference elicitation methods may be caused by an inadequate selection of the (elicitation) decision making instrument. Furthermore, we claim that the use of qualitative instruments may be a way to increase the rationality of individual responses, such as a way for obtaining those relevant dimensions to be taken into account.

Emphasis will be given to the contingent valuation (CV) approach and in particular the willingness to pay approach<sup>vi</sup> for many reasons. First is the main instrument applied to public decision making. Second, its catalogued as well founded by economic theory. Finally, since CV tries to encounter the idea of public preferences in terms of real or political market decisions – despite the hypothetical context – it might be one of the most efficient methods in terms of eliciting public trade-offs. In fact, many health regulatory agencies use CV method to assess preference –based values for non market goods [Dubourg et al, 1997]. However, CV studies have demonstrated a variety of anomalies and inconvenient disparities. This feature may be explained by the failure associated with rigorous design or limitations of respondents to articulate preferences. However, we suggest that the instrument purposed may also play a relevant role. In particular, there may be a mismatch between expressed preferences and real preferences due to the inadequate decision making framework .

Individual and social rationality emerges from accepting that rationality does not arise from holding the so-called "right preferences". As a result *there are no irrational preference per se*. This idea is implicitly assumed in contingent valuation studies. In this studies rational assumptions emerge from the hypothesis underlying economic theory, and may be tested by means of empirical or experimental methods. Moreover, despite the original idea of contingent valuation is to assume that every individual shows a well-defined

preferences ,recent evidence suggests that preferences sometimes are not previously structured but are constructed when respondents are confronted with de decision making context [see Tversky, 1996]. Therefore, individuals show a set of beliefs and "narrow values" that determine its action ,and its attitude towards the "hypothetical goods to be valued" [Ajzen et al 1975].

Rational decision theory states that rationality follows (Coherence) , what is to imply transitivity, independence and stochastic dominance, and (ii) invariance what means that preferences are independent of how they are presented (descriptive invariance) and of elicitation methods (procedure invariance).

When procedure invariable is violated, then these events are called "preference reversals" in a decision making framework [Lichtenstein and Slovic ,1973] usually linked with the use of monetary elicitation instruments. However, Kanheman and Ritov (1995) found that preference reversals are to appear as a general pattern of choice, since does appear despite there are no bets to be chosen. This is also tested in this paper, in particular we show that when monetary instruments are restricted preference reversals may diminish considerably.

In a contingent scenario, the underlying concept of rationality doesn't account exclusively for the logical consistency requirement. According to Sen (1993) rationality requires expecting something more than just consistency of choices but involves the cogent between aims and objectives, and therefore the rationality of decision is best assessed in the light of "*what the person is aiming to do or trying to achieve*". Following a similar idea, Kanheman (1995) states that it's generally useful and sometimes possible to supplement the logical analysis of decisions by substantive criteria<sup>vii</sup>. In particular within a contingent valuation framework there are three main sources of rationality

concepts that may be classified in terms of the dimension the refer in validity (if they focus on the decision context determinants ) and reliability or stability if they rely on a temporal dimension.

The remainder of the paper is the following. In section II, we analyze the limitations of assessing the rationality of preferences revealed in contingent valuation experiments. In section III we discuss the meaning in this context of the "reasoned preferences" as an *ex-ante* criteria to lead to some rationality test. Section IV provides some evidence form a contingent valuation experiment , and the paper ends with some concluding remarks.

## **VIII.2 Assessing rationality in contingent valuation methods**

Contingent valuation (CV) is currently the most extended technique applied to assist *ex-ante* decision making in a large number of fields such as environment and health. The aim is to elicit money metric measures in order to value benefit (welfare) changes and therefore expliciting social trade-offs (or revealing social preferences) between specific benefit improvements o reductions. The idea is to simulate a market transaction (see Chapter VI for an application) under a real or political market context. Respondents are asked to compare a status quo with a variation - introduction of a new health program - and asked to state to it a monetary valuation that is assumed to reduce its current wealth.

Value elicited, sometimes involve a large deal of benefit dimensions concerning not only the use value, but also the existence and option values, i.e the altruistic concerns . Under this scenario some doubts arise concerning the ability of respondents to process complex information, sometimes involving a large number of dimensions. Simple scenarios lead to a large source of



information arising, whereas complex scenarios may be uncompressible by the individuals ( Harris, 1989; Fischhoff et al, 1993)

Let us depart from a formal definition of the money metric measures by means of the expenditure function  $e(\cdot)$ . The money metric measure of benefit changes denote the expenditures – paid by citizens or users - necessary to maintain a specified utility level associated with an increase in benefits ( $X_{i0}$  to  $X_{i1}$ ) as follows:

$$M_i = e(p, X_{i0}, u) - e(p, X_{i1}, u)$$

and therefore since  $\partial M / X_i \geq 0$  , money metric measures bring to the fair a state preference over a range of ( $X_{i0}, X_i, X_{i1}$ ) benefits associated with a determine welfare change. However, are this money metric values and their underlying preferences rational?. There are some assumptions that preferences should accomplish :

- (i) The status quo ( $X_{i0}$ ) should be compared under identical informational conditions with the “new state” ( $X_{i1}$ ).
- (ii) Prices may not be constant when we are taken into account hiding opportunity costs.
- (iii) Decisions should not be biased by the context ( $u$ ).
- (iv) People should have constructed preferences over the benefits valued ( $X_{i0}, X_i$ ).
- (v) The classification of a welfare change as a benefit or not can differ between individuals.

All this assumption show clearly linked informational determinants, are often are not solved by traditional contingent valuation methods.

## VIII. 2.1 Rational choice and informational constraints

One of the reasons why contingent valuation is so discussed is based on the argument that "people do not display enough information among the different benefits that they are to value "(Boyle et al, 1994). Probably linked with the fact that respondents do not hold market experience for some goods, This is particularly true in environmental valuations and sometimes also in health care. The departing argument under a health care context, is that a large part of the population has never used some of the health care programs implemented by the health public sector, and therefore people face problems to value them accurately. A second problem appears under a policothomous choice scenario –that is when there is more than one relevant alternative -. There is a tendency to value those best familiarized programs from the scope of programs available, that is those are well known programs where individuals, or the ones that the individual is best informed. Therefore, ex-ante criteria of rationality emerge as a need, in order to test the individual way of reasoning . Recently research techniques have improved in order to solve some of the limitation arising from the CV studies.

Under the assumption that there is no information about the range of the non-use values, we can distinguish individuals in terms of the amount and type of information. Withehead et al (1995) analyzes the effects of information on the willingness to pay (WTP), and conclude that information determined the validity of the WTP. A general classification of participants in the contingent valuation survey can be reproduced as : (i) *on -site informed*, if they use and hence hold enough experience of a determined health care program , (ii) *off -site informed* if they have some information coming from other peoples experience and they have no experience, and finally (iii) *uninformed*, if they have no more information than the one the researcher sets out in the contingent valuation survey. Uninformed would hold exclusively the existence values but

we cannot simply reject results from ignorance, because a "rational ignorant" appear to be associated with costly information, as in many elicitation procedures . Moreover, another important feature is that although information is desirable, information per se does not guarantee a reflection process resulting in reasonable preferences. Although the relevance of the amount of information individuals appear to show initial biases associated with prior uninformed beliefs can limit substantially the role of information in contingent valuation surveys.

#### **VIII. 2.2. Testing Rationality in Contingent Valuation Experiments: Validity, Reliability and Consistency**

Investigating the extent of "rational preferences" is a current debating issue in experimental decision analysis. One of the major fields regarding the study of collective choice such as mechanisms for revealing the demand for public provided goods is CV. Under CV, the nature of rational preferences is and investigated from different dimensions. Preferences elicited are catalogued as accurate if they meet some conditions. A first perspective relates to the theoretical determinants of preferences (so-called construct validity) that is if the informational variables do show expected signs are consistent with the measure of values. A second dimension refers to the capacity of individuals to reason ( so-called convergent validity<sup>viii</sup> ). Finally, the third dimension of rationality refers to logical rationality, or consistency in a broad sense usually connected to the foundation of traditional consumer behavior (consistency)<sup>ix</sup>.

The main link between the revealed preference approach and the contingent market approach is the stability requirement. If preferences between the two alternative goals are stable then in the real context, individuals are assumed to behave according to the "expressed preferences" revealed in the contingent

scenario. Table VII.2 summarizes the traditional rationality requirements attached to the contingent valuation approach.

**Table VII.2.**  
**Rationality tests in Contingent Valuation Surveys**

Rationality criteria	Description	Resolution
1. STABILITY	Similar (stable) individual values over time	Rank Correlation Tests
2. THEORETICAL VALIDITY	The extent to which a measure behaves according to theoretical predictions	Split samples
2.1 Convergent validity	Independence of the elicitation instrument	Varying irrelevant aspects of the elicitation method.
2.2 Divergent validity	The extent to which the values of a priori different goods are different	Correlation tests
2.3 Construct validity	Values relate to "constructs" according to the theoretical hypothesis	Regression analysis
3. INTERNAL CONSISTENCY	No contradictory responses	Rank correlation and share of insistent responses

Assuming the existence of a family of value functions  $V(\cdot)$ , we can represent the underlying preferences as a real number by means of the following statement "if the alternative  $x$  is preferred to an alternative  $y$ , the value of  $x$   $v(x)$  should be higher than the value of  $y$   $v(y)$ "<sup>8</sup>. The experimental example reported in section 4 applies this consistency test assuming the existence of a set of alternative programs to be prioritized according to its benefits, a rationality will emerge if individuals (i) are able to tell for every pair of alternatives programs which of them she/he prefers, or is indifferent, (ii) its preferences are to be transitive, and (iii) its valuation  $V(\cdot)$  describes preferences over health systems benefits. Empirically, testing the consistency criteria means to assure that participants have been able to answer the framed questions (minimizing the non-response questions) and that the rank correlation between preferences is approximately 1. However, usually besides the traditional neoclassical consistency assumptions, contingent valuation methods

assume a concept of consistency related to beliefs and attitudes rather than in logical assumption. The reference criteria were set out by Fishbein and Ajzen (1974), assuming that individual behavior is the result of attitudes. Therefore, under this assumption, WTP is a measure of behavioral intention that seem to predict real behavior.

The empirical research testing the consistency requirements is still small. However, the two initial references that appear to be especially relevant for our discussion are Heohn and Randall (1987). They test the consistency of CV in an applied WTP experiment showing an expected result, WTP methods seem to be consistent with preferences revealed by actual choice behavior. Furthermore, Mitchell and Carson (1989) conclude that CV methods are capable for measuring directly the range of economic benefits for a wide range of goods, including those not yet supplied. In the experimental part of this paper we show a specific feature that we hope to clarify. When a large set of alternatives is purposed to be valued, CV measures do not capture "consumer preferences" but heterogeneous preference intensities or relative preferences over different sets of benefits<sup>xi</sup>

Individuals are supposed to hold limited information, so their decision usually depends on the structural characteristics of the environment, such that the principle is understood as "valid" in order to overcome the complexity of the world. This complexity introduces a great deal of biases that usually do not appear in the simplified world of economic theory. Accordingly in the literature of contingent valuation there are a large number of bias investigated usually lined with the function of informational determinants. Table 2 provides a summary of the most extended biases as influencing results in contingent valuation methods.

**Table VIII.3. Measurement bias in contingent valuation**

Nature	Description	Consequence
Hypothetical framing	Mismatch between the hypothetical and actual WTP	Reduced validity
Endowment effect	Starting from a neutral reference point, individuals may value losses more than they value gains.	Underestimation WTP
Moral satisfaction	Overvaluation of the higher valued benefits.	WTP is not a pure trade off between income and health
Embedding effect	Similar bid values for bundles of goods such that one was logically contained in another	An amount of benefit is equally valued that the overall benefit
Strategic Behavior	Respondents feel they can influence the final result with a strategically response	Overestimation /underestimation
Merit goods effect	Propensity to overestimate environmental and health as considered "caring externality" and "under-founded"	Overestimation of the WTP
Payment instrument	Zero response as protest, i.e taxes or private insurance	Underestimation of the WTP
Apparent altruistic concerns	Altruistic attitude is larger to altruistic actions	Overestimation of the WTP

### VIII. 2.3 Preference reversals.

A preference reversal appears when invariance is dismissed , since different p elicitation systems produce different preferences. We define preference reversals when choice differs from payoffs. For instance, imagine we have two option two prioritize, sat A and B. When individuals are told to state their preference, A is preferred to B. However, when they are asked to assign a monetary valuation to each program, for this their money-metric valuation the value of B,  $V(B)$  is higher than the value of A,  $V(A)$ . Despite this concept comes for the psychological literature has a large relevance in contingent valuation surveys. If we accept that values should account preferences the existence of preference

reversals would dismiss the validity of the results obtained by this instrument. However, this possible failure is captured if individuals are asked to rank the alternatives prior to the elicitation procedure.

#### **VIII. 2.4 Practical Rationality**

In some contexts we have to distinguish between preferences over real o possible sets and impossible sets . The differences is that the last preferences will never be possible to occur in practice, individuals cannot think in any real scenario in order to help the reasoning process. These preferences are called, unpractical preferences, in opposition to practical preferences where it is possible to have a choice where the alternatives can be compared.

However, we should distinguish between rational preferences related to individual behavior where the final outcomes depend on the interaction with other individuals from the approach that we are employed in this paper. Here, individual displays some knowledge on the possible set of alternatives and values of each program, without any incentive to co-operate or to adopt strategic decisions as they have no information of the aggregation procedure.

In a social sphere, the analysis of social rationality seems to be much more complex, as there is a great variability between individuals. An alternative for aggregating individuals preferences is to group individuals according to some characteristics, aggregating the groups preferences instead of individuals preferences since its assumed that inside a groups there would be a higher homogeneous preferences than between groups. This can be tested by means of a (dis) similarity measure.

Moreover, if preferences are to reflect individual and social values, preferences should take into account previous revealed values. Therefore, if

individuals or social groups are able to answer the elicitation questions posed if their responses reflect the previous benefits revealed, then we should accept a so-called social consistency criterion.

#### VIII.2.6 Preference strength and the status quo effect

One of the most conflicting issues in decision making process is assessing strength with regard to alternative outcomes. Given a fixed cardinality and a fixed number of dimension's, the strength of preference over any welfare change can be viewed as a ratio (Dreier, 1996):

$$\frac{U(X_1) - U(X^0_1)}{U(X_2) - U(X^0_2)} \quad (\text{VIII.1})$$

where X are to represent different outcome valued according to a defined status quo. The preference strength captures the intensity of preferences, by means of comparing the value increases of two specific outcomes.

However, what is the dependence of the status quo? Obviously the status quo is to determine the utility gain , therefore if a health system departs from status quo defined by a high equity, then is probable that the equity benefits are not as valued as an alternative outcome. Without trivializing this argument, stated preferences over the existence values of health systems are to depend on the amount of benefits provided by the health system.

#### VIII.4Preference Stability

However, as Shiell et al (1997) pointed out, preferences obtained by such elicitation procedures although they are assumed to be *stable*, there are in fact <sup>xi</sup>. In particular, stable preferences appear when individuals hold



"differentiated values" obtained usually through experience. In the same direction Dolan (1997) states that people display "articulated opinions" on a set of issues that are familiarized what determines the existence of "true" underlying preferences. Stable preferences and articulated opinions may arise after a process of reflection that permit us to reformulate some uniformed or un-reflexive ideas, however this takes time, as it needs to become familiar with the questions asked which influences choices.

#### **VIII. 2.7 The problem of identifying the correct dimension**

Are preferences computing what they should compute? Often preferences are not linked to a particular outcome, but should rely on an evolving concept of benefit since health care programs are ultimately term referred to its benefits. Therefore, CV techniques usually try to involve in the survey implemented a set of wide outcomes of some particular health programs to be valued. An extended approach based on the household production approach (Becker, 1967), the demand for characteristics (Lancaster, 1978) maintains that there is something underlying the objects of preferences. That is preferences over courses of actions are in fact preferences over their benefits. If benefits are not previously identified, then preferences may be reflecting some values for different objects rather than the ones are supposed to value.

### **IX.3 Rationality and Reasoned Preferences**

Rationality requires taking into account three aspects that appear to be relevant: (i) the context where a particular choice is applied, (ii) the set of alternative courses of action available and (iii) the consistency of responses. However the term "consistency" is seen in a broad sense, that is respondents of an elicitation questionnaire are assumed to show previous beliefs about actions that determine its behavior (Akerlof and Dickens, 1989), and therefore responses are to be consistent or not regarding its previous beliefs.

Let us redefine the Simon (1987) rational actor assumptions as "an individual with given "true" beliefs, internally coherent and capable to define his preferences and to display deductive reasoning ". From this definition, rationality implies (i) a reasoning process, which means accepting that there are no irrational preferences per se, but differences in values and beliefs across individuals. Furthermore, (ii) an individual is to perceive a representation of the world, when receives a stimulus (information) elicits a preference from a set of alternatives without disturbing the other elements.

An individual is rational in this context depending on the preferences over other things that motivate their choice. In a public decision making context preference choice should realize the individuals desires and beliefs in health care system monitoring, if the process of belief formation is not to be distorted by informational and motivational biases (Elster, 1996). However, choices may not always agree with "true beliefs", on which preferences should be based . Therefore, one question arises: which kind of preferences should we use for decision making? Our answer to this question is that relevant preferences are to be reasoned preferences. That is those preferences that are delivered from reasoning about the different dimensions of benefits, differences within each dimension of benefits and finally the preference intensity for each dimension of

benefits. One of the accepted ways to improve reasoning is the use of qualitative methods, in table VIII.4 we compare the advantages and disadvantages of the focus groups (see Chapter VII for an explanation an an application) method respect to standard survey methods. The idea, is that reasoning is something that cannot be encountered if there are no incentives for participants to reason its answers. Focus groups, differs from the standard questionnaire in the way the information comes up. In the standard questionnaire, information goes from the respondent to the interviewer , whereas in a focus group to the flow of information is wider, individuals share and discuss its ideas with others. Therefore, a priori, we may assume that answers from a focus group are to lead to a higher degree of rationality.

Under an applied welfare economics approach, a higher value (say a higher willingness to pay) of an alternative with respect to another, say  $V(A)$  is higher than  $V(B)$ , implies that we the benefit A is preferred over B. However, there is a relevant hypothesis underlying this assumption that should be taken into account, we are assuming that the information about preferences is under control of the researcher and probably this is perhaps a restrictive assumption. For instance, suppose that A contains higher degree if uncertainty, than B, this could explain why  $V(B)$  could be higher as  $V(A)$ .

Another possible explanation relies on the role of information. Welfare economics usually distinguish between true preferences and choices that fail because they are based on ignorance and incorrect information (Harsanyi, 1997). Harsanyi stresses one aspect of preferences that is highly relevant, that is "informed preferences" which is the opposite to "mistaken preferences". Informational conditions are to constrain the cognitive process that leads us to understand the coherence that lies behind individual responses. This idea is clearly reflected in the applied welfare economics by means of the so-called framing effect. However, its implication for applied analysis are large, since

this idea call for developing qualitative instrument before any sort of extensive analysis . That is individuals should become familiar with the kind of questions that they have to answer. Therefore, the value of preferences obtained within an elicitation method depends on the capacity of individuals to reason rather than the consistency requirements imposed by microeconomic theory

Additionally, modern microeconomic theory emphasizes the consistency of responses according to the well-known completeness, monotonicity and transitivity. However, when researchers use these requirements in their empirical data they cannot base on the strict preference criteria that microeconomic theory advocates, but they adopted a "moderate" concept of consistency<sup>xiii</sup> such as wide concept of rationality understand as the avoidance of instrumental bias.

**Table VIII.4.**  
**Focus group vs survey based methods**

<i>Criteria</i>	<i>Focus Group</i>	<i>Survey- based instruments</i>
<i>Questions</i>	Open and general questions	Carefully designed questions
<i>Sample</i>	Small sample N=(6,15)	Large sample
<i>Methodology</i>	Qualitative and quantitative	Quantitative
<i>Aim</i>	Depth consultation dealing with the motives of individual responses	Representative of a determined population
<i>Responses</i>	Assures <i>reasoned responses</i> permits to resolve misunderstandings	Uncertainty on the underlying reasoning process
<i>Question Dependence</i>	Responses do widely depend on the question framed	Large dependency on the question framed
<i>Understanding</i>	Discussion introduces the public policy situation enabling to consider relevant comparisons and opportunity costs.	There is no guarantee of understanding of the public policy scenario

## **VIII. 4. Evidence from a choice experiment**

The experimental scheme is the same as the one outlined the chapter VII, therefore in this section we only provide a brief review on the main aspects that appear to be relevant. The experiment simulates a collective choice scenario where a hypothetical health decision maker has to deal with the “complex” task of selecting a bundle of health programs to be publicly financed on the basis of individual preferences organized by social groups<sup>xiv</sup>. Under this context, we deal to analyze some of the “rationality criteria” usually linked with preference elicitation mechanisms.

### **VIII.4.1 The experiment: a brief description**

The experiment scheme has been outlined and analyzed in chapter VII. Therefore, we just point out some relevant features for the purpose of this chapter. The experimental scheme can be contemplated in terms of a two-step process. In a first step, six social groups selected, choose by means of a qualitative technique (the focus groups approach) the perceived benefits from the Catalan Health System (table VII.1). In a second stage, a set of ten-health care programs were designed in consensual advice from participants capturing the previously defined health system benefits (table VII.2). In a final third stage, individuals were asked to answer a benefit ranking exercise, a willingness to assign exercise and a cost priority exercise. The first and third elicitation methods were simple rankings differing in the characteristic that the cost priority ranking included the cost of the program as a relevant dimension. The WTAS method however, is a new method especially design for the purpose of this study as a deviation of the willingness to pay (WTP)<sup>xv</sup>. Participants felt comfortable with these exercises, despite the large amount of programs, a reduced number of participants need help for finishing the WTAS

exercise, what suggests that was understood, despite for future research the practical implementation should be performed.

#### VIII.4.2 Consistency and reasoned preferences

The basic results from the three elicitation methods are reported in table VIII.5. From this table we can note that the most preferred programs do not vary significantly according to the different elicitation methods implemented. Moreover, the standard deviation is quite stable at least for the willingness to assign responses therefore, taking the standard deviation as a previous measure of agreement we can conclude that in principle *there are no significant differences in the degree of consensus* between groups. Additionally, a test for equality of means was undertaken, and results confirm the rejection of the null hypothesis, that is preferences seem to be *complete*, people prefer one program to another. Transitivity however, is difficult to be tested since the nature of the question suggest to answer implicitly requires a to order the alternative programs in such a way that transitivity cannot be derived. Usually, transitivity appears when a binary question is framed. Finally we analyze individual responses computing a measure of inconsistency in terms of a the distance between the rankings of individuals and the its implicit rankings when the value the different programs.

Results suggest that there are relevant differences in terms of the consistency criteria over groups. The method use to compute this variable is based on computing the distance between the two different rankings weighted by the maximum possible difference, i.e if three programs are compared and rankings are range from 1 to 3, the maximum difference is 2.

Table VIII.5. Degree of consistent responses

	% of Inconsistency
Group2	38%
Group 3	42%
Group 4	20%
Group 6	36%

A second feature relates to *informed preferences*. Respondents in a first qualitative exercise, set as a large set of process utility benefits as important benefits to that the health system should encounter (see Chapter VIII). However, when they ere asked to value health programs dealing with these benefits as a trade -off from other programs dealing with health gain benefits, they assess a high priority to health gain benefits and a low priority to process utility benefits.

Table VIII.6 Comparison of health programs (median)

Health Program	Benefit	WTAS	Rank
Medical revision	Health gain	700	8
Breast cancer	Health gain	700	9
Medicament bonus	Equity	400	4
Odonthology	Equity	450	5
Waiting lists	Process utility	600	7.5
Attention and user information	Process utility	200	3

This feature suggests, that although individual claims are guided to improve process utility, in fact they do not attach to them a high priority with respect to the main relevant dimensions of health systems (health gain). Another possible explanation could rely on the programs selected, since as its wide range of *people show a moral satisfaction effect*, overvaluing those programs dealing to solve cancerous diseases. However, this does not seem to be an explanation for the large valuation of the revision program. Although, respondents do not assess a large value to process utility, they value in a

Table 7. Results from the choice experiment

Programs N=59	Cancer	Coordination	Historical	Attention	Treat	Revision	Waiting Lists	Life styles	Odontology	Bonus
Null founds(%)	1.7	18.2	11.8	10.1	18.6	10.1%	1.7%	20.3%	5.1%	28.8%
Priority (1)	High	Middle	Low	Low	Low	High	Middle	Low	Middle	Low
Low Priority	5.81	41.18	55.88	70.59	64.71	11.76	20.59	52.94	23.53	64.71
Middle Priority	20.58	32.35	14.71	26.47	26.47	32.36	50	38.24	50	32.35
High Priority	64.71	26.46	29.41	2.94	8.82	55.88	29.41	8.82	26.47	2.94
Priority Ranking (2)	7.65	5.65	5.18	3.65	3.5	7.88	7.24	4.47	5.74	5.65
	(1.91)	(2.79)	(2.95)	(2.4)	(2.15)	(2.77)	(1.89)	(2.81)	(1.96)	(2.19)
Implicit WTAS	7.85	6.27	4.65	3.31	3.58	7.73	6.96	4.46	5.81	4.27
Ranking(2)	(1.93)	(2.66)	(2.87)	(2.38)	(2.16)	(3.0)	(1.93)	(3.02)	(1.92)	(2.18)
Test Equity of match ranks (4)	0.577**	0.0525*	0.0825*	0.5235**	0.5235**	0.0768*	0.6776**	1.0000**	0.3323**	0.3323**
Cost Priority (2)	7.99	5.67	5.05	4.2	3.42	7.92	7.16	4.60	5.33	3.68
	(2.5)	(2.42)	(2.53)	(3.32)	(2.16)	(2.50)	(2.26)	(2.64)	(2.3)	(2.66)
Cost effect (3)	+	-	+	+	-	+	+	+	-	-
Cost-Benefit	9.03	8.14	3.23	6.45	5.87	6.03	3.45	7.89	1.99	2.49
Ranking	(2.45)	(2.98)	(1.46)	(1.89)	(2.34)	(1.97)	(1.47)	(2.36)	(0.9)	(1.07)
CBA reversal	NO	YES	NO	YES	YES	YES	YES	YES	YES	YES
Benefit(5)	H	P	P	P	P	H	P	H	E	E

(1) Low priority refers to less than 5 point in the ranking. Middle priority refers to more than 5 and less than 8 points and finally high priority denotes more than 8 points.

(2) Means and standard deviation in parenthesis. Implicit rank refers to the WTAS implicit ranking. Cost rank refers to the resulting ranking from revealing the cost information.

(3) Refers to the response to the cost a high/reduce cost information : (+) refers to increase, (-) to a decrease, and (=) refers to no variation.

(4) Snedecor and Cochran (1989) test of equality of match pairs of ranks. Ho: median of Predicted-Real=0, p-values results.

(5) Health gain(H), Process Utility (P), Equity(E)

(\*\*) We cannot refuse the null hypothesis at a 1% significant level.

(\*) We can refuse the null hypothesis at a 10% significant level.



middle position those programs leading to equity benefits (see table VIII.7). Moreover, moral satisfaction may be capped when more than one program is assumed to be valued. The reason is that individuals in this experiment are aware that the assessment of an excessive monetary valuation to one program may reduce the available resources for alternative programs.

Table VIII.8. Preference Elicitation Results

Total Groups	<i>BR</i>		<i>WTAS</i>		<i>CPR</i>		<i>Cost</i>
	Mean	SD	Mean	SD	Mean	SD	Total
Attention	3.65**	2.40	235	145	3.31*	2.38	100
Styles	4.47**	2.81	312	215	4.46*	3.02	100
Treat	3.50*	2.15	264	244	3.58*	2.16	300
Bonus	5.65*	2.19	500	296	4.27*	2.18	2000
Odontology	5.74*	1.96	500	307	5.81*	1.92	2000
Coordination	5.65*	2.79	360	226	6.27*	2.66	100
PPIHCAI	5.18*	2.95	369	248	4.65*	2.87	500
Lists	7.24*	1.89	640	339	6.96*	1.93	700
Cancer	7.85*	1.91	708	381	7.85*	1.93	150
Revision	7.88*	2.77	698	337	7.73*	3.00	500

\*Significantly different from all other means at a 99 confidence level.

\*\*Significantly different from all other means at a 95 confidence level.

Rankings range from 1(less preferred) and 10 (most preferred)

#### VIII.4.3 The dependence on the framing effect

This aspect has been treated in both aggregate and individual level. It has been tested by a non parametric test of the equality of the two rankings (the direct ranking and the implicit ranking obtained from the willingness to assign elicitation question). At an aggregate level we use the Wilcox test since we have a considerable large sample, however in terms of every program we compute the Snedecor and Cochran test (table VIII.7) . Results are provided in table VIII. 6 for aggregate responses and table VIII.7 at an individual level. At an aggregate level two programs show problems with the framing effect. In particular coordination and clinical history, suggesting a possible framing

effect bias at an aggregate level. Moreover, at an individual level we find that at a 10% level of significance we can reject the null hypothesis of equality of rankings.

**Table VIII.9 Wilcox test results for equality of rankings (aggregate results).**

<b>Total Groups</b>			
	<b>Preference Rank</b>	<b>WTAS Ranking</b>	<b>Wilcoxon Signed-Ranks Test(*)</b>
Attention	3.65**	3.31*	-0.12
Styles	4.47**	4.46*	0.34
Treat	3.50*	3.58*	-0.95
Bonus	5.65*	4.27*	-1.43
Odontology	5.74*	5.81*	1.17
Coordination	5.65*	6.27*	-3.01
PPIHCAI	5.18*	4.65*	2.54
Lists	7.24*	6.96*	1.76
Cancer	7.85*	7.85*	0.001
Revision	7.88*	7.73*	0.421

(\*) Z values are to be significant if are < than 2.

**Conclusion VIII.1** Tests of equality of rankings suggest there are no significant framing effect bias. That is, the WTAS seems to work particularly well under the context purposed.

#### VIII.4.4 Cost sensitivity and "welfarist rationality"

When information about the cost associated with every program are revealed people seem to be quite sensitive to costs (this results were already advanced in Chapter VII). The program cost may be seen as "negative benefit" dimension. That is, we may assume as a consistency criterion that participants

would prefer a program that involves a reduced cost to an equivalent program -yielding to the same benefits - involving higher costs. The underlying idea is the one viewing respondents as outweighing costs and benefits of the alternative courses of actions . Therefore, a higher degree of cost sensibility might be interpreted as a way of economic rationality. An explanation of this feature could comes up if participants understand that society and probably themselves would have to contribute to the costs associated with health programs. Another way of conceptualizing this feature in the context of this experiment is to consider the budget constraint. Since, a cost reduction implies that additional programs may be financed, participants would asses to the cost reducing program a higher priority when cost turns to reduce.

As we show in chapter VII, measures of net benefit - appropriate to a cost benefit framework - when applied to the context of this experiment differ substantially from preferences public priorities elicited in a cost-priority ranking. That is, implicit rankings obtained from computing the difference (or equivalently the ratio) of costs and benefits of each program, lead to a preference order that shows a different pattern of the ones observed in the cost priority question (see table VIII.9). This finding may be particularly relevant for decision making, since suggests an explanation of why some policy makers would be reticent in extending the public coverage for some programs that usually capture equity concerns. This idea has been already stressed in chapter VII, suggesting that despite programs yielding to equity benefits are to be to some extent highly valued, people are not willing to assign what it costs.

Table VIII.10 Cost sensibility and Welfarist effects

	Priority Ranking (Median)	WTAS (Median)	Cost Rank (Median)	Cost	SNB ratio (Arithmetic mean)
Breast cancer	8	700	9	150	4.69
Attention	3	200	3	100	2.43
Medicament Bonus	4	400	3	2000	0.25

**Conclusion VIII.2** Experimental results on the use of the WTAS as a measure of relative preference show a large cost sensibility. However, since some programs involve large costs, under a welfarist rationality approach, we would reject its funding under a priority setting exercise. Though they are largely priorities, they are not valued enough to be financed.

#### **VIII.4.5 On preference reversals and lexicographic orders**

Our choice experiment follows quite accurately the Kahneman (1997) example of preference reversals. They specially emerge when decisions involve some kind of monetary pay-off. In particular, in our choice experiment at an aggregate level there is some evidence of preference reversals if we take into account the mean as a central tendency indicator whereas it reduced when the median is used, suggesting there are presence of outliers. At an individual level there is some evidence of moderate preference reversals in the middle values (in particular those programs leading to non health benefits), a 10.2% of individual valuations do not seem to follow a similar pattern in terms of values attached. The large number of programs considered may explain this. However since the payment instrument do not required directly to pay the share of preference reversals is quite low, what is to be an additional finding for further research in eliciting preferences for publicly provide goods.

Table VIII.11 Preference reversals for WTAS results

	Priority Ranking		WTAS		WTAS	
	Mean	Ranking*	Mean	Ranking*	Median	Ranking*
Attention	3.65	2	235.58	1	200.00	1-2
Styles	4.47	3	311.78	3	250.00	3
Treat	3.50	1	263.62	2	200.00	1-2
Bonus	5.65	5-6	500.00	6-7	400.00	6
Odontology	5.74	7	500.00	6-7	450.00	7
Co-ordination	5.65	5-6	359.15	4	300.00	4
PPIHCAI	5.18	4	368.73	5	340.00	5
Lists	7.24	8	640.44	8	600.00	8
Cancer	7.85	9	708.00	9	700.00	9
Revision	7.88	10	697.88	10	700.00	10

\*Ratings range from 1 (less preferred) and 10 (most preferred)

According to table VIII.11, the willingness to pay instrument despite we consider a referendum format<sup>vi</sup>, shows a preference reversal phenomenon both at an aggregate such as at an individual level. That is, preferences are widely reversed when the willingness to pay instrument is used to elicit public preferences. The explanation of this feature is clearly connected with the Norweigan experiment (Olsen, 1997). Olsen argues that whereas the willingness to pay is founded on a value judgement under a market scenario, the contingent ranking (in a public decision making context) is to reflect a collective preference clearly linked with political concerns. Kanheman and Ritov (1994) assert that " the WTP is to be based on a purchase model where the respondent determined how much the public good is worth to her household". The willingness to assign however is to be more connected with the Kanheman and Ritov (1994) contribution model suggesting that the willingness to contribute as a citizen to the founding of a particular program. However, as there are also preference reversals appearing. However, two feature differentiates the willingness to pay from the willingness to assign in terms of the underlying reasoning process. First, the willingness to assign requires "mathematical computation" assigning money to programs but

keeping in mind that they cannot assign more than a fixed amount. That is, the higher complexity on making explicit welfare trade-offs explains differences appearing between rankings and values. Second, according to table, the magnitude of preference reversals is clearly higher when WTP is used (compare the adequacy of rankings).

**Conclusion VIII.3.** According to this limited small-scale experimental evidence, the willingness to assign seems to be less misrepresented by the preference reversal phenomenon than the willingness to pay approach.

**Table VIII.12** Preference reversals for WTP results

Variable	Priority Ranking		Willigness to Pay	
	Mean	Priority*	Mean	Priority*
Cancer	8.13	2	13722.22	1
Coordinat	5.59	4	7553.846	5
Historial	4.45	7	2584.615	9
Attention	3.45	9	5170	7
Treate	2.40	10	2125	10
Revision	8.81	1	10647.06	2
List	7.40	3	9093.75	4
Styles	3.77	8	7111.111	6
Odontology	5.22	6	5085.714	8
Bonus	5.54	5	9642.857	3

\*Ratings range from 1(less preferred) and 10 (most preferred)

## **5. Concluding remarks**

If preference elicitation mechanisms are to become a relevant alternative to an indirect participation of citizens in public policy, then some additional rationality criteria should be imposed. Particularly, some ex-ante rationality criteria should complement the theoretical validity and reliability analysis, since sometimes the mismatch between real and expressed preferences may come from the inadequacy of the instrument purposed to capture the decision making problem. This is clearly the case of some health care and environmental decisions where there is no possibility to gain experience from a repeated consumption within a market context. Therefore, the nature of individual preferences may limit to some extent the consistency of responses, since slight variations in the elicitation method may produce significant differences.

We argue that the consistency requirement's usually carried out by in the majority of CV studies does uniquely capture a small dimension of what is to be assumed as rational responses. Other relevant information and cognitive determinants involved in the individual decision making should be taken into account in order to deal with reasoned preferences, as a previous requirement for measuring the consistency of health system benefit elicitation's. Results from a choice experiment where the decision making instrument was changed, suggest that the method for valuing health systems benefits purposed in chapter VII seems to fits better with some rationality criteria that traditional WTP . Additionally, the use of a previous qualitative approach seems to reduce significantly the framing effects such as other extended bias associated with the use of the contingent valuation approach. Some implications of out results for public policy would be that a cost benefit rule does not always guarantee that preferences elicited by means of a contingent valuation experiment reflect social preferences. This is particularly observed when the cost influence

changes substantially the set of programs assumed to be valued, especially when programs lead to equity benefits.



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- <sup>i</sup> I acknowledge the comments received from the participants in the XIX Jornadas de Economía de la Salud, Zaragoza 1999.
- <sup>ii</sup> Based on the agent's (individuals/citizens) values in ultimate terms affected by public policy.
- <sup>iii</sup> Ryan et al (1999) identified around 1200 articles in the health care field
- <sup>iv</sup> Despite table IX.1 contains a wide number of methods, it only shows a first classification that would substantially increase if we include all existing methods.
- <sup>v</sup> For instance, the QALY approach assumes that benefits are measured as health gains (adjusting lifetime by quality of different health states). The contingent valuation approach requires measuring benefits by an equivalent monetary metric measure while conjoint analysis assumes that monetary valuations of an attribute can be obtained implicitly by means of choices involving different associated costs.
- <sup>vi</sup> The justification of this option relies on the wide use of contingent valuation techniques in all public policy fields such as health, environment, public transport etc.
- <sup>vii</sup> Substantive analysis means an independence of the quality of decision outcomes.
- <sup>viii</sup> The accuracy of a contingent valuation survey depends on the relative validity and reliability of its responses. The state willingness to pay value is named as *valid* if the extent that the measured value corresponds to the theoretical definition of value
- <sup>ix</sup> Another necessary requirement is the individual rationality over the well known internal consistency criteria usually implemented in microeconomic theory by means of three criteria: completeness, transitivity and monotonicity..
- <sup>x</sup> This is stated under the assumptions of completeness ( for all  $x$  and  $y$ ,  $x \succ y$  or  $y \succ x$  ), transitivity (for all  $x, y, z$  if  $x \succ y$  and  $y \succ z$  then  $x \succ z$ ) and monotonicity (if  $v(x) \geq v(y)$  and  $v(x) \neq v(y)$ , then  $x \succ y$ ). The same could be defined in weak terms if the indifference is included or not.
- <sup>xi</sup> This assertion was similarly set by Diamond ( 1991).
- <sup>xii</sup> Shiell et al (1997) remains the Becker position on the discussion of stability of preferences. Becker argues that only what he calls "underlying preferences" are to be stable, what are to correspond with essential aspects of life.
- <sup>xiii</sup> The concept consistency when a survey analysis is to be carried only be measure in relative terms of a "degree of rationality".
- <sup>xiv</sup> We restrict the analysis to ranking alternatives with a fixed number of elements rather than other approaches Pattanaik and Xu (1990) , Bossert, Pattanaik and Xu (1994).
- <sup>xv</sup> However, theoretically shows large differences with respect to the WTP.
- <sup>xvi</sup> Olsen (1997) suggests that a referendum format may be viewed as eliciting public preferences in terms of political participation.



## **Conclusions**



En aquesta tesi s'ha investigat l'aplicació d'una concepció de racionalitat descriptiva sota la presència d'informació imperfecta en el marc d'aplicació de la sanitat. En aquest apartat es presenten les principals aportacions, s'apunten quines són les seves possibles implicacions de cara al disseny de la política sanitària, així com les vies futures de recerca en aquest àmbit.

### **Primera part. Racionalitat i política sanitària.**

1. L'anàlisi de la racionalitat està vinculat al fet que els individus s'han d'enfrontar amb la necessitat de decidir. Segons una visió positiva associada a la teoria del consum, s'entén el concepte de racionalitat com a equivalent a la *consistència* de la conducta revelada en el mercat amb les preferències de l'individu, bé sigui en un ambient de certesa o incertesa. Malgrat aquesta concepció de racionalitat pot ser una representació adequada des d'un anàlisi purament teòric, quan no és la conducta humana el que es vol predir, de la revisió realitzada es dedueix que aquesta no sembla explicar com els agents econòmics prenen decisions. Per tant, la concepció de racionalitat que aquest treball investiga, parteix dels avenços recents al voltant d'ampliar el marc de referència que defineix la conducta racional, incloent factors contextuais, així com creences i percepcions sobre fets incerts. Aquests avenços situen la noció de racionalitat en un ambient d'informació imperfecta, on l'individu es considera que presenta una capacitat limitada per a realitzar càlculs complexos i es troba afectat per la informació que rep del seu entorn. Aquesta idea extesa a un conjunt ampliada decisions rep el nom de *quasiracionalitat*. La en aquest cas racionalitat vindrà definida *per l'adequació de les creences i valors - manifestats en percepcions i/o preferències- amb la conducta individual observada*.

2. En la seva aplicació a la política sanitària, aquesta idea de racionalitat s'ha estudiat en tres nivells de decisió : la decisió de conducta individual , la decisió d'assegurament



sanitari i de dependència i, finalment, l'elecció col·lectiva i/o establiment de prioritats per programes sanitaris.

### **Segona part. Racionalitat individual i conducta sanitària**

3. Els estils de vida d'una població es poden contemplar com un conjunt de decisions de conducta sanitària que involucren diferents nivells de riscos sobre la salut. Tanmateix la racionalitat de l'adopció d'un estil de vida saludable és compatible amb determinades conductes que individualment poden no ser saludables, en tant que comporten assumir un risc sanitari individual subjecte a un nivell d'informació disponible.

4. Des d'una extensió dels models d'inversió pura en salut, tot i la limitació per introduir determinants informacionals, podem formular la següent apreciació: el consum de bens que presenten efectes sobre la salut es produirà sempre que la millora en la utilitat del seu consum superi les necessitats futures de serveis sanitaris així com els efectes esperats sobre la salut en conseqüència es produiran. Addicionalment, els individus més aversos al risc consumiran més bens que generen efectes beneficiosos per la seva salut i menys bens que presenten efectes adversos sobre la salut.

5. En un context de decisió sanitària en presència d'addicció les diferents perspectives teòriques rellevants ( addició racional, racionalitat cognitiva, racionalitat imperfecta, i preferències miops) difereixen en la utilització d'un concepte diferent de racionalitat de la conducta humana. En primer lloc, la teoria de l'addicció racional proposa que la conducta sanitària en presència d'addicció es determina pel grau de dependència del consum actual respecte el consum passat, la qual es suposa consistent en el temps. En segon lloc, segons la perspectiva de la racionalitat cognitiva, la informació dels riscos sanitaris es presenta com el determinant principal de la conducta, de manera que la racionalitat de la mateixa ve determinada per la capacitat d'entendre els riscos i prendre decisions segons aquesta. En tercer lloc, la perspectiva de la racionalitat parcial sosté que

## Conclusions

els individus en la seva conducta, tenen una perspectiva temporal determinada pel consum i la informació present. Finalment, la teoria de les preferències miops entén que el grau de resposta de la conducta a la informació és molt reduït, per la qual cosa la conducta no respon a una racionalitat clara. De la revisió de l'evidència empírica es posa de manifest que els individus no segueixen una conducta consistent en el temps, i són sensibles a la informació de riscos. En conseqüència, la conducta individual es mostra consistent amb una perspectiva de racionalitat cognitiva on la naturalesa de les percepcions de risc es presenta com un determinant significatiu de la conducta sanitària.

6. Atès que els individus cometen errors en les seves percepcions (desviacions o biaixos respecte de la seves creences inicials) la racionalitat de la conducta sanitària en presència d'informació imperfecta sembla adequar-se a un enfocament bayesià. En aquest cas la conducta sanitària vindrà determinada per les percepcions de risc així com pels determinants informacions. Tanmateix, existeixen altres possibles perspectives no testades experimentalment i que podrien adequar-se a la idea de racionalitat proposada. Aquest és el cas de la teoria de la dissonància cognitiva. La principal limitació però es situa en la dificultat associada a la seva constatació empírica.

7. La decisió de fumar es pot entendre sota la base teòrica d'un model d'utilitat seguint l'anomenada *Propect Reference Theory*. L'aplicació al cas del tabac evidencia que la decisió de fumar vindrà determinada per la percepció de risc de les malalties associades amb el consum de tabac així com pels beneficis i costos derivats d'aquest consum. En particular, es mostra que la conducta en relació al tabac s'entén com a racional si la percepció diferencial de risc entre fumadors i no fumadors prediu la decisió de fumar.

8. El paper de la informació dels riscos associats al consum de tabac es pot afirmar que segueix l'estructura de l'enfocament de l'aprenentatge baiesià, si els individus sobreestimen els riscos sobre els que hi ha una informació abundant, com és el cas de la informació sobre els riscos associats al consum de tabac. Atès que la informació pot provindre de diverses fonts, així com de la pròpia experiència, la percepció de risc es

conceptualitza com una ponderació de l'efecte de diverses fonts d'informació sobre els riscos inherents al consum de tabac. En aquest cas, la informació pública, exerceix una influència sobre la percepció de risc en funció de la ponderació que l'individu assigna a aquesta font d'informació com a determinant informatiu de la percepció de risc.

9. D'acord amb els resultats obtinguts de les estimacions de les percepcions de risc relacionades amb el consum de tabac per una mostra representativa de la població espanyola, les percepcions de risc demostren una sobreestimació del risc percebut respecte del risc objectiu derivat de l'evidència empírica. En particular, els no fumadors presenten una percepció de risc superior al fumadors, la qual es pot entendre com una primera evidència confirmatòria de la idea de racionalitat proposada en aquest treball. No obstant, les percepcions de risc difereixen segons el tipus de malaltia associada al consum de tabac. Per tant, atenent a aquest resultat es rebutjaria el supòsit de Viscusi (1992) segons el qual les percepcions de risc de càncer de pulmó són una variable *proxy* del conjunt de riscos associats al consum de tabac.

10. Els resultats de les estimacions d'un model d'equacions simultànies pel cas de la conducta sanitària i les percepcions de risc associades al consum de tabac ens porten a rebutjar la hipòtesi de simultaneïtat. Els resultats mostren un efecte significatiu de l'edat sobre les percepcions de risc càncer de pulmó, que presenta una forma de U. Aquest resultat, pot evidenciar una certa consistència amb els supòsits teòrics del model d'aprenentatge baiesià, en tant que el paper de la informació pública pot ser més important en els joves, mentre l'experiència pot exercir la mateixa influència en edats avançades. La classe social està associada a majors percepcions de risc així l'educació. El sexe es mostra associat a una menor percepció de risc. El resultat més rellevant però és l'efecte significatiu de les creences dels efectes del consum de tabac sobre les malalties relacionades amb el consum de tabac, i en especial l'efecte negatiu que presenta el fet de ser un fumador sobre la percepció de risc. Aquesta variable es mostra negativament associada amb la percepció de risc, fet que fa esperar que la decisió de fumar vingui alhora determinada per les percepcions de risc. Els resultats per altres

malaltia associades al consum de tabac, no permeten ser tant concloents, atès que moltes de les variables considerades, no resulten ser significatives. No obstant, de les estimacions realitzades, s'observa que malgrat la percepció de risc d' atac de cor mostra uns determinants similars al cas anterior, aquest no és el cas de les malaltia pulmonars. No obstant, per aquestes dues estimacions el fet de ser fumador estar inversament relacionat a les percepcions de risc, el que es mostra consistent independentment de malaltia considerada.

11. Les estimacions de la conducta en relació a l'hàbit tabacari, confirmen finalment la idea de racionalitat del treball. *Les percepcions de risc es troben inversament relacionades amb la decisió de fumar i resulten significatives al 1%.* Segons aquestes estimacions , el fet de fumar està inversament associat a l'edat i directament associat amb el sexe. Es mostra un efecte significatiu de la classe social, així com algunes professions com els empresaris de menys de sis treballadors i les mestresses de casa.

## **2.Racionalitat de l'assegurament sanitari**

12. La decisió de compra d'una assegurança sanitària es pot entendre com el resultat de la comparació de tres alternatives d'elecció : assegurar-se, no assegurar-se i consumir serveis sanitaris privats i no assegurar-se i no consumir serveis sanitaris privats. D'acord amb això, la utilització esperada de serveis sanitaris privats, l'edat i la riquesa es mostren com a determinants principals de la decisió d'assegurar-se. En el context en el que hi ha un Sistema Nacional de Salut (SNS), llavors la decisió d'utilització de serveis sanitaris privats vindrà determinada per la percepció o avaluació de la oferta de serveis finançats públicament.

13. La demanda d'assegurament sanitari quan hi ha un SNS es pot entendre com el resultat de dos processos. Un primer pel que s'avaluen els serveis sanitaris i un segon en el que es pren la decisió d'assegurar-se. De ser així, llavors caldria estimar un model doble tanca "double hurdle" (els models prohibit tradicionals serien inconsistents) on

primer s'estima un model pel qual es determinen els determinants de l'avaluació del SNS i posteriorment un model probit condicionat a aquesta primera estimació. Els resultats d'aquesta estimació amb les dades obtingudes de l'Enquesta de Salut de Catalunya (1994) posen de relleu que *no es pot rebutjar que la decisió d'assegurar-se sigui independent de la decisió de l'avaluació del SNS*.

14. Els resultats de l'estimació mostren que la demanda d'assegurament no està determinada per l'estat de salut ni per l'ús de serveis sanitaris, per tant no sembla existir evidència de selecció adversa ni tampoc de risc moral en aquest mercat. No obstant, existeix una associació clara amb l'edat fins a unes edat, tot i que a partir d'una edat al voltant dels 45 anys comença a disminuir la demanda. La renda i el fet de viure a regió sanitària de Barcelona es troba clarament associat a una major demanda d'assegurament. L'avaluació negativa del SNS està associada a individus amb nivell d'educació mitja, però amb un nivell de renda alt que sovint visiten al metge general.

15. La racionalitat de la compra de l'assegurament per dependència suposadament a rebre en edats avançades (long-term care insurance) es proposa com a dependent de les percepcions de risc de discapacitat. Una assegurança per dependència es compararà si la cobertura del consum esperat de prestacions socio-sanitàries supera la possible pèrdua de benestar derivada del pagament d'una prima així com les pèrdues en el cas de no estar discapacitat. Per tant, aquells individus que perceben un major risc d'estar discapacitat serien els que s'assegurarien en front els costos derivats d'una situació de dependència futura. Contra més grans són els costos esperats derivats d'una situació de discapacitat, més gran serà el benefici derivat d'assegurar-se.

16. Els resultats d'una estimació realitzada sobre la base d'una enquesta representativa de la població de Catalunya mostra *que els individus sobreestimen les percepcions de risc de discapacitat*. Els determinants de les percepcions de discapacitat són l'educació, l'edat, la salut i les actituds enfront el risc. Les percepcions de la pròpia discapacitat es

mostren fortament influenciades per la salut i el sexe. Finalment, l'estimació de la disposició a assegurar-se estan clarament determinades per les percepcions de la pròpia discapacitat, així com per percepcions de discapacitat general, l'educació, i la població. Per tant es confirma segons les estimacions obtingudes que les percepcions de risc determinen l'assegurament de prestacions de dependència.

17. Atesa la manca d'assegurament privat per a cobrir les prestacions derivades de la dependència a Catalunya, la valoració de la cobertura de les prestacions a rebre en un estat de discapacitat s'ha d'estimar a partir d'altres instruments. Un d'ells és la valoració contingent a través del mètode de la disposició a pagar simulant un mercat. La màxima disposició a pagar en aquest context és la prima màxima que de ser pagada per l'individu igualaria la utilitat esperada de d'una primera situació en la que l'individu s'assegura i una altre en la que ha de fer front a les despeses futures en cas d'estar discapacitat.

18. Els resultats d'un estudi de valoració contingent dut a terme a Catalunya, sobre la base d'un mètode dicotòmic, posa de manifest que: la disponibilitat a pagar estimada per a cobrir els costos d'una situació de dependència en edats avançades, depèn negativament de l'edat- atès l'efecte d'altres mecanismes alternatius per tal de cobrir els costos derivats de la dependència – i de *les percepcions de risc de la pròpia discapacitat, que es mostren com a determinants de la decisió de participar en la compra d'assegurament per dependència*. No obstant, de la validació dels resultats, es troba evidència de dos biaixos, un primer determinat pels preus de sortida i un segon determinat pel mecanisme de pagament utilitzat.

### **3. Racionalitat social i elecció col·lectiva**

19. Els mètodes de revelació de preferències col·lectives en el marc de la valoració contingent mostren algunes limitacions quan s'apliquen sobre els beneficis dels serveis sanitaris finançats públicament. (1) Les preferències revelades no sempre tenen en compte l'existència d'una limitació pressupostària. (2) Alguns estudis mostren que la

perspectiva de valoració, tot i en el cas d'un escenari de referèndum, no es correspon amb el d'unes preferències col·lectives sinó que respon a una actitud per a participar, finançant o no, un programa sanitari. (3) En ocasions no s'identifiquen les dimensions de benefici que hi ha al darrere de les valoracions obtingudes. (4) La consistència de les respostes és sensiblement reduïda, atès el nombre de biaixos que s'hi identifiquen.

20. Sobre la base de les limitacions dels mètodes de valoració contingent, i en el marc d'un context de priorització, s'ha proposat un nou mètode com a instrument per revelar directament preferències sobre els programes sanitaris que el sistema sanitari pot oferir. Aquest mètode es basa en un escenari hipotètic, on hi ha un conjunt de programes a valorar d'acord amb els seus beneficis per a la col·lectivitat, i on es demana la màxima disposició a assignar uns recursos addicionals a un conjunt de programes sanitaris que amplien la cobertura actual. Els resultats de l'aplicació d'aquest mètode en un experiment d'escala reduïda, mostren que els individus, tot i aquells amb menor formació i de classe social mitja-baixa, són capaços d'assignar uns hipotètics recursos a uns programes. Aquests resultats s'han comparat amb els de l'aplicació del mètode de la disposició a pagar un augment d'impostos. Els tests de consistència realitzats semblen evidenciar que el mètode proposat d'adequa millor a un escenari de decisió col·lectiva que la disponibilitat a pagar atès que les respostes d'una priorització directa dels programes i les valoracions obtingudes mitjançant el mètode de la disponibilitat a pagar estan fortament correlacionades.

20. Tot aplicant aquest mètode, un experiment intermedi s'ha realitzat per tal d'identificar les dimensions de benefici que els individus perceben del sistema sanitari, així com de cada programa. Els resultats d'un anàlisi factorial mostren que semblen haver tres dimensions de benefici del sistema que es poden conceptualitzar en termes de guany de salut, beneficis d'equitat i beneficis de procés. En quant als beneficis de cada programa, a través d'un model hedònic, s'han identificat les dimensions de benefici que hipotèticament explicarien la valoració de cada programa. Els resultats semblen revelar algunes

### *Conclusions*

dimensions rellevants de benefici, tot i que atesa la reduïda dimensió de l'experiment la capacitat explicativa del model és molt reduïda.

21. La idea de racionalitat implícita en els mètodes de valoració contingent es basa en que els individus presenten unes preferències estables sobre uns bens, de manera que els instruments de valoració pretenen captar aquestes preferències en forma d'una valoració monetària de les mateixes. No obstant, un conjunt de biaixos relacionats amb l'instrument utilitzat, el connexa de decisió sobre el que es realitza la valoració i la possibilitat de conductes estratègiques condicionen la validesa de les preferències revelades. Per tant, atesa l'existència d'aquests biaixos, davant d'un canvi de l'escenari de decisió de mercat, per un escenari de decisió política, alguns d'aquests biaixos es podrien reduir. Amb aquesta finalitat s'han contrastat les hipòtesis de racionalitat dels mètodes estàndard de valoració contingent aplicats al mètode de la disponibilitat a assignar. Els resultats mostren que : (1) el grau de consistència interna de les respostes no és sensiblement superior al que s'obté aplicant els mètodes de valoració contingent. (2) Es mostra que si bé els individus valoren altres beneficis que el guany en salut, els programes que porten a un guany en salut semblen ser els més valorats. (3) No s'ha trobat un baix significatiu respecte del mètode utilitzat de valoració. (4) Els resultats semblen ser sensibles a la informació de cost. (5) Es troba evidència del que s'anomena racionalitat welfarista, segons la qual tot i que alguns programes relacionats amb l'equitat del sistema sanitari són clarament prioritzats sobre d'altres, els individus no estan disposats a pagar-los. (5) Finalment, es troba evidència del fenomen d'inversió de preferències, no obstant d'una comparació amb l'aplicació del mètode de la disponibilitat a pagar es pot afirmar que aquest biaix és sensiblement inferior.





## **Vies de recerca futures**



Atès que un treball de tesi és un treball acotat, no s'han pogut abordar molts aspectes que estan dintre de la mateixa línia de recerca que la present tesi doctoral. Tanmateix, aquests aspectes formen part de les línies de recerca futures. Entre aquests aspectes cal destacar :

- a) L'anàlisi de la racionalitat de la conducta aplicada a l'anàlisi del risc prenen com a element de referència tres focus d'atenció com ara el risc mediambiental i el risc laboral .
- b) L'estudi del paper del sector públic en l'assegurament sanitari tenint en compte variables diferents com ara llistes d'espera, qualitat etc. .
- c) L'estudi de les possibilitats de finançament de l'assegurament de la discapacitat .
- d) Finalment, un darrer eix d'interès és el desenvolupament de les tècniques de revelació de preferències així com els sistemes de prioritització en sanitat.



## **ANNEXES**



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**ANÁLISIS DE LA DEMANDA DE PRESTACIONES  
SANITARIAS A LARGO PLAZO ANTE EL  
ENVEJECIMIENTO DE LA POBLACIÓN EN  
CATALUÑA**

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**Documentación Técnica del Cuestionario  
Informe de Campo y Cuestionario**

**Nombre del Entrevistador :**

**Día:**

**Tiempo de realización:**



## 1. FICHA TÉCNICA

### FICHA TÉCNICA

**Metodología:** de carácter cuantitativo.

**Técnica empleada:** entrevista individual.

**Universo:** cabeza de familia (entendidas como aquel del que depende el sostenimiento de la unidad familiar). Los individuos seleccionados han de ser mayores de 18 años.

**Ámbito:** representación de las provincias de Cataluña.

**Tamaño de la muestra:** 400 entrevistas.

**Selección:** aleatoria de los hogares en donde realizar la encuesta, barrido en zona.

**Nivel de confianza y margen de error:** 95% de confianza, y bajo el supuesto de máxima indeterminación ( $p=q=0,5$ ) para garantizar un error global máximo del  $\pm 5\%$ .

**Tiempo de realización:** tres semanas, entre junio y julio de 1999.

### Puntos esenciales a concretar

El entrevistador debe hacer *especial hincapié en el método de pregunta de la disposición a pagar*. Se trata preguntar si esta dispuesto a pagar una cantidad definida en el cuestionario para seguidamente preguntar hasta cuanto esta dispuesto a pagar. Solo en el caso de que no quiera pagar nada, se pregunta el por qué.

## 2. OBJETIVOS

El trabajo pretende identificar y cuantificar la demanda potencial de cobertura y prestaciones, así como las condiciones de acceso a su utilización en base al estudio de las preferencias de la población, mediante la técnica de valoración contingente denominada "disponibilidad a pagar".

El cuestionario pretende:

- Identificar las preferencias respecto de prestaciones a obtener en un largo plazo que supuestamente aumentan la calidad de vida en una edad avanzada.
- Estimar la disponibilidad a pagar por prestaciones a obtener a largo plazo, mediante preguntas con las que se pretende simular un mercado (valoración contingente).
- Identificar las ventajas y/o desventajas percibidas por los entrevistados acerca de las prestaciones de un seguro privado en relación a las ofrecidas por el sistema sanitario público. Analizar en qué medida la oferta de prestaciones del sistema sanitario público influye en la demanda de prestaciones privadas.
- Estimar en qué medida la decisión de asegurarse responde a una percepción y previsión de pérdida de salud y/o necesidad de uso de ciertos servicios sanitarios.

### 3. CUESTIONARIO

Buenos días/tardes, mi nombre es \_\_\_\_\_. En estos momentos estamos realizando un estudio sobre temas de seguros sanitarios y envejecimiento de la población para una fundación sin finalidad de lucro. ¿Sería tan amable de colaborar con nosotros, contestando a unas breves preguntas, asegurándole que sus respuestas no serán tratadas de forma individual y que su nombre nunca será utilizado?.

#### PREGUNTA INICIAL:

¿Es usted cabeza de familia y/o es usted quien determina su sustento económico?

- Sí                                      1    (empezar el cuestionario)  
No                                      0    (cuestionario mal seleccionado e invalido)

#### A. COBERTURA ASEGURADORA

A1. ¿Tiene algún seguro privado (voluntario) de asistencia sanitaria(\*)?

- |                      |   |   |            |
|----------------------|---|---|------------|
| Sí                   | 1 | → | PASAR A A2 |
| No                   | 0 |   |            |
| Lo tuve pero lo dejé | 2 | → | PASAR A A7 |

(\*) No incluye MUFACE ni otras mutualidades públicas, tampoco los seguros por pago fijo de hospitalización.

A2. ¿Qué tipo de prestaciones cubre su seguro?

- |                                   |   |
|-----------------------------------|---|
| Sólo hospitalización              | 1 |
| Sólo servicios de atención médica | 2 |
| Cobertura plena                   | 3 |
| Otras (especificar)               | 4 |

A3. ¿Qué miembros de su familia están cubiertos por un seguro privado de asistencia sanitaria? (valor numérico)

Nº cubiertos

Nº no cubiertos

Parentesco.....

A4. Aproximadamente, ¿cuánto paga al mes por cada miembro de su familia que posea un seguro privado? (valor numérico en pesetas)

a) Cabeza de familia

b) Hijos

c) Otros

A5. ¿Valore de 1 (muy insatisfactoria) a 10 (muy satisfactoria) la calidad de las prestaciones que le ofrece su seguro privado? (valor numérico)

Muy insatisfactoria    1    2    3    4    5    6    7    8    9    10    Muy satisfactoria

A6. ¿Qué razones le han llevado a contratar un seguro de asistencia sanitaria privado?

Para mejorar la asistencia sanitaria	SÍ(1)	NO(0)
Para recibir un mejor trato personal	SÍ(1)	NO(0)
Para evitar listas de espera	SÍ(1)	NO(0)
Otras razones.(especificar).....	SÍ(1)	NO(0)

PASAR A A8

A7. ¿Por qué motivo no tiene contratado un seguro de asistencia sanitaria privado?

Es excesivamente caro	SÍ(1)	NO(0)
Las prestaciones que ofrecen no me satisfacen	SÍ(1)	NO(0)
Nunca me lo he planteado	SÍ(1)	NO(0)
Nunca contrataría un seguro de asistencia sanitaria privado	SÍ(1)	NO(0)
Otros ( especificar cual)	SÍ(1)	NO(0)

Motivos: .....

- A8. Teniendo en cuenta su comportamiento ante determinados hábitos de vida (piense en si fuma, bebe alcohol regularmente, conduce rápidamente, come demasiado, etc.), valore del 1 al 10 su actitud ante los riesgos para la salud, si el valor 1 ( indica que evita todo riesgo) y el valor 10 (indica no le importa asumir riesgos):

Evita todos los riesgos    1   2   3   4   5   6   7   8   9   10   No le importa asumir riesgos

- A9. ¿Tiene algún tipo de seguro de vida y/o del hogar?

Ninguno	1
Seguro de vida	2
Seguro del hogar	3
Ambos	4

- A10. ¿Posee un seguro de automóvil a todo riesgo?

Sí	1
No	0
No procede (no posee automóvil)	2

- A11. ¿Posee algún plan de pensiones, fondo de inversión a largo plazo o de jubilación privado?

Sí	1
No	0

**B. VALORACIÓN DE PRESTACIONES NO CUBIERTAS HABITUALMENTE POR LOS SEGUROS SANITARIOS PRIVADOS**

**B.1** En caso de poder contratar un seguro de asistencia sanitaria que le cubriera los servicios de residencia asistida o atención domiciliaria en el caso de necesitarlo por discapacidad física o mental(\*), pagaría una cantidad de \_\_\_\_\_ al mes de ahora en adelante (para siempre) con el fin de cubrir los posibles gastos.

SI	1
NO	0
NS/NC	9

(\*) Esta situación aparecería como consecuencia el trato de enfermedades como el alzheimer, la demencia senil, etc. que aparecen generalmente aunque no siempre en una edad avanzada.

**B2.** Hasta cuanto estaría dispuesto a pagar al mes por este servicio (valor numérico)

--	--	--	--	--	--

SI B2=0 PESETAS, ENTONCES PASAR A B3, SI NO ENTONCES PASAR A B4

**B3.** ¿Por que razón?

No esta dispuesto a pagar por una aseguradora sanitaria	1
No tiene suficientes recursos	2
Otras (especificar)	3

**B4.** Si tuviera (o tiene) la edad de 40 años, cuanto le parecería razonable pagar por un seguro de asistencia sanitaria que le cubriera los servicios de residencia asistida o alternativamente atención domiciliaria, en el caso de necesitarlo por discapacidad

--	--	--	--	--	--

SI B4=0 PESETAS, ENTONCES PASAR A B5, SI NO ENTONCES PASAR A C

**B5. ¿Por que razón?**

No esta dispuesto a pagar por una aseguradora sanitaria 1

No tiene suficientes recursos 2

Otras (especificar) 3

.....

## C. ESTADO DE SALUD PERSONAL Y UTILIZACIÓN DE SERVICIOS

**C1. ¿Cómo definiría su estado de salud actual?**

Malo	1
Regular	2
Normal	3
Bueno	4
Excelente	5

**C2. ¿Padece alguna enfermedad, incapacidad o limitación que afecte a su calidad de vida (en su movimiento, relación o actividades diarias corrientes)?**

Sí	1
No	0

**C3. ¿Ha visitado algún médico o centro sanitario en los tres últimos meses?**

Sí	1	→	PASAR A C4
No	0	→	PASAR A C6

**C4. ¿Cuántas veces ha visitado al/un ..... en los tres últimos meses? (valor numérico)**

Médico de cabecera

Especialista

Hospital

Centro de Rehabilitación


**C5. ¿Qué tipo de cobertura ha hecho uso en las visitas o en la utilización de los servicios, anteriormente mencionados, durante los tres últimos meses?**

	Médico	Especialista	Hospital	Centro
Cobertura pública	1	1	1	1
Seguro sanitario privado	2	2	2	2
Pago directo de honorarios	3	3	3	3
Otros	4	4	4	4



**C6. Valore de 1 (muy satisfactoria) a 10 (muy insatisfactoria) la asistencia sanitaria que recibe de la Seguridad Social (\*) (valor numérico).**

Muy satisfactoria    1    2    3    4    5    6    7    8    9    10    Muy insatisfactoria

(\*) En Cataluña hace referencia al Servei Català de la Salut.

**C7. Si tuviera o tiene un seguro sanitario privado, ¿Qué tipo de cobertura escogería en cada uno de los siguientes casos?**

	<b>Pública</b>	<b>Privada</b>
Atención primaria	1	1
Especialista	2	2
Hospitalización leve	3	3
Hospitalización grave	4	4

(\*) Hace referencia al sistema sanitario público en Catalunya el Servei Català de la Salut.

**C.8 ¿Hasta que edad espera vivir? (Valor numérico)**

# D. VALORACIÓN DE LAS PRESTACIONES ASEGURADORAS

D1 ¿Qué tipo de prestaciones hecha en falta en la cobertura que ofrecen las Compañías y Mutuas privadas? Sugerencias : odontología, atención al domicilio, servicios a la tercera edad, etc.

PRESTACIÓN	MOTIVO

D2. De cada cien individuos que llegan a una edad de 80 años, cuantos cree que estarán en una situación de discapacidad? (valor numérico)

D3. ¿Usted cree que se encontrará en esta situación de discapacidad a los 80 años?

SI                      1  
NO                      0

<b>E.DATOS DE CLASIFICACIÓN</b>
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**E1. RENTA FAMILIAR**

Aproximadamente, ¿en qué intervalo se situarían los ingresos mensuales netos en su hogar?

Ningún ingreso	0
Más de 50.000 a 100.000	1
Más de 100.000 a 150.000	2
Más de 150.000 a 200.000	3
Más de 200.000 a 250.000	4
Más de 250.000 a 300.000	5
Más de 300.000 a 400.000	6
Más de 400.000 a 500.000	7
Más de 500.000	8

**E2. TIENE ALGÚN PISO EN PROPIEDAD?**

SI	1
NO	0
NS/NC	9

**E3. PROVINCIA**

Lleida	1
Tarragona	2
Girona	3
Barcelona	4

**E4. CAPITAL DE PROVINCIA**

Si	1
No	0 (especificar.....)

**E5. NIVEL DE ESTUDIOS**

Estudios Primarios	1
Bachillerato o FP 1	2
COU o FP 2	3
Estudios Medios o FP 3	4
Estudios Superiores	5

**E6. VIVE SOLO/A?**

SI	1
NO	0

**E7. NÚMERO DE MIEMBROS DEL HOGAR** (valor numérico)

**E8. OCUPACIÓN**

Ama de casa	1
Jubilado	2
Estudiante	3
Agricultor/jornalero/ subalterno	4
Profesional liberal	5
Pequeño empresario	6
Empresario >6 trabajadores	7
Técnico – especialista	8
Funcionario	9
Otras	10

**E9. EDAD**(valor numérico)

**E10. GÉNERO**

Hombre	1
Mujer	0

CUESTIONARIO

**PERCEPCION DE RIESGOS ASOCIADOS AL TABACO  
-PARA PHILIP MORRIS -**

Buenos días / tardes, soy ..... entrevistador de INNER, una empresa de estudios de mercados y opinión. En estos momentos estamos realizando una encuesta sobre temas de salud. Le agradecería que me contestara a unas preguntas, asegurándole que sus respuestas nunca serán tratadas de forma individual y que su nombre no será utilizado. Muchas gracias por su colaboración.

**1. ¿Suele usted, aunque sea de vez en cuando...? LEER LISTA Y CODIFICAR**

(Múltiple (13 a 17))

Beber cerveza	1
Mascar chicle	2
Beber café	3
Fumar	4
Beber whisky	5
Ninguna / Ns/nc	6 (Columna 13)
	(Si aparece en Columna 14 a 17 es "Ninguna más")

**SI CODIGO 4 MARCADO PASAR A P.2**

**SI CODIGO 4 NO ESTA MARCADO PASAR A P.3**

**2. ¿Que suele fumar más habitualmente? LEER LISTA Y CODIFICAR**

(Múltiple (18 a 22))

Cigarrillos	1
Tabaco de liar, de picadura	2
Falias	3
Puros / puritos	4
En pipa	5
Habitualmente no fuma	6 (Sólo en columna 18)
	(Si aparece en Columna 18 a 22 es "Ninguna forma más de fumar")
Ns/nc	7 (Columna 18)

**SI CODIGO 1 NO ESTA MARCADO PASAR A P.3**

**SI CODIGO 1 MARCADO PASAR A P.5**

**3. ¿Ha sido usted antes fumador de cigarrillos y después ha dejado de fumar o nunca ha fumado cigarrillos?**

(23)

Fumaba alguna vez, pero no era fumador	1
Era fumador y lo dejó	2
No, nunca fumó	3
Ns/nc	4

**SI CODIGO 1 ó 3 PASAR A P.8**

**SI CODIGO 2 MARCADO PASAR A P.4**

## 4. ¿Cuánto tiempo hace que dejó usted de fumar cigarrillos?

(24-25)

Menos de un mes	1
Más de un mes y no más de 3 meses	2
Más de 3 meses y no más de 6 meses	3
Más de 6 meses y no más de un año	4
Más de 1 año y no más de 2 años	5
Más de 2 años y no más 3 años	6
Más de 3 años y no más de 4 años	7
Más de 4 años y no más de 5 años	8
Más de 5 años y no más de 10 años	9
Más de 10 años	10
No recuerda	11

**PASAR A P.8**

## 5. ¿Aproximadamente, cuántos cigarrillos fuma usted por término medio al día?

(26-27)

99 Ns/nc

**SI MENCIONA MENOS DE 3 PREGUNTAR P.6****SI MENCIONA MAS DE 3 PASAR A P.7**

## 6. ¿Todos los días fuma menos de 3?

(28)

Si todos los días	1
No algunos fumo más	2

## 7. ¿Cuanto tiempo hace que fuma cigarrillos?

(29)

Menos de 6 meses	1
Más de 6 meses y no más de un año	2
Más de 1 año y no más de 2 años	3
Más de 2 años y no más 3 años	4
Más de 3 años y no más de 4 años	5
Más de 4 años y no más de 5 años	6
Más de 5 años y no más de 10 años	7
Más de 10 años	8
No recuerda	9

A TODOS

Si entendemos como fumador a una persona de 40 años que fuma 20 o más cigarrillos al día,

ROTAR LOS BLOQUES P.8, P.9, P.10 y P.11

8.a ¿cree usted que los que son fumadores contraen más cáncer de pulmón que los no fumadores? **NO ADMITIR NS/NC**

	(30)	
No, igual unos que otros	1	PASAR A P.8c
Si, los fumadores más	2	PASAR A P.8b
No, los fumadores menos	3	PASAR A P.8c
No sabe	4	PASAR A P.9a

8.b Por cada persona no fumadora que muere de cáncer de pulmón, ¿cuántos cree usted que mueren por ser fumadores?

	(31-32)
Igual 1 x 1	1
2 fumadores x 1 no fumador	2
3 fumadores x 1 no fumador	3
4 fumadores x 1 no fumador	4
5-7 fumadores x 1 no fumador	5
8-10 fumadores x 1 no fumador	6
10 fumadores x 1 no fumador	7
Más de 10 fumadores (ANOTAR)	8
NS/NC	9

8.c De cada 100 fumadores, ¿cuántos piensa usted que acabarán teniendo cáncer de pulmón debido al hábito de fumar? De 0 a 100

\_\_\_\_\_ (33-35)  
101 Ns/Nc

SI NS/NC PREGUNTAR

8.d Dígame la cifra que espontáneamente le parezca más lógica. De 0 a 100

\_\_\_\_\_ (36-38)  
101 Ns/Nc

8.e De cada 100 no fumadores que conviven o trabajan con fumadores o en ambiente con humo de tabaco, ¿cuántos piensa usted que acabarán teniendo cáncer de pulmón? De 0 a 100

\_\_\_\_\_ (39-41)  
101 Ns/Nc

SI NS/NC PREGUNTAR

8.f Dígame la cifra que espontáneamente le parezca más lógica. De 0 a 100

\_\_\_\_\_ (42-44)  
101 Ns/Nc

**A TODOS**

9.a ¿Cree usted que los que son fumadores contraen más enfermedades de corazón que los no fumadores? **NO ADMITIR NS/NC**

	(45)	
No, igual unos que otros	1	PASAR A P.9 c
Si, los fumadores más	2	PASAR A P.9b
No, los fumadores menos	3	PASAR A P.9c
No sabe	4	PASAR A P.10a

9.b Por cada persona no fumadora que muere de una enfermedad del corazón, ¿cuántos cree usted que mueren por ser fumadores?

	(46-47)
Igual 1 x 1	1
2 fumadores x 1 no fumador	2
3 fumadores x 1 no fumador	3
4 fumadores x 1 no fumador	4
5-7 fumadores x 1 no fumador	5
8-10 fumadores x 1 no fumador	6
10 fumadores x 1 no fumador	7
Más de 10 fumadores (ANOTAR)	8
NS/NC	9

9.c De cada 100 fumadores, ¿cuántos piensa usted que acabarán teniendo una enfermedad del corazón debido al hábito de fumar? De 0 a 100

                    (48-50)  
101 Ns/Nc

**SI NS/NC PREGUNTAR**

9.d Dígame la cifra que espontáneamente le parezca más lógica. De 0 a 100

                    (51-53)  
101 Ns/Nc

9.e De cada 100 no fumadores que conviven o trabajan con fumadores o en ambiente con humo de tabaco, ¿cuántos piensa usted que acabarán padeciendo una enfermedad del corazón? De 0 a 100

                    (54-56)  
101 Ns/Nc

**SI NS/NC PREGUNTAR**

9.f Dígame la cifra que espontáneamente le parezca más lógica. De 0 a 100

                    (57-59)  
101 Ns/Nc



**A TODOS**

10.a ¿Cree usted que los que son fumadores contraen más enfermedades pulmonares (por ejemplo: bronquitis, enfisema) que los no fumadores? **NO ADMITIR NS/NC**

(60)

No, igual unos que otros	1	<b>PASAR A P.10c</b>
Si, los fumadores más	2	<b>PASAR A P.10b</b>
No, los fumadores menos	3	<b>PASAR A P.10c</b>
No sabe	4	<b>PASAR A P.11a</b>

10.b Por cada persona no fumadora que muere por algún tipo de enfermedad pulmonar, ¿cuántos cree usted que mueren por ser fumadores?

(61-62)

Igual 1 x 1	1
2 fumadores x 1 no fumador	2
3 fumadores x 1 no fumador	3
4 fumadores x 1 no fumador	4
5-7 fumadores x 1 no fumador	5
8-10 fumadores x 1 no fumador	6
10 fumadores x 1 no fumador	7
Más de 10 fumadores ( <b>ANOTAR</b> )	8
NS/NC	9

10.c De cada 100 fumadores, ¿cuántos piensa usted que acabarán teniendo alguna enfermedad pulmonar debido al hábito de fumar? De 0 a 100

                     (63-65)

101 NS/NC

**SI NS/NC PREGUNTAR**

10.d Dígame la cifra que espontáneamente le parezca más lógica. De 0 a 100

                     (66-68)

101 NS/NC

**A TODOS**

11.a ¿Cree usted que los que son fumadores contraen más diabetes, es decir azúcar en la sangre, que los no fumadores? **NO ADMITIR NS/NC**

	(69)	
No, igual unos que otros	1	PASAR A P.11c
Si, los fumadores más	2	PASAR A P.11b
No, los fumadores menos	3	PASAR A P.11c
No sabe	4	PASAR A P.12a

11.b Por cada persona no fumadora que muera por diabetes o azúcar en la sangre, ¿cuántos cree usted que mueren por ser fumadores?

	(70-71)
Igual 1 x 1	1
2 fumadores x 1 no fumador	2
3 fumadores x 1 no fumador	3
4 fumadores x 1 no fumador	4
5-7 fumadores x 1 no fumador	5
8-10 fumadores x 1 no fumador	6
10 fumadores x 1 no fumador	7
Más de 10 fumadores (ANOTAR)	8
NS/NC	9

11.c De cada 100 fumadores, ¿cuántos piensa usted que acabarán teniendo diabetes o azúcar en la sangre debido al hábito de fumar? De 0 a 100

\_\_\_\_\_ (72-74)  
101 Ns/Nc

**SI NS/NC PREGUNTAR**

11.d Dígame la cifra que espontáneamente le parezca más lógica. De 0 a 100

\_\_\_\_\_ (75-77)  
101 Ns/Nc

**ATENCIÓN HACER BLOQUES P.8-11 SI NO ESTAN HECHOS ANTES DE PASAR A P.12**

12. ¿Qué porcentaje de niños que nacen pequeños cree usted que es atribuible al hecho de que la madre fume?

\_\_\_\_\_ % (78-80)  
101 Ns/Nc

13. ¿Cree usted que la presencia de enfermedades pulmonares en niños está relacionada con los hábitos de fumar de sus padres?

	(81)
SI	1
NO	2
NS/NC	3

Imagine dos personas que son hermanos gemelos y que han vivido toda su vida de la misma manera, en la misma ciudad, con las mismas costumbres y hábitos, solo que uno fuma un paquete de cigarrillos diarios desde los 20 años y el otro no ha fumado nunca.

14. ¿Hasta qué edad piensa que puede llegar a vivir el hermano gemelo que no fuma? **(INSISTIR QUE DIGA UNA EDAD. NO SIRVE NS/NC)**

\_\_\_\_\_ Años (82-83)

15. ¿Hasta qué edad piensa que puede llegar a vivir el hermano gemelo que fuma? **(INSISTIR QUE DIGA UNA EDAD. NO SIRVE NS/NC)**

\_\_\_\_\_ Años (84-85)

16. ¿Hasta qué edad piensa que puede llegar a vivir el hermano gemelo que no fuma si vive en la misma casa que el que fuma? **(INSISTIR QUE DIGA UNA EDAD. NO SIRVE NS/NC)**

\_\_\_\_\_ Años (86-87)

Por último y con el fin de poder clasificar sus respuestas con las de otras personas me gustaría que me dijera:

# DATOS DE CLASIFICACION

EDAD (VALOR NUMERICO)	<u>Columnas y códigos</u> (11-12)
SEXO	(10)
HOMBRE	CODIGO 5
MUJER	CODIGO 6
NUMERO DE MIEMBROS DEL HOGAR Numérico	(88-89)
AREA NIELSEN	(143)
I Cataluña	1
II Levante	2
III Andalucía	3
IV Centro	4
V Noroeste	5
VI Centro Norte	6
VII A.M. Barcelona	7
VIII A.M. Madrid	8
IX Canarias	9
COMUNIDAD AUTONOMA	(144-145)
Andalucía	1
Aragón	2
Principado de Asturias	3
Baleares	4
Canarias	5
Cantabria	6
Castilla la Mancha	7
Castilla León	8
Cataluña	9
Comunidad Valenciana	10
Extremadura	11
Galicia	12
Madrid	13
Región Murciana	14
Comunidad F. de Navarra	15
País Vasco	16
La Rioja	17
PROVINCIA	(146-147)
Area metropolitana de Barcelona	(Según código INE) 98
Area metropolitana de Madrid	99)
POBLACION MUNICIPIO (EN MILES)	(148-151)

TAMAÑO DE HABITAT	(152)
Gran área metropolitanas	1
Áreas metropolitanas pequeñas	2
Ciudades administrativas	3
Cabeceras comarcales	4
Población rural	5
Población dispersa	6
CAPITAL DE PROVINCIA	(153)
Capital	1
No capital	0
CABEZA DE FAMILIA (SI/NO)	(154)
Si	1
No	2
CLASE SOCIAL	(155)
Alta	1
Media Alta	2
Media Media	3
Media baja	4
Baja	5
ESTUDIOS PROPIOS	(157)
Menos que primarios	1
Primarios	2
Secundarios	3
Medios Universitarios	4
Superiores Universitarios	5
Ns/nc	6
OCUPACION PROPIA	(158-159)
Empresario + de 6 empleados	1
Empresario - de 6 empleados	2
Agricultor sin empleados	3
Profesión liberal/ Autónomos	4
Director y cuadros superiores	5
Técnicos y especialista en la Ind.	6
Técnicos y especialistas en Serv. en oficina.	7
Técnicos y especialistas en Serv. fuera oficina	8
Funcionarios	9
Jornaleros y Subalternos	10
Parados	11
Jubilados y pensionistas (viudas con pensión)	12
Resto	13
Amas de casa	14
Estudiantes	15

# OTROS CODIGOS IMPORTANTES

**P8.b, P9.b, P10.b, P11b:** Quienes dijeron más de 10 fumadores por 1 no fumador fueron codificados según la siguiente tabla:

	<u>Códigos</u>
DE 11 A 20 Fumadores por 1 no fumador	51
DE 21 A 30 Fumadores por 1 no fumador	52
DE 31 A 40 Fumadores por 1 no fumador	53
DE 41 A 50 Fumadores por 1 no fumador	54
DE 51 A 60 Fumadores por 1 no fumador	55
DE 61 A 70 Fumadores por 1 no fumador	56
DE 71 A 80 Fumadores por 1 no fumador	57
DE 81 A 90 Fumadores por 1 no fumador	58
DE 91 A 100 Fumadores por 1 no fumador	59
MÁS DE 100 Fumadores por 1 no fumador	60
MÁS DE 1000 Fumadores por 1 no fumador	61
OTRAS RESPUESTAS	8
Ns/Nc	9

## VARIABLES DE CONTROL INTERNO

Las siguientes variables que aparecen en el fichero son parámetros de control del trabajo de campo y del sistema. En algunos se trata casos datos brutos o intermedios para la composición de variables finales, o bien informaciones ajenas al cuestionario. En principio se ofrecen a efectos de eventual comprobación e identificación del registro, pero no son realmente útiles para el objetivo del estudio. Se trata de:

\* Número cuestionario, D-1, D-2, D-3, D-4, D-5, GRACIAS, Tfn, CLASE BRITAN, Intento, Fecha, Hora, Entrevistador