



UNIVERSITAT<sup>DE</sup>  
BARCELONA

## Equity and Utilisation of Primary, Specialist and Dental Health Services in Spain

Alexandrina Petrova Stoyanova



Aquesta tesi doctoral està subjecta a la llicència **Reconeixement 4.0. Espanya de Creative Commons.**

Esta tesis doctoral está sujeta a la licencia **Reconocimiento 4.0. España de Creative Commons.**

This doctoral thesis is licensed under the **Creative Commons Attribution 4.0. Spain License.**



**EQUITY AND UTILISATION OF  
PRIMARY, SPECIALIST AND DENTAL  
HEALTH SERVICES IN SPAIN**

**Alexandrina Petrova Stoyanova**

**EQUITY AND UTILISATION OF  
PRIMARY, SPECIALIST AND DENTAL  
HEALTH SERVICES IN SPAIN**

**Alexandrina Petrova Stoyanova**

Department de Teoria Econòmica

Universitat de Barcelona

**February 2004**

**ACADEMIC DISSERTATION  
FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY IN ECONOMICS**

Supervisor: Marisol Rodríguez Martínez, PhD

Associate Professor

Departament de Política Econ. i Estructura Econ. Mundial

Tutor: Joan Costa i Font, PhD

Associate Professor

Departament de Teoria Econòmica

*To Luis*



*“The important thing is never to stop questioning”*

*Albert Einstein*

## Abstract

Although public health expenditure in Spain still account for more than 70% of all health expenditures, the importance of private financing in health care has risen over the last decades. The continued growth of private health expenditures is considered to have adverse consequences for equity in the access and utilisation of health care services. Regarding the increase of out-of-pocket payments for complementary to the public sector health care, the main concern is that the poor members of the society are likely to reduce (or even not use at all) their utilisation of health products and services more than the better-off. This may result in violation of the principle of horizontal equity, according to which people with similar needs should be treated equally, irrespective of their income. With respect to expenditures on private health insurance premia and on other health services that are substitutes to the ones provided by the public sector, the most important consideration is that those expenditures may ensure access to health services of a different “quality”.

The topics studied in this thesis follow up on the general knowledge about inequity in health and health care delivery by trying to study more in depth how some aspects of private health care financing affect equity in the context of the *mainly public* Spanish Health Care System. Especially, we address the following three issues: a) the potential inequalities in the pattern of utilisation of health care services due to socio-economic factors and not to differences in health; b) the determinants of the demand for private health insurance; c) the inequalities in dental health and dental care utilisation.

In chapter two we try to shed light into the investigation of differential patterns of utilisation of physician services by populations subgroups that is emerging in a number of studies. Using Spanish data coming from the 1997 National Health Survey, we try to explain the distinct role of the type of insurance on the choice

between specialists and GPs and its intertwining with the choice between private and public providers. We estimate a two-stages probit to conclude that differences in the insurance access is the main determinant of both the choice of provider and the type of physician contacted, giving rise to very different patterns of consumption of generalists and specialists visits. People with only public insurance access go 2.8 times to the generalist per one time that they visit a specialist; individuals with duplicate coverage have a ratio of GP/specialists visits equal to 1.4 (the combination being public GP and private specialist) and people with only private insurance access actually have an “inverted” pattern of visits: they contact specialists more often than GPs – that it is against cost control, common sense and basic epidemiological recommendations. Age, sex and health also have a distinct and interesting impact on these choices. Finally, equity concerns based on the implied assumption that specialist care is superior to generalist care are discussed.

Given that the type of insurance access appeared to be the main determinant of the choice of health care provider, we present a more comprehensive analysis of the decision to purchase voluntary health insurance in chapter three. In Spain the statutory health coverage already fulfils the basic function of health insurance, which is to smooth the financial risks associated with uncertain future health care costs. Consequently, the purchase of VHI must be motivated by other factors like inflexibilities of the public sector, private rooms in hospitals, personalised care, and different attributes of “quality”. Approximately, 11% of the population buys supplemental private health insurance in Spain. The theoretical model behind the analysis is that of risk averse individuals who maximise their expected utility. We model the purchase decision based on individual and household characteristics as well as public and private health sector supply variables using data from the panel of the Spanish Family Expenditures Survey and other sources. Our results show that the decision is actually significantly influenced by a wide range of those variables. The importance of price is discussed by analysing the impact of the tax reform introduced in 1999 by which the existing tax deduction on individually bought private insurance

policies was removed and employer-paid policies were instead fiscally favoured, according to our results, with success.

In chapter two we studied the utilisation of health services included in the public health benefits package, but for which some people buy supplementary health coverage. In chapter four, we analyze inequalities in the utilisation of health services altogether excluded from the public finance and provision, that is, dental services. We employ the concentration index approach, which although commonly used in the research of income-related inequality in health and health care, has but never been applied to analyze inequity in dental health and dental care utilisation before. The data (as in the empirical analysis in chapter two) comes from the 1997 Spanish Health Survey. Our findings confirm the hypothesis of the existence of significant income-related inequity in the distribution of good dental health favouring the better-off. Regarding the analysis of equity in the utilisation of dental care, we find significant pro-rich inequity in the utilisation of dental services. Finally, the results from the analysis of inequities in the utilisation of specific types of dental care reveal that preventive care (like diagnostics and teeth cleanings), basic restorative care and aesthetic services are concentrated among the wealthier segments of the population, while oral surgery (tooth extractions) – the cheapest way of treating a damaged tooth besides being the only one provided by the public sector – is the only type of dental care with unequal distribution favouring the poor. The existence of inequities in dental health and dental services utilisation is to be expected in a system where high treatment prices, usually paid out-of-pocket, constitute an important barrier to access care. Including dental services, or at least preventive dental care, in the package of publicly provided health services may be the right policy to adopt.

# Contents

Acknowledgements	xv
<b>1 Public-Private Interface in health care</b>	<b>1</b>
1.1. The rationale for public intervention in health care.....	2
1.1.1. Information failure.....	3
1.1.2. Asymmetric information in the health insurance market.....	4
1.1.3. Adverse health-related behaviour .....	5
1.1.4. Distributive and equity concerns .....	5
1.2. Determining the optimal level of public health expenditures.....	7
1.2.1. Positive analysis.....	7
1.2.2. Economic evaluation.....	8
1.3. Spanish Health Care System.....	9
1.3.1. Institutional setting .....	11
1.3.2. Coverage .....	13
1.3.3. Equity of the system .....	13
1.4. Health care expenditures.....	15
1.4.1. Public health expenditures .....	16
1.4.2. Private health expenditures.....	18
1.5. Three topics of focus in the public-private interface .....	21
1.5.1. Choice of health care provider.....	23
1.5.2. Demand for supplemental health insurance.....	24
1.5.3. Inequalities in dental health and dental care utilisation.....	25
References.....	27
<b>2 The role of private health insurance access on the choice of physician</b>	<b>33</b>
2.1. Introduction.....	33

2.1.1.	Preliminary comments and objective of the study.....	33
2.1.2.	Previous studies using Spanish data .....	35
2.1.3.	What differentiates this study? .....	36
2.2.	Types of insurance access.....	37
2.3.	Theoretical framework.....	39
2.4.	Data, descriptive statistics and variable definitions.....	41
2.4.1.	The data.....	41
2.4.2.	Descriptive statistics .....	42
2.4.3.	Variable definitions.....	47
2.5.	Econometric specification.....	50
2.6.	Exogeneity of the insurance status.....	52
2.7.	Estimation results.....	53
2.7.1.	Probability of visiting a physician .....	53
2.7.2.	Two-stage probit for the choice of health care provider.....	53
2.8.	Discussion and conclusion.....	61
Appendix A	Descriptive characteristics of the sub-sample of civil servants .....	69
Appendix B	Estimation of the household monthly income .....	71
Appendix C	Preliminary analysis of the decision to purchase VHI .....	74
References	.....	81

<b>3</b>	<b>The demand for supplemental health insurance in public health care systems</b>	<b>87</b>
3.1.	Introduction.....	87
3.1.1.	Preliminary discussion.....	87
3.1.2.	Previous studies using Spanish data .....	88
3.1.3.	Previous international studies .....	90
3.1.4.	Why study further the demand for VHI? .....	94
3.2.	Theoretical framework.....	95
3.2.1.	Theoretical model .....	95
3.2.2.	Expected effect of the factors determining the decision	

to purchase VHI.....	98
3.3. Econometric specification.....	101
3.3.1. Econometric model.....	101
3.3.2. Explanatory variables.....	105
3.4. Data and descriptive analysis.....	110
3.4.1. The data.....	110
3.4.2. Descriptive statistics.....	111
3.4.3. Longitudinal descriptive analysis.....	112
3.5. Results and discussion.....	115
Appendix D Descriptive characteristics of the sample of heads of household in each quarter.....	120
Appendix E A preliminary dynamic analysis of the demand for VHI.....	127
E.1. Conditional fixed effects logit model.....	127
E.2. Estimation results.....	128
References.....	131
<b>4 Measuring inequalities in dental health and dental care utilisation</b>	<b>137</b>
4.1. Introduction.....	137
4.1.1. Preliminary discussion.....	137
4.1.2. Review of previous studies on inequalities.....	138
4.1.3. Reasons to study inequalities in dental health and dental care utilisation.....	140
4.2. Methodology.....	141
4.2.1. The concentration curve.....	142
4.2.2. The concentration index.....	143
4.2.3. Horizontal inequity measure.....	144
4.3. Data, variable definition and descriptive statistics.....	146
4.3.1. Defining good dental health.....	146
4.3.2. Determinants of dental care need.....	150
4.3.3. Dental services utilisation.....	151

4.3.4. Determinants of dental services utilisation: Socio-economic and supply-side variables.....	153
4.4. Measuring inequalities in dental health .....	157
4.5. Measuring inequalities in dental care utilisation .....	162
4.5.1. Estimation strategy .....	162
4.5.2. Estimation results.....	165
4.6. Discussion and conclusion.....	173
References.....	179



## List of Figures

Figure 1.1.	Information failure in the health care market.....	3
Figure 1.2.	The Spanish Health Care System (since 2002) .....	10
Figure 1.3.	Evolution of GDP and the share of health expenditures in the GDP in Spain .....	15
Figure 1.4.	Evolution of the share of public health expenditures in total health expenditures in Spain .....	18
Figure 1.5.	Health care expenditures by source of financing, 1983-2001 .....	19
Figure 2.1.	Type of insurance access, by income quintiles .....	38
Figure 2.2.	Number of visits to a physician during the last 14 days prior to the interview.....	42
Figure 2.3.	Observed provider of the last visit, by insurance access group.....	45
Figure C.1.	Purchase of voluntary health insurance (VHI) by income quintile .....	74
Figure C.2.	Purchase of VHI, by income quintile and region .....	78
Figure 4.1.	Concentration curve .....	142
Figure 4.2.	Actual frequency of dental visits among those who have visited the dentist during the last three months .....	152
Figure 4.3.	Good dental health concentration curves, by sex .....	159
Figure 4.4.	Concentration curves for actual and expected good dental health.....	161
Figure 4.5.	Concentration curves for actual and need-predicted dental care utilisation within the last year .....	165
Figure 4.6.	Concentration curves for actual and need-predicted dental care utilisation within the last three months .....	169
Figure 4.7.	Concentration curves for actual and need-predicted utilisation of several types of dental care services within the last year.....	171
Figure 4.8.	Concentration curves for actual and need-predicted utilisation of several types of dental care services within the last year.....	172

## List of Tables

Table 1.1.	Public expenditures in health in 2001, percentage of total expenditures on health in some OECD countries.....	17
Table 2.1.	Descriptive characteristics of the three insurance access groups .....	43
Table 2.2.	Average income by type of choice of provider .....	46
Table 2.3.	Percentage of people who have visited a doctor, by insurance access and income quintiles .....	47
Table 2.4.	Definition of explanatory variables .....	49
Table 2.5.	Probit for the decision to see a doctor .....	54
Table 2.6.	Results of the two-stages probit: Choice of specialist (versus GP) and private provider (versus public one) .....	55
Table 2.7.	Predicted mix of physician visits, by type of insurance access .....	57
Table 2.8.	Predicted mix of physician visits, by income quintile.....	58
Table 2.9.	Predicted mix of physician visits, by income quintile and type of insurance access .....	59
Table 2.10.	Predicted odd-ratios of the main choices involved, by insurance access group and some individual characteristics.....	60
Table 2.11.	Number of GP visits over number of specialists visits in several European countries, by having or not private insurance (PI).....	62
Table A.1.	Descriptive characteristics if the sub-sample of civil servants, by type of health care provider chosen .....	70
Table B.1.	Household monthly income interval regression.....	73
Table C.1.	Probit for the decision to buy VHI.....	76
Table C.2.	People holding VHI, by Autonomous Region .....	79
Table 3.1.	Variable definition.....	106
Table 3.2.	Lagged regional variables.....	109
Table 3.3.	Quarterly evolution of heads of household voluntary health coverage.....	113

Table 3.4.	Actual sequence of VHI holding .....	114
Table 3.5.	Random-effects logit estimation of the demand for voluntary health insurance .....	116
Table D.1.	Characteristics in the 1 <sup>st</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	120
Table D.2.	Characteristics in the 2 <sup>nd</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	121
Table D.3.	Characteristics in the 3 <sup>rd</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	122
Table D.4.	Characteristics in the 4 <sup>th</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	123
Table D.5.	Characteristics in the 1 <sup>st</sup> quarter of 2000 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	124
Table D.6.	Characteristics in the 2 <sup>nd</sup> quarter of 2000 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	125
Table D.7.	Characteristics in the 3 <sup>rd</sup> quarter of 2000 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status .....	126
Table E.1.	Conditional fixed-effects logit estimation of the demand for voluntary health insurance .....	130
Table 4.1.	Variable definitions and descriptive statistics .....	147
Table 4.2.	Dental attendance rates for some European countries, USA and Australia.....	153
Table 4.3.	Provider of the last visit.....	154

Table 4.4.	Dentist per population ratio in some European countries, USA and Australia.....	156
Table 4.5.	Prevalence (per cent) of some dental conditions among the Spanish adults, by income quintile.....	158
Table 4.6.	Quintile distributions, inequality and inequity concentration indices for good dental health.....	160
Table 4.7.	Quintile distributions of observed, need-predicted, and need-standardised dental care utilisation within the last year. Inequality and inequity indices.....	166
Table 4.8.	Observed, need-predicted, and need-standardised number of dental visits within the last three months. Inequality and inequity indices....	168
Table 4.9.	Inequality and inequity measures for several types of dental services	173
Table 4.10	Average number of decayed, missing, and filled teeth (DMFT) at age of 12.....	176

## **Acknowledgements**

First and foremost, I am greatly indebted to Marisol Rodríguez, my supervisor, for being the responsible for getting me interested in health economics, for giving me valuable academic guidance, for her generous involvement in the research topics studied in this dissertation and for her helpful comments that were always very insightful and that contributed to clarify and improve my arguments.

I owe a special gratitude to my “American professor” and friend, Dr. Charles Hedges, who was the first to offer encouragement and support when I initiated the long way to completing a dissertation.

I consider myself extremely lucky to be a member of the Spanish team of the ECuity project. The annual workshops I attended were (and I hope they will continue to be) greatly inspiring. I wish to thank all of you, and especially, Xander Koolman, Tom Van Ourti, Adrew Jones, Agnes Couffinhal, Eddy Van Doorslaer, and Elizabeth Seidler.

I also appreciate the encouragement and the helpful comments from the members and the two visiting professors of the Centre de Recerca en Economia del Benestar (CREB). Special thanks to Antonio Manresa, Samuel Calonge, Juan Carlos Conesa, Fernando Sánchez, Jesus Ruíz and Xavier Raurich.

I wish to heartily thank my dearest friends Raquel, Lola and Dritana (“las chicas del CREB”). Over the past three years (Tana only a year and a half) they have been witnesses of my numerous ups and downs. And girls, thanks for been always ready for a coffee break.

I also wish to thank my family. Thank you, mum and dad, for your faith and confidence in my abilities. Thank you for your support, understanding and love. Thank you for everything. Special thanks to my sister, Dr. Guergana Stoyanova.

*Искам да благодаря на моето семейство. Благодаря ви, мамо и татко за доверието ви в мен и опората, която ми давате. Благодаря за подкрепата, разбирането и обичта. Благодаря ви за всичко. Специални благодарности и на сестра ми, д-р Гургана Стоянова.*

I am also very thankful to my parents-in-law, Pilar and Domingo, and to my sister-in-law, Pilar Díaz. Your sincere concern for my success on a day-by-day basis is of an enormous value.

*Muchas gracias también a mis suegros, Pilar y Domingo, y a mi cuñada Pilar Díaz. Vuestra sincera preocupación por mi éxito en el día a día ha sido de enorme valor.*

There is one person above all others who deserves my deepest thanks for being a constant source of support and inspiration, Luis. Thank you for being always there and for converting all my moans, complaints, and cry in tranquillity, serenity and laugh. I dedicate it to you.

# CHAPTER 1

## PUBLIC-PRIVATE INTERFACE IN HEALTH CARE

Few people would disagree that some government involvement in the provision of social services like health care is necessary. Nevertheless, given that health services are (in their majority) private goods<sup>1</sup> with some elements of “publicness”<sup>2</sup>, choosing the “optimum” level of public participation in the provision and financing of health care is not an easy task. It depends on the political values of the society and on its preferences for equity and efficiency (Callejón and Ortún, 2003). It is important to determine the reasons for and the consequences from public sector involvement in the markets for health care. But it is also essential to investigate the role of private

---

<sup>1</sup> Unlike pure public goods, private goods are characterised by being both excludable (it is possible to preclude someone not willing to pay for them from consuming these goods) and rival (one person’s consumption of the goods reduces the quantity available for consumption by someone else).

<sup>2</sup> Although the health care provided to a particular individual is a private good, health care can have spill-over effects that may benefit all individuals. Having one person immunised against a communicable disease contributes to creating a healthier environment, and a healthier environment is a non-excludable good.

sector in health care, especially when it accounts for more than one fourth of total health expenditures in a country with a National Health System offering free at the point of provision health care to all citizens, like the Spanish one.

### **1.1. THE RATIONALE FOR PUBLIC INTERVENTION IN HEALTH CARE**

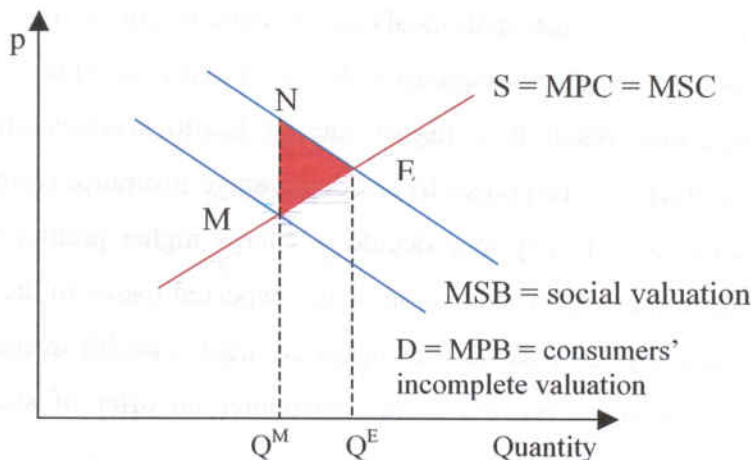
The underlying rationale for public sector provision of goods and services and for the regulation of private markets is usually based on equity and efficiency concerns. On one hand, given the unequal distribution of income in the society, private markets ruled by the “ability to pay” principle will lead to an unequal distribution of the goods and services favouring the better-off. On the other hand, the presence of various forms of market failure impedes the achievement of efficiency. Market failure refers to a situation where the price mechanisms fails to establish a Pareto optimal allocation of resources. The health care market faces many potential problems leading to market failures: lack of perfectly competitive markets (the need for health care is highly unpredictable and costly for the individuals); incomplete markets (e.g. the absence of supply of insurance policies covering certain types of health risks or non-existing markets for transplants); imperfect and asymmetric information between patients, physicians and health authorities; difficulty in assessing which services are justifiable; the existence of public goods (e.g. immunisation programmes, water fluoridation, epidemiological surveillance) and externalities; moral hazard and adverse selection related to health insurance coverage; etc (Arrow, 1963; Besley and Gouveia, 1994; Barr, 1998; López-Casnovas and Ortún, 1998). Some of these market failures and equity concerns are discussed in more details in the following paragraphs.



### 1.1.1. Information failure

Figure 1.1 depicts the welfare loss generated by the existence of information failure in the health care market. The demand curve for health care, which represents individuals' actual desires and preferences, is a measure of private marginal benefits. In the case of health care, private and social ("correct") benefits and costs may not coincide. This makes the equilibrium level of output delivered by the free market,  $Q^M$ , allocatively inefficient. Many individuals, left to themselves, may fail to purchase the "right" quantities<sup>3</sup> of health care (which creates a welfare loss equal to MNE) because they lack full-information about the existence (e.g. new kind of virus, new medicine), quality (e.g. waiting times, getting an appointment), effectiveness and/or appropriateness (e.g. receiving the right, given one's conditions, medical treatment) of health services. Some economists argue that only the Government has sufficient information to place an accurate and complete value on socially desirable goods such as health and health care. These arguments are often employed to justify government intervention in the market place to assure the provision of health care to all citizens.

**Figure 1.1.** Information failure in the health care market.



<sup>3</sup> The "right quantities" of care are those that the individuals would have purchased if well-informed.

### 1.1.2. Asymmetric information in the health insurance market

The existence of imperfect and asymmetric information causes the two principal failures in the market for health insurance: adverse selection and moral hazard. The pool of clients of an insurance company is very heterogeneous, composed by both high (bad) and low (good) risks. Adverse selection arises because the insurance companies can not charge the actuarially fair premium since they lack precise information about each individual's morbidity or risk level (probability of illness, exposure to hazardous situations, adverse health habits). Charging the "average risk" premium makes low risk individuals drop out from the plan. Consequently, those who remain insured, mostly high risk individuals, who are both more likely to choose a contract with complete coverage and to use health care services, face higher average insurance premia. The increase of the premium causes more drop outs of people with lower risk individuals, who may find themselves excluded from the market. In the presence of asymmetric information of ex ante risk attributes, Rothschild and Stiglitz (1976) and Wilson (1977) show that a competitive equilibrium may fail to exist.

The second potential information failure in the health insurance markets is known as "moral hazard". It denotes a situation in which the presence of health insurance induces changes in one's attitude towards health care. When covered by a comprehensive health insurance, individuals do not have incentives (as they will not bear the associated financial consequences) to avoid risky activities or unhealthy behaviours, which may result in a higher rate of health services utilisation<sup>4</sup>. If because of such behavioural responses to health coverage insurance companies incur greater costs than expected, they may decide to charge higher premia to everyone. This premia is based on ex post evaluation of the expected losses in the presence of insurance. Consequently, individuals willing to contract a health insurance, basing their decisions on ex ante expected losses, encounter no offer of such contracts.

---

<sup>4</sup> Pauly (1968) identified as allocatively inefficient the over-utilisation of health care generated by insurance, as it creates an excess welfare burden.

Therefore, as Hurley (2000) points out, moral hazard can lead to incomplete markets for risk-bearing.

Public involvement in the health insurance markets is claimed to improve social welfare. The universal and mandatory health coverage at the “average risk” premium implies redistribution from the low to the high risks (because contribution do not depend on individual’s risk level) and also from the better off to the worse off individuals (because of the progressivity of personal income taxes) (Hindriks and De Donder, 2003). The over-consumption of health care due to “moral hazard” can be reduced, for example, designing a “limited” public coverage policy that guarantees a certain level of health services and makes individuals participate in the cost of all services above this level. And last, an additional advantage of the public health insurance is that it covers a more comprehensive set of health services than the private insurance contracts (Rodríguez, 2001).

### **1.1.3. Adverse health-related behaviours**

Other important reasons for public interference in the market mechanism are the external and internal costs of health-related individual behaviours. Informed rational individuals would not harm their health by adopting bad habits like smoking and drinking. However, people have proved not to be rational in all their consumption decisions, rather to be driven by external factors (fashion, caprice or impulse). Thus, health authorities may want (and in the case of publicly financed health care systems may be obliged) to prevent people from damaging their own health (Cutler, 2002).

### **1.1.4. Distributive and equity concerns**

Public involvement in health care can also be justified on the grounds of arguments that have to do with distributive justice and equity concerns (Besley and Coate, 1991;

Blackorby and Donaldson, 1988; Besley and Gouveia, 1994; Blomquist and Christiansen, 1995, Cremer and Gahvari, 1997). Different segments and institutions of the society may have different concepts of justice and fairness (Elster, 1992). Most people agree that ordinary goods and services should be allocated according to one's willingness and ability to pay. This is usually not the case when we consider social goods like health care<sup>5</sup>, which are seen as rights and not goods (Cutler, 2002). Health professionals and most probably the great majority of the population agree that health care should be distributed according to need. The principles of equity in health care and health services utilisation, however, are inconsistent with the profit maximisation principles and consequently may not be implemented through the market mechanisms without any form of public intervention. By providing health services the government ensures that the access to those services will be less dependent on individuals' income or individuals' ability to pay for them<sup>6</sup>. Many economists would recommend redistribution of income itself, claiming that this should allow the poorer individuals to buy health services they may need on the marketplace. However, the existing mechanisms of income redistribution may not be efficient enough to achieve this goal, the basic reason being that health care markets are not perfectly competitive. In such circumstances, income redistribution in the form of monetary transfers to the less favoured segments of the population will not be the proper policy instrument for guaranteeing equal access to health care, since it will not have any effect on the functioning of the markets (Rodríguez, 2001). Thus, if the objective is not only achieving equity, but also reducing or removing market inefficiencies, then government intervention in the form of regulations, subsidies and taxes, and universal provision of health care or a combination of these is required (Besley and Coate, 1991). Blomquist and Christiansen (1995, 1998a, 1998b) show that the public provision of private goods overcomes the information constraints that

---

<sup>5</sup> Health care is usually perceived as a special good (a merit good in the terminology of public economists), which is considered intrinsically desirable and socially valuable and for which "the society is unwilling to accept the level of inequality in consumption resulting from market allocations" (Gouveia, 1997).

<sup>6</sup> Already in 1970 Tobin discusses the principle of "specific egalitarianism", according to which some scarce commodities should be distributed less unequally than the ability to pay for them (Tobin, 1970).

restrict redistribution through the tax system. Additionally, equity concerns may be related not only to access to health services but also to the receipt of those services. In this case, equal or universal provision of health services is what is socially desirable.

## **1.2. DETERMINING THE OPTIMAL LEVEL OF PUBLIC HEALTH EXPENDITURES**

Rodríguez (2001) reviews the two basic strands of research related to the determination of the socially desirable level of public expenditures in health care. The first strand of research comprises positive analyses that show how public provision of private goods can be understood as a result of some political process through which segments of the population support policies that are redistributive in their favour. The second strand contains studies arguing that the level of public participation in the provision and/or financing of private goods should be assessed using indirect techniques to infer consumers' preferences, through eliciting their "willingness to pay" or "willingness to accept" compensation.

### **1.2.1. Positive analysis**

The basic assumption behind the positive political economy literature is that the decision about the level of public provision of private goods (health care, education, etc.) is a product of a democratic voting process. Individuals vote, according to their preferences, for the implementation of a specific public policy comparing the expected utility gain from the public expenditure and the expected utility after discounting the taxes financing the public policy in question. There are three main categories of analyses of the public provision of private goods. First, studies that oppose public monopoly provision to a completely free market (Buchanan, 1970;



Spann, 1974, Usher, 1977). They defend the public alternative, which is modelled as a function of the distribution of tastes and income. Starting with Stiglitz (1974), a second line of research has been developed. Numerous authors (Besley and Coate, 1991; Blomquists and Christiansen, 1995; Bergstrom and Blomquist, 1996 are just few examples) have used a model that allows for the co-existence of public and private sector but restricts the individual's consumption to only one of the two sectors. This results in non-single peaked preferences over the provision of the good or service (an example of Arrow's impossibility theorem) and, potentially, in the non-existence of a majority rule voting equilibrium. Third, relaxing the assumption of exclusivity of consumption, i.e. allowing for complementarity between the public and private provision, researchers find that a majority rule equilibrium exists (Pauly, 1992; Epple and Romano, 1996; Gouveia, 1997). In this equilibrium, the level of public and private expenditures on a good or service is determined by the preferences of the median voter. Voters belonging to lower social class vote for a big public sector, but for lower levels of public expenditures (the opportunity cost of taxes is too high for these people). On the other extreme, high income voters prefer small public sector and low level of public expenditures. Thus, these are the votes of the middle classes that defend high public sector involvement.

### **1.2.2. Economic evaluation**

The rationale behind the studies from the second strand is the importance of placing monetary value on certain goods and services that are not sold and bought on the market for the decision over the appropriate level of public expenditures on such goods and services. The methods developed to fulfil this aim fall in two categories. The first one tries to assess the value of the goods/services based on revealed preferences from related markets, while the second one relies on inferring value from hypothetical markets. Those last are called "stated preferences" methods and the most popular among them are the contingent valuation method and the choice experiments. In the contingent valuation method, survey and questionnaire

techniques are employed to create a hypothetical market situation in order to extract estimates of the willingness of individuals to pay for the good or service under consideration. Within the choice experiment approach the value of any good is assumed to depend on the good's attributes, and the levels these take. Individuals are presented with a series of choices, and for each choice set they must state what option they prefer. Although, these methods have been increasingly used for health economic evaluation over the last years (Diener, O'Brien and Gafni, 1998; Klose, 1999; Ryan *at al.*, 2001, Olsen and Smith, 2001), they have not received much attention by policy makers.

### **1.3. SPANISH HEALTH CARE SYSTEM**

Besley and Gouveia (1994) identify three basic “types” of health care systems. According to their classification the Spanish Health System falls in the category of type III health systems, where the public sector plays a predominant role both in the finance and provision of health care<sup>7</sup>. A detailed description of the institutional settings and organisation of the Spanish Health System is due in order to obtain a broader perspective of the involvement of the government in the health sector. This is the purpose of the present section.

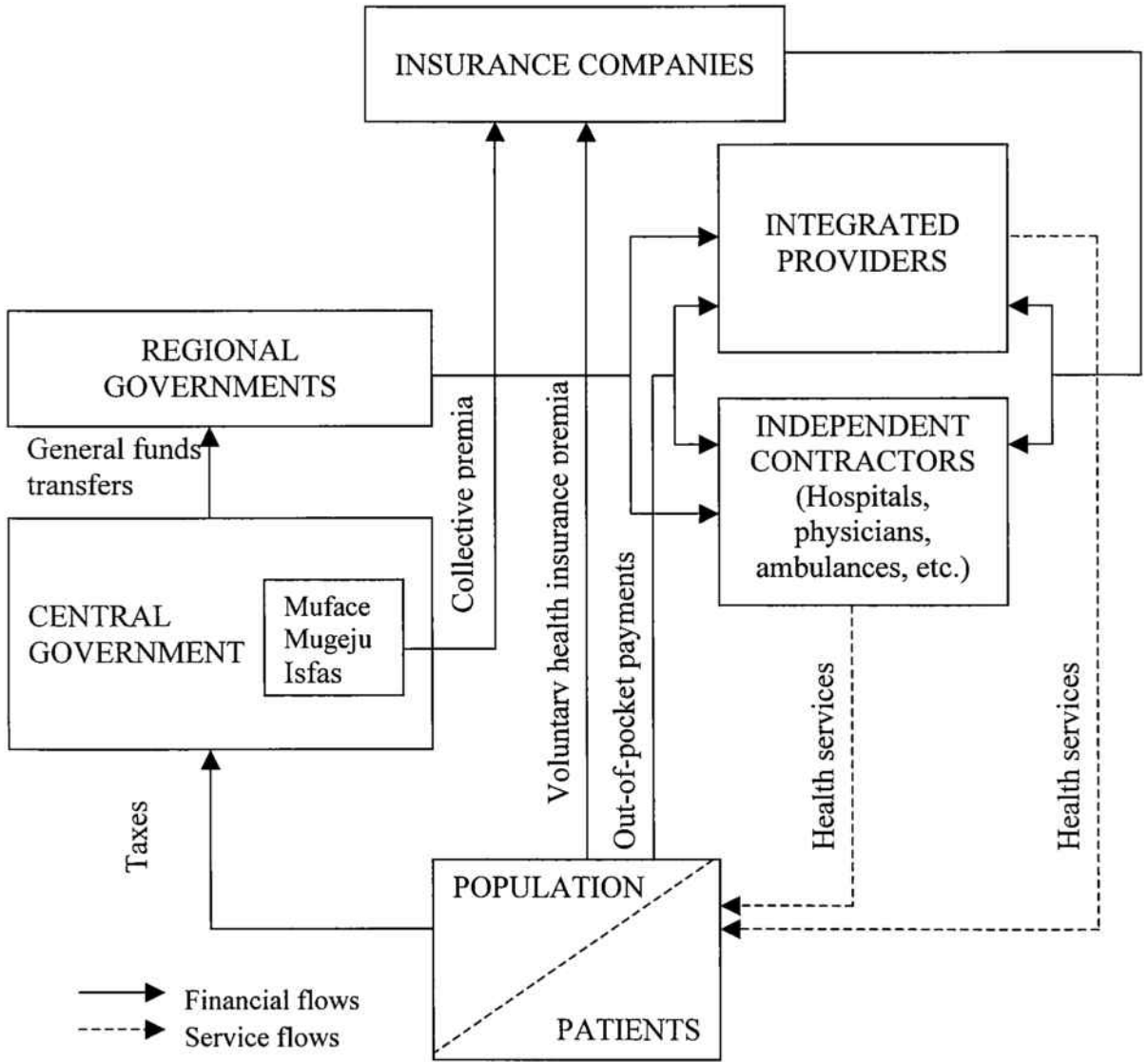
#### **1.3.1. Institutional setting**

Following the methodology set out in Hurst (1992), we describe the structure of the Spanish Health Care System after the changes in 2002 in Figure 1.2. There are four groups of actors who interact in the health care sector. The first group includes the

---

<sup>7</sup> The other two types are defined as follows: type I indicates a health system dominated by the private finance and provision of health care (e.g. the US one); and type 2 denotes systems with public finance and considerable private delivery (e.g. Germany, the Netherlands).

Figure 1.2. The Spanish Health Care System (since 2002).



Central and Regional Governments. The Central Government<sup>8</sup> involvement in the health system consists of collecting taxes from the citizens and transferring funds to the Regional Governments. The Regional Governments, in turn, use those funds to

<sup>8</sup> The Central Government also runs the special mutualities for civil servants and members of the armed forces.



buy goods and services, invest in health care facilities and pay physicians, either salaries to the health personnel in publicly owned clinics and hospitals, or tariffs to contracted providers (“conciertos”), to provide health services to the patients under the universal public health coverage. The second group comprises all individuals, the patients, who receive health care either from the public sector, financed by the taxes they pay to the Central Government, or from the private sector. To access to treatment in the private sector, the individuals may buy voluntary health insurance (paying premia to the insurance companies), or pay directly to private physicians. Insurance companies, the third group of actors, pay for the health services contracted by the individuals or by their employers, and also establish the rules on when, where and under what conditions patients can seek health care. At last, providers attend patients, diagnose health problems, suggest appropriate treatment, and provide those treatments.

### 1.3.2. Coverage

The public system offers just about universal coverage. In 2001 the proportion of the population that benefited from the public entitlement (including civil servants) was about 99%. The public benefits package is fairly comprehensive. It covers primary health care (general medical and paediatric care, as well as prevention programmes, health promotion, and rehabilitation), specialised care (both outpatient and inpatient care); pharmaceutical benefits, and some complementary benefits (prostheses, orthopaedic products, wheelchairs, health care transportation, complex diets and home-based oxygen therapy)<sup>9</sup>. Co-payments are low compared to most OECD countries (Kalisch, Aman, Bucéele, 1998). They exist only for prescribed drugs (users pay 40% of the price on medicines prescribed by public general practitioners) and some orthoprosthesis products, but pensioners under affiliation with the Social

---

<sup>9</sup> In Spain, like in most of the European countries, long-term care is not included in the public health benefits package. This type of services depends on the Ministry of Labour and Social Affairs and on the governments of the Autonomous Regions.

Security system, disabled, and individuals who have suffered work-related injuries are exempted from payment. Also, individuals who have been diagnosed a chronic disease pay only 10% of the price of the medicines prescribed by public doctors. There are few categories of care explicitly excluded from the public benefits package – psychoanalysis and hypnosis; sex-change surgery; spa treatments; plastic surgery not related to accidents, disease or congenital malformation; and dental treatments. Among the types of care not covered by the public entitlement, dental care is the one that accounts for the most important part of private out-of-pocket payments, about one-fifth of all private health expenditures.

Mandatory social insurance also applies to civil servants and members of the armed forces, but they have their own mutualities (Muface, Mugeju and Isfas) that manage their public but special social security regime. Opting out of the statutory health insurance is not permitted, but civil servants are the only publicly insured that enjoy the privilege of being able to choose their *provider of care* between the public NHS and any of the private insurance companies that want to enter the scheme. This special feature of the Spanish health system is going to be very important in our study. Approximately 85% of Muface members choose a private insurance company and 15% choose the NHS as their provider; in the armed forces (Isfas) the percentages are 70% and 30%, respectively.

Under the public system, the delivery of health care services to the population is quite clearly marked and channelled and choice is very limited. Every Spaniard is assigned a general practitioner that, in turn, is linked to a group of medical specialists for referral services, and also linked to a hospital for in-patient services. Change of GP within a defined health area is permitted in many regions, but it is limited by space in the doctor's list and it has to be approved by the local health area inspector. First access to specialists has to be granted by the general practitioner, who thus acts as a *gatekeeper*. GPs can only refer patients to the specialists they are administratively linked to and exceptions, again, have to be approved (Andalusia has introduced free choice of specialist, starting in 1998). Access to hospitals can be

obtained either through a general practitioner referral, a specialist referral or through the emergency door. Most services are provided in publicly owned facilities (primary care centres and hospitals), staffed with public employees. Altogether, the system performs reasonably well, or even very well, according to some international standards<sup>10</sup>.

### **1.3.3. Equity of the system**

#### **1.3.3.1. Equity in the finance of health care**

The first relevant issue regarding the level of equity of the system is to what extent health care is financed according to one's ability to pay. Wagstaff, Van Doorslaer *et al.* (1999) and Calonge and Rodríguez (1998) measure progressivity or vertical equity<sup>11</sup> in the finance of health care by computing the Kakwani index, which equals the difference between the tax-payments concentration index and the Gini coefficient for income. The authors find that the combination of all taxes (progressive income tax, regressive indirect taxes, property taxes, etc.) paid by the Spanish population results in a roughly proportional (or a mildly progressive) the Health Care System. This means that every citizen contributes to the finance of health care by a similar fraction of his/her earnings, regardless of their total level of health.

#### **1.3.3.2. Equity in the delivery of health care**

From a more global perspective on the redistributive effect of the system, it is necessary to consider who benefits from it, that is, who receives the health services. In public health systems the dominant principle is that of horizontal equity – people in

---

<sup>10</sup> Spain ranked 7<sup>th</sup> in the league of 191 countries analysed in the World Health Report 2000 (WHO, 2000).

<sup>11</sup> Vertical equity in health care finance exists if individuals or households of unequal ability to pay make appropriately different contributions to health care financing.

equal need of care (in terms of morbidity) ought, on average, to be treated equally, regardless of their socio-economic conditions. Van Doorslaer, Wagstaff *et al.* (1992) employ two approaches to study the income-related inequity in the delivery of health care in seven European countries and the USA. First, they rank individuals by income and then compare the cumulative percentage of morbidity-standardised health care expenditures across income groups. The second approach consists of controlling for differences in morbidity by implementing regression analysis (a two-part model), to test for significant relationship between income and health care use. The results, based on data for 1987, reveal that in Spain people with similar morbidity levels do not receive similar treatments (including public and private services) and that this inequity is related to income. On the other hand, Calonge and Rodríguez (1998) compare the distribution of only public health expenditures across households<sup>12</sup> to the distribution of income and find that consumption of these health services is quite uniformly distributed across income deciles. This means that the net redistributive effect of the health care system takes place through the expenditures side. Richer individuals pay more but receive the same as the rest of individuals, while for the poorer members of society the reverse holds. Following the methodology proposed by Wagstaff and Van Doorslaer (2000), Urbanos-Garrido (2001a and 2001b) studies the existence of social inequalities (the classification variable she uses is social class instead of income) in the utilisation of public health care (visits to GPs and specialists, emergency visits and hospital care) in several years 1987, 1993, 1995 and 1997. Her results show that poor individuals are more frequent users of primary health services and hospital care than the rest of the population with similar levels of need. Specialists services change from a certain degree of pro-rich inequity in 1987 to some pro-poor inequity in 1997. However, the estimated levels of inequity in 1997 are not statistically significant, indicating that the utilisation of those types of public health services is relatively evenly distributed among the different income groups. Finally, although not significant, the results about emergency visits show that poor individuals tended to seek emergency care

---

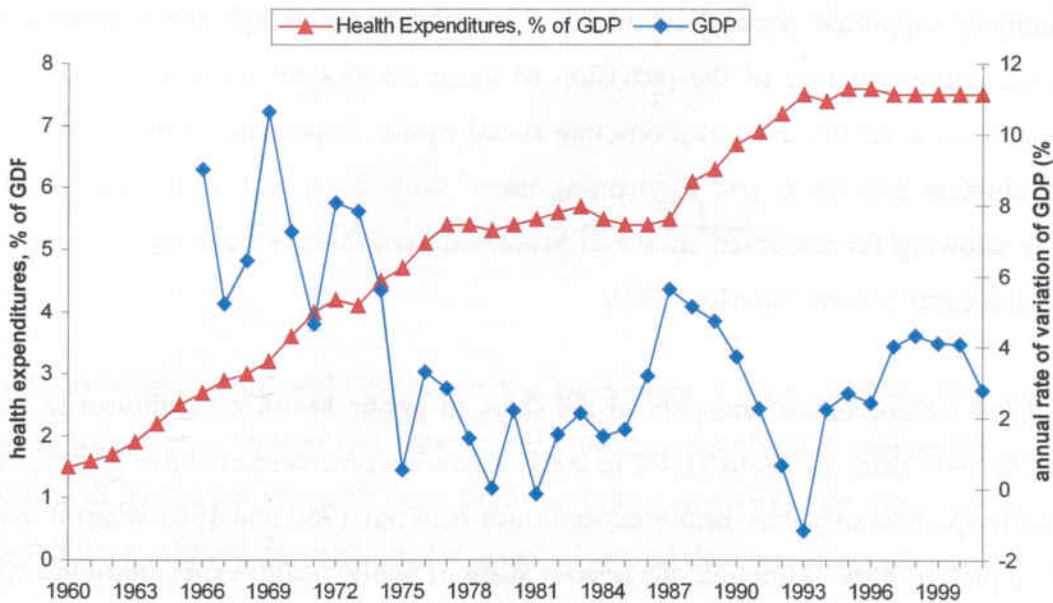
<sup>12</sup> The total public health expenditures are assigned to the different households based on the number and age of their members.

relatively more than the better-off in 1987, 1993 and 1995. The tendency has changed in 1997, with rich people attending the emergency rooms significantly more often.

#### 1.4. HEALTH CARE EXPENDITURES

According to OECD Health Data 2002 health care sector represents (on average) 8.5% of the GDP of most developed countries. In Spain 7.5 percent of national income was devoted to health care in 2001. Similarly to other countries, there has been a notable increment in health care expenditures observed over the last forty years (see figure 1.3). However, the most interesting feature is that the expansion of

**Figure 1.3.** Evolution of GDP and the share of health expenditures in the GDP in Spain.



Source: OECD Health Data 2002 and Instituto Nacional de Estadística (Tempus series).

health care expenditures appears to be completely “independent” of the overall growth pattern of the economy. While the annual growth rate of GDP shows important volatility, health care sector in Spain has been continuously rising between 1960 and 1993. Since then, the fraction of GDP represented total health expenditures has stayed relatively stable. The main reasons of the incessant growth of health expenditures in the developed world are the rising proportion of the elderly population that also forms the largest group of health services users, the emergence of new and costly health threats, the development of advanced and the improvement of the existing treatment techniques, and the changes in the living conditions that lead to increased expectations and demand for health of the citizens.

#### **1.4.1. Public health expenditures**

Public health care sector bears more than two-thirds of these health care expenditures in most industrialised countries. The USA is a notable exception with only less than 50% of all health expenditures publicly financed (see table 1.1). These public expenditures are employed to guarantee the universal entitlement of the citizens to a publicly supported package of health care services. Although the economic and organisational nature of the provision of those health care services differs across countries, it ideally aims at promoting social equity, improving quality of care and production efficiency, and augmenting users’ satisfaction with health care services (by allowing for increased choice of health care provider or ensuring fast access to health care) (Chernichovsky, 2000).

Figure 1.4 charts the time-path of the share of public health expenditures in Spain since 1960 from 58.7% to 71.4% in 2001. There is an increase of above 20 percent in the proportion of public health expenditures between 1960 and 1983 when it comes to a pick of 85%. Although, the overall share of public health expenditure has risen, its pattern has been quite volatile between 1960 and 1976, the year when the long period of dictatorship came to an end. Between 1976 and 1982 Spain has been



**Table 1.1.** Public expenditures in health in 2001, percentage of total expenditures on health in some OECD countries.

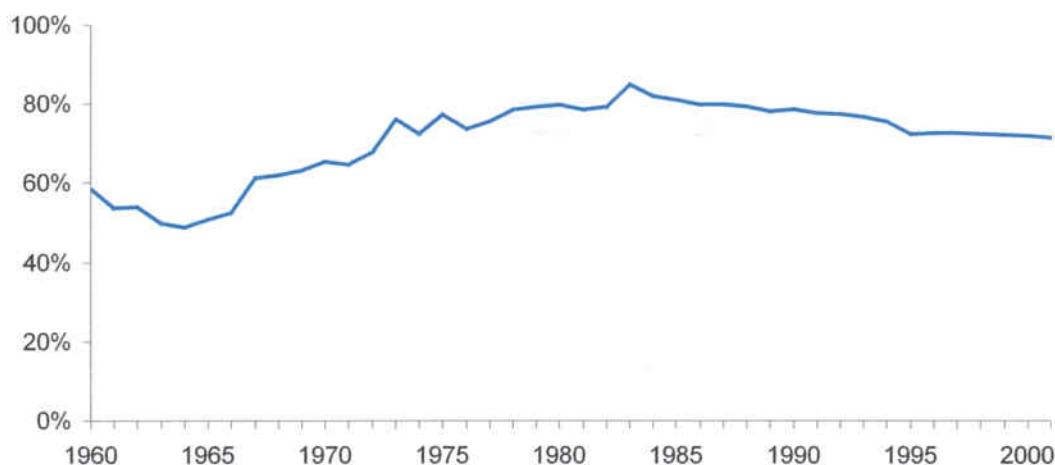
<b>Country</b>	<b>2001 (%)</b>
Austria	67.9
Belgium	71.7
Canada	70.8
Denmark	82.4
Finland	75.6
France	76.0
Germany	74.9
Greece	56.0
Iceland	82.9
Ireland	76.0
Italy	75.3
Luxembourg	87.8
Netherlands	63.3
Norway	85.5
Portugal	69.0
Spain	71.4
Sweden	85.2
Switzerland	57.1
United Kingdom	82.2
<b>Europe (average)</b>	<b>74.3</b>
Australia	67.9
Japan	77.9
New Zealand	76.4
United States	44.4

*Source: OECD Health Data 2002*

governed by the centre-right Union of the Democratic Centre. In 1982 the social democrats come into power and, interestingly (because a priori it is against the social doctrine defended by the politicians from the left), since 1983, the share of public expenditures in health has exhibited a marginal annual decline (of about 0.5%) up to

1995 when a fall of above 3% is apparent<sup>13</sup>. Since 1995 the central (politicians from the centre-right Popular Party replaced the social democrats in March 1996) and regional governments have financed about 72% of all health care expenses. This figure is just below the average share of 74% of the European countries (see table 1.1).

**Figure 1.4.** Evolution of the share of public health expenditures in total health expenditures in Spain.



Source: OECD Health Data 2002.

### 1.4.2. Private health expenditures

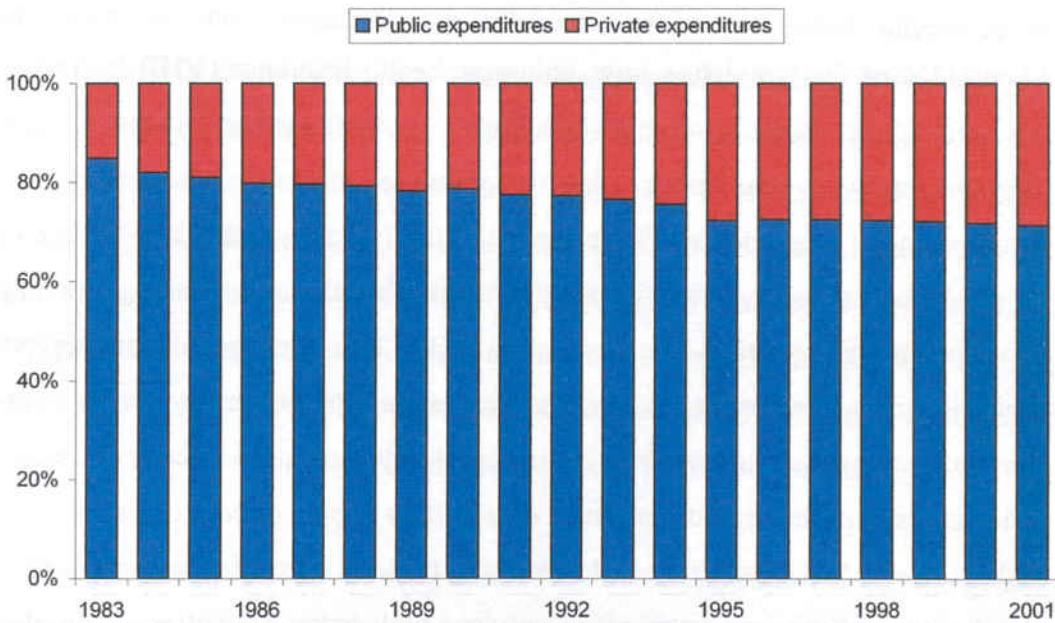
As noted above, the share of public health expenditures in total health expenditures has experienced small, but continuous, decline over the last two decades. This same information can be interpreted as a constant increase in the share of private health care expenditures (see figure 1.5). In 2000 and 2001 more than 28 per cent of the country's total health expenditures were financed privately. What do the private

<sup>13</sup> The decline in 1995 should be interpreted with caution as according to the Spanish Ministry of Health introduced in this year a new methodology of computation of public health expenditures was introduced.



health expenditures buy in a Health System that covers almost the whole population and ensures access to quite thorough package of health services? Private health expenditures buy goods and services that are either complementary or substitute to the ones supplied by the public health sector (Rodríguez, 1988). They include out-of-pocket payments to the public sector (basically co-payments for pharmaceuticals), out-of-pocket payments to the private sector (direct payments or fee-for-service), and voluntary health insurance premia (Propper and Green, 2001).

**Figure 1.5.** Health care expenditures by source of financing, 1983-2001.



Source: OECD Health Data 2002.

#### 1.4.2.1. Out-of-pocket payments to the public and private sectors

According to data from the Continuous Expenditures Family Survey (2000) out-of-pocket payments, which finance health products and services that are either complementary or substitute to the public sector, constitute about 23.27% of all health care expenditures. There are two groups of complementary health products

and services: orthopaedic and ophthalmologic products and dental services. Orthopaedic apparatus and ophthalmologic products (eyeglasses, contact lenses, etc.) represent around 21% of the out-of-pocket payments, and dental treatments and products account for another 25%. Substitute health products and services include medicines, inpatient and outpatient services. Co-payments by patients for pharmaceuticals constitute the highest share of out-of-pocket expenditures, 34%. Private expenses on other outpatient and inpatient services represent 16% and 4%, respectively.

#### **1.4.2.2. Voluntary health insurance**

About 11% of the population buys voluntary health insurance (VHI) in Spain. We can distinguish three possible situations – supplementary, substitutive and complementary to the public health coverage insurance (according to the terminology by Mossialos and Thomson (2002)). First, people that buy VHI *on top of* the public coverage pay twice for insuring against health risks already granted by the universal public coverage (supplementary VHI). For these people buying private health insurance implies having duplicate coverage. Supplementary health insurance does not buy financial certainty. It is essentially purchased because it facilitates faster access and increased consumer choice (this means direct access to specialist without need of a GP referral and less waiting time for specialists appointments), but also because private coverage offers services with better amenities, more pleasant atmosphere, etc. Second, people that purchase VHI because they are not covered by the public system (approximately 0.5-1% of the population). It is important to remark that only in this case we can appropriately think of private insurance as providing financial certainty, which otherwise is generally granted by the statutory scheme. Note also that for these people VHI does not constitute duplicate coverage, but a substitute one. Likewise, for civil servants choosing this provider option, access to care through a private insurance company does not mean having duplicate coverage either. At last, complementary health policies insure against risks associated with the

utilisation of services excluded or not fully covered by the state. Dental insurance policies subscribed by some people are of complementary nature.

### **1.5. THREE TOPICS OF FOCUS IN THE PUBLIC-PRIVATE INTERFACE**

As noted in section 1.4.2 the importance of private financing in health care has risen over the last decades. The continued growth of private health expenditures is considered to have adverse consequences for equity in the access and utilisation of health care services. Regarding the increase of out-of-pocket payments for complementary to the public sector health care, the main concern is that the poor members of the society are likely to reduce (or even not use at all<sup>14</sup>) their utilisation of health products and services more than the better-off. This may result in violation of the principle of horizontal equity, according to which people with similar needs should be treated equally, irrespective of their income. With respect to expenditures on private health insurance premia and on other health services that are substitutes to the ones provided by the public sector, the most important consideration is that those expenditures may ensure access to health services of a different “quality”.

The topics presented in the following chapters of this thesis follow up on the general knowledge about inequity in health and health care delivery by trying to study more in depth how some aspects of private health care financing affect equity in the context of the *mainly public* Spanish Health Care System. Especially, we address the following three issues:

---

<sup>14</sup> Dental care is a pronounced example.

- **Potential inequalities in the pattern of utilisation of health care services due to socio-economic factors and not to differences in health.**

We investigate the role of the individual's health insurance status (determined by the purchase of voluntary health insurance) on both the choice between using GP or specialists services and the choice between consulting private or public health care provider. The interest of health economists and policy makers in the impact of private health coverage on the utilisation of physician services is based not only on equity concerns, but also on issues of its appropriate fit in the predominantly public Spanish health care system.

- **Determinants of the demand for private health insurance.**

Given the importance of the type of insurance access to health care in the pattern of utilisation of physician services found in chapter 2, we study the individuals' decision to purchase voluntary health insurance in chapter 3. We model this decision as a function of a wide range of considerations that include price, personal characteristics and regional public and private health sector features. Determining the factors that motivate the individual's decision to purchase private health insurance in the presence of universal obligatory public health coverage is a fundamental element in the design of public health policies.

- **Inequalities in dental health and dental care utilisation.**

In chapter 2 we studied the utilisation of health services included in the public health benefits package, but for which some people buy supplementary health coverage. In chapter 4, we examine the extent and causes of inequalities in the utilisation of health services altogether excluded from the public finance and provision. We present a formal analysis of the inequalities and inequities in dental health and dental care

utilisation and seeks an answer to a more basic policy question: should dental care be included in the public health benefits package? The relevance of this question is backed by the recent interest in dental health issues demonstrated by the policy makers. In its 2004 pre-electoral programme, regarding health policy, the conservative Popular Party proposes the inclusion of dental health services for two segments of the population – the young (under 15 years of age)<sup>15</sup> and the adults above 65 years – in the package of publicly provided health services.

### 1.5.1. Choice of health care provider

The second chapter studies the individual's health care utilisation behaviour, specifically, his/her demand for physician visits. A principal emphasis is put on the role of the type of insurance access: public only, private only or both public and private. The exceptional principle of civil servants, who can choose their provider of care between the public NHS and the private sector is especially taken into account.

The main contribution of our study is the analysis the choice of physician as involving *two attributes or characteristics*: whether the physician is a GP or a specialist, and whether the visit takes place through a public or a private payment mechanism. The individual's utility maximisation problem is empirically tested by means of a two-stages probit, corrected for heteroskedasticity. The data are obtained from the Spanish Health Survey of 1997. Our main conclusion is that differences in the insurance access has the strongest effect on both, the choice of sector and kind of physician contacted. The insurance access status determines very different patterns of consumption of GP and specialists visits. People with only public insurance go 2.8 times to the generalist per one time that they visit a specialist; individuals with duplicate coverage have a ratio of GP/specialist visits equal to 1.4 (the combination being public GP and private specialist) and persons with access to the private health

---

<sup>15</sup> This proposal follows the example of other European countries (Denmark, Finland, Germany, the Netherlands, Sweden) that guarantee free dental care for those under 18 (under 20 in Sweden).



sector only actually have an “inverted” pattern of visits; they contact (private) specialists more often than GPs. Age, sex and health and public supply characteristics also have a distinct and interesting impact on these choices.

The crucial question arising from our findings is who (which insurance access group) is doing it right from a medical perspective? Although no definite answer can be given, we are inclined to think that because individuals with duplicate coverage have a more balanced consumption arising from the widest choice of health care provider, their pattern of utilisation of health services is closest to the answer. Finally, equity concerns based on the implied assumption that specialists care is superior to general practitioner care are discussed.

### **1.5.2. Demand for supplemental health insurance**

Given that the type of insurance access appeared to be the main determinant of the choice of health care provider, chapter three offers a more comprehensive analysis of the individual’s decision to purchase voluntary health insurance. In Spain the statutory health coverage already fulfils the basic function of health insurance, which is to smooth the financial risks associated with uncertain future health care costs. Consequently, the purchase of VHI must be motivated by other factors, for example, the inflexibilities of the public sector. The economic theory predicts that private purchases should be sensitive to such concerns since, in the private sector, individuals can guarantee themselves faster access to treatment when necessary. Furthermore, the privately insured also gain access to certain “hotel benefits” such as better food, private rooms in hospitals, more pleasant atmosphere, the courtesy of health personnel and many other facets of a personalised service.

The theoretical model behind the analysis is that of risk averse individuals who maximise their expected utility. Thus, voluntary health insurance is purchased if the expected utility of being privately insured exceeds the expected utility of not having

private health insurance coverage. The demand for voluntary health insurance equation is estimated using data from the panel of the Spanish Family Expenditures Survey 1999-2000, which allows for the testing of some dynamic effects. We add several contributions to the existing literature on the demand for voluntary health insurance by accounting for changes in public and private health sector supply and by including some specific regional variables instead of just having a dummy for each region. We also discuss the importance of price by analysing the impact of the Personal Income Tax Reform in 1999, which abolished the existing tax deduction on individually purchased private health policies and introduced a fiscal advantage for employer-provider health policies.

The estimation of the random effects probit model shows that the decision to contract private health insurance stems from a wide variety of considerations that include price, personal characteristics – including “tradition” of insurance purchase in the region – and regional attributes of the public and private health sectors. Our findings also confirm the hypotheses that regional public health expenditures are negatively correlated to the probability of buying private health insurance, while the presence of private medical facilities with high technology equipment in the region of residence exerts a positive effect on the purchase of private health policies. At last, if the goal of the 1999 Personal Income Tax Reform was to promote health insurance policies contracted by the employer, then our results indicate that the reform was successful.

### **1.5.3. Inequalities in dental health and dental care utilisation**

Chapter four is an investigation of income-related inequality and inequity in dental health and dental services utilisation in Spain. In the analysis we employ the methodology of concentration curves and concentration indices, commonly used in the research of income-related inequality in health and health care. This methodology has never been specifically applied in the measurement of income-related inequality and inequity in dental health and health care before. The data (as in the empirical

analysis in chapter two) comes from the 1997 Spanish Health Survey. Following the construction of general health indicators in the health economics literature, we construct a measure of good dental health based on the objective oral health indicators available in the data.

Our findings confirm the hypothesis of the existence of significant income-related inequity in the distribution of good dental health favouring the wealthier segments of the population. Besides studying dental health inequities, in this chapter we also offer a broad view about inequalities and inequities in dental services utilisation, which is measured by two alternative indicators – a dichotomous variable representing usage of dental services within the last year and a count variable containing the number of dental visits during the last three months. Two different econometric models (a probit and a generalised negative binomial model) are estimated. The aim was to contrast the findings obtained with the two measures and to provide results that can be compared with future results from other countries. Independently of the variable used as a measure of dental services utilisation, we find significant pro-rich inequity in the utilisation of that type of services. Finally, our findings about income-related inequities in the utilisation of specific types of dental care reveal that preventive care (like diagnostics and teeth cleanings), basic restorative care and aesthetic services are concentrated among the wealthier segments of the population, while oral surgery (tooth extractions) – the cheapest way of treating a damaged tooth besides being the only one provided by the public sector – is the only type of dental care with unequal distribution favouring the poor.

The existence of inequities in dental health and dental services utilisation is to be expected in a system where high treatment prices, usually paid out-of-pocket, constitute an important barrier to access care. Including dental services, or at least preventive dental care, in the package of publicly provided health services may be the right policy to adopt.



## REFERENCES

Arrow, K. (1963), "Uncertainty and the Welfare Economics of Medical Care", *American Economic Review*, **53**, 941-973.

Buchanan, J.M. (1970), "Notes for an Economic Theory of Socialism", *Public Choice*, **8**, 29-43.

Barr, N. (1998), *The Economics of the Welfare State*, 3<sup>rd</sup> edition, Stanford University Press, Stanford.

Bergstrom, T., and S. Blomquist (1996), "The Political Economy of Subsidized Day Care", *European Journal of Political Economy*, **12**, 443-457.

Besley, T., and S. Coate (1991), "Public Provision of Private Goods and the Redistribution of Income", *American Economic Review*, **81**, 979-984.

Besley, T., and M. Gouveia (1994), "Alternative Systems of Health Care Provision", *Economic Policy*, **19**, 200-258.

Blackorby, C., and D. Donaldson (1988), "Cash Versus Kind, Self-Selection, and Efficient Transfers", *American Economic Review*, **78**, 691-700.

Blomquist, S., and V. Christiansen (1995), "Public Provision of Private Goods as a Redistributive Device in an Optimum Income Tax Model", *Scandinavian Journal of Economics*, **97(4)**, 547-567.

Blomquist, S., and V. Christiansen (1998a); "Topping up or Opting out? The Optimal Design of Public Provision Schemes", *International Economic Review*, **39(2)**, 399-411.

Blomquist, S., and V. Christiansen (1998b), “The Political Economy of Publicly Provided Private Goods”, *Political Economy*, **39(2)**, 399-411.

Callejón, M., and V. Otrún (2003), “Empresa privada en sanidad: grado de adecuación a las diferencias funcionales sanitarias”, in López-Casasnovas, G. (Ed.) *El interfaz público-privado en Sanidad*, Masson, S.A., Barcelona, pp.105-121.

Calonge, S., and M. Rodríguez (1998), “Consecuencias distributivas y de equidad de las políticas de gasto y financiación de la sanidad”, *Papeles de Economía Española*, **76**, 259-272.

Chernichovsky, D. (2000), “The Public-private Mix in the Modern Health Care System – Concepts, Issues, and Policy Options Revised”, NBER Working Paper Series, Working paper No. 7881, <http://www.nber.org/papers/w7881>, [16 November 2003].

Cremer, H., and F. Gahvari (1997), “In-kind Transfers, Self-Selection and Optimal Tax Policy”, *European Economic Review*, **41**, 97-114.

Cutler, D. (2002), “Health Care and the Public Sector”, NBER Working Paper Series, Working paper No. 8802, <http://www.nber.org/papers/w8802>, [15 November 2003].

Diener, A., O'Brien, B., and A. Gafni (1998), “Health Care Contingent Valuation Studies: A Review and Classification of the Literature”, *Health Economics*, **7**, 313-26.

Elster, J. (1992), *Local Justice: How Institutions Allocate Scarce Goods and Necessary Burdens*, Russell Sage Foundation, New York.

Epple, D., and R.E. Romano (1996), “Public Provision of Private Goods”, *Journal of Political Economy*, **104**, 57-84.

Gouveia, M. (1997), "Majority Rule and the Public Provision of a Private Good", *Public Choice*, **93**, 221-244.

Hindriks, J., and P. De Donder (2003), "The Politics of Redistributive Social Insurance", *Journal of Public Economics*, **87**, 2639-2660.

Hurley, J. (2000), "An Overview of the Normative Economics of the Health Sector", in A.J. Culyer and J.P. Newhouse (Eds.) *Handbook of Health Economics*, Elsevier, Amsterdam, Chapter 2, pp.55-118.

Hurst, J. (1992), *The Reform of Health Care: A Comparative Analysis of Seven OECD Countries*, OECD, Paris.

Kalisch, D., Aman, T., and L. Bucéle (1998), "Social and Health Policies in OECD Countries: A Survey of Current Programmes and Recent Developments", Labour market and social policy - occasional paper N°33. DEELSA/ELSA/WD(98)4. <http://www.oecd.org/EN/documents> [15 January 2003].

Klose, T. (1999), "The Contingent Valuation Method in Health Care", *Health Policy*, **47(2)**, 97-123.

López-Casnovas, G., and V. Ortún Rubio (1998), *Economía y salud. Fundamentos y políticas*, Ediciones Encuentro, Madrid.

Mossialos, E., Thomson, S., *et al.* "Voluntary Health Insurance in the European Union", Report Prepared for the Directorate General for Employment and Social Affairs of the European Commission, [http://europa.eu.int/comm/employment\\_social/soc-prot/social/prot/social/index\\_en.htm](http://europa.eu.int/comm/employment_social/soc-prot/social/prot/social/index_en.htm), [27 February 2002].

Olsen, J.A., and R. Smith (2001), "Theory Versus Practice: A Review of "Willingness-to-pay" in Health and Health Care", *Health Economics*, **10**, 39-52.

Pauly, M.V. (1968), "The Economics of Moral Hazard", *American Economic Review*, **58(3)**, 231-237.

Pauly, M.V. (1992), "The Normative and Positive Economics of Minimum Health Benefits", in P. Zweifel and H.E. Frech (Eds.), *Health Economics Worldwide*, 3<sup>rd</sup> edition, Basil Blackwell, Oxford.

Propper, C., and K. Green (2001), "A Larger Role for the Private Sector in Financing UK Health Care: The Arguments and the Evidence", *Journal of Social Policy*, **30**, 685-704.

Rodríguez, M. (1988), "El gasto sanitario en Cataluña. Análisis del gasto sanitario privado y su contribución a la política sanitaria", PhD thesis, University of Barcelona.

Rodríguez, M. (2001), "El espacio de los seguros privados en los sistemas sanitarios públicos: marco conceptual y políticas", *Gaceta Sanitaria*, **15(6)**, 527-237.

Rothschild, M., and J. Stiglitz (1976), "Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information", *Quarterly Journal of Economics*, **90**, 629-649.

Spann, R.M. (1974), "Collective Consumption of Private Goods", *Public Choice*, **20**, 63-81.

Ryan, M., Scott, D.A., Reeves, C., Bate, A., van Teijlingen, E., Russell, E., Napper, M., and C. Robb (2001), "Eliciting Public Preferences for Health Care: A Systematic Review of Techniques", *Health Technology Assessment*, **5(5)**.

Stiglitz, J.E. (1974), "The Demand for Education in Public and Private School Systems", *Journal of Public Economics*, **3**, 349-385.

Tobin, J. (1970), "On Limiting the Domain of Inequality", *Journal of Law and Economics*, **13**(October), 263-77.

Urbanos-Garrido, R.M. (2001a), "Explaining Inequality in the Use of Public Health Care Services: Evidence from Spain", *Health Care Management Science*, **4**, 143-157.

Urbanos-Garrido, R.M.(2001b), "Measurement of Inequality in the Delivery of Public Health Care: Evidence from Spain", FEDEA Working Paper 2001-15 (Fundación de Estudios de Economía Aplicada),

<http://www.fedea.es/hojas/publicaciones.html> [12 January 2003].

Usher, D. (1977), "The Welfare Economics of the Socialization of Commodities", *Journal of Public Economics*, **8**, 151-168.

Van Doorslaer, E, Wagstaff, A., Calonge, S., Christiansen, T., Gerfin, M., Gottschalk, P., Janssen, R., Lachaud, C., Leu, R.E., Nolan, B., O'Donnell, O., Paci, P., Pereira, J., Pinto, C.G., Propper, C., Reñe, J., Rochaix, L., Rodríguez, M., Rutten, F., Upward, R., and B. Wolfe (1992), "Equity in the Delivery of Health Care: Some Cross-country Comparisons", *Journal of Health Economics*, **11**(4), 389-411.

Wagstaff, A., Van Doorslaer, E., Van der Burg, H., Calonge, S., Christiansen, T., Citoni, G., Gerdtham, U.-G., Gerfin, M., Gross, L., Häkinnen, U., Johnson, P., John, J., Klavus, J., Lachaud, C., Lauritsen, J., Leu, R., Nolan, B., Perán, E., Pereira, J., Propper, C., Puffer, F., Rochaix, L., Rodríguez, M., Schellhorn, M., Sundberg, G., and O. Winkelhake (1999), "Equity in the Finance of Health Care: Some Further International Comparisons", *Journal of Health Economics*, **18**, 263-290.

Wagstaff, A., and E. Van Doorslaer (2000), "Measuring and Testing for Inequity in the Delivery of Health Care", *Journal of Human Resources*, **XXXV(4)**, 716-733.

Wilson, C. (1977), "A Model of Insurance Markets with Incomplete Information", *Journal of Economic Theory*, **16**, 167-207.

## **CHAPTER 2**

### **THE ROLE OF PRIVATE HEALTH INSURANCE ACCESS ON THE CHOICE OF PHYSICIAN<sup>1</sup>**

#### **2.1. INTRODUCTION**

##### **2.1.1. Preliminary comments and objective of the study**

One of the latest findings of the international team lead by Van Doorslaer, Wagstaff *et al.* (2000) is the existence of a significant pro-rich inequity in physician visits in many of the European countries due to a differential use of general practitioners (GPs) and specialists by the rich and the poor. A generalised pattern emerges in almost all the countries: the higher-income groups are more intensive users of

---

<sup>1</sup> A version of this chapter written with Marisol Rodriguez is forthcoming in Health Economics.

specialist services while the lower income groups use visits to the GP much more. Recently, Van Doorslaer, Koolman and Puffer (2002) have tried to investigate the role of non-need factors, such as private insurance coverage and regional differences in explaining the results observed in the previous study. Using a common data set (the European Community Household Panel – ECHP) they confirm the same pattern for most countries – including Spain<sup>2</sup> – and conclude that standardising for private health insurance coverage and regional disparities in utilisation lowers the level of income-related inequity in the use of specialists services, but does not entirely remove it. Polhmeier and Ulrich (1995) had also reported a positive effect of income and private health insurance on the use of specialists in Germany, while the sign was negative in the case of general practitioners. However, Jiménez, Labeaga and Martínez (2002) do not find any effect of income on the number of visits to the GP in the twelve European countries they analyse, and only a concave effect on the decision to contact an specialist.

The objective of the study presented in this chapter is to follow up on Van Doorslaer, Koolman and Puffer (2002) results by trying to explain more in depth the role of private health insurance coverage on the differential use of specialists and GP visits in Spain. The effects of private health insurance on the utilisation of health services are of interest to health economists and policy makers not only out of equity concerns, but also because of issues of its appropriate fit in predominantly public health care systems, like the European ones. We use a different data set that allows for a better definition of the type of insurance access held by the individual and gives detailed information about the characteristics of the last visit to a doctor. This way, we can model the choice of physician as involving two attributes or characteristics: whether he/she is a GP or a specialist, and whether the visit takes place through a public or a private payment mechanism.

---

<sup>2</sup> Spain is one of the countries included in the work by Van Doorslaer, Koolman and Puffer (2002), to which their general conclusions apply. It shows a significant pro-poor distribution of GP visits (the highest among the countries studied); a significant pro-rich distribution of specialist visits that does not disappear after adjusting for private insurance coverage and region, and the overall number of visits is somewhat pro-poor distributed, but it is not significant.



### 2.1.2. Previous studies using Spanish data

There have been several studies in Spain that have dealt with the demand for physician visits, alone or together with other medical services. Already in 1993, Rodríguez, Calonge and Reñé (1993) had reported that the distribution of health care expenditures showed a U-shape across income groups, which was due to a turning-point in the type of doctor visited in the fourth quintile. In fact, visits to the specialist accounted in 1987 (the year of their data) for 40% of total visits in the top quintile, whereas the proportion was only half in the bottom group.

Urbanos-Garrido (2001a and 2001b) estimates the degree of inequality in the utilisation of *public* health care services amongst individuals with similar need in several years: 1987, 1993, 1995 and 1997. Her results reveal the existence of pro-poor inequity in public GP visits for all years; however, visits to public specialists change from a certain degree of pro-rich inequity in 1987 to some pro-poor inequity in 1997.

Vera-Hernández (1999) analyses the effect of duplicate coverage, but only on the demand for *specialist* visits and only in Catalonia. One of his conclusions is that having private health insurance on top of the public one increases the average number of visits to specialists by 27%; income having a positive effect, too. Nevertheless, his variable indicating duplicate health coverage may not be very accurate in all cases, since the special insurance status of civil servants is not clearly defined in the survey he used.

Álvarez (2001) also finds a positive effect of income and private coverage on the *total number* of visits for 1993 data. Availability of physicians in the residence area seems to affect the contact decision, but not the frequency of visits.

Puig-Junoy, Sáez and Martínez-García (1998) focus on patient-initiated contacts to study the choice among a visit to a GP (public and private), to an emergency

department or to a specialist (private) taking into account the form of coverage of the election: public insurance, private insurance and direct payment. They find that indirect access costs (travel time and waiting time) play an important role in the choice of health care provider when monetary prices are zero, especially in the case of emergency visits. Together with this, they report high cross time elasticities, showing that emergency visits are good substitutes for GP and specialist visits.

Abásolo, Manning and Jones (2001) test empirically the existence of horizontal and vertical equity, defined with respect to need, in the utilisation of and access to *public-sector* GPs in Spain during 1993. They conclude that the utilisation of GP services in Spain is consistent with the principle of vertical equity, but that there is horizontal inequity in utilisation favouring, among others, the lower socio-economic groups, women with a lower level of education, men who are not working and individuals residing in selected regions.

### **2.1.3. What differentiates this study?**

Our study is different from this previous research in several ways. First of all, we do not investigate the decision to contact a physician nor the determinants of the number of visits; what we analyse is the choice of provider using information on the characteristics of the last visit. In this sense our work is closest to that of Puig-Junoy, Sáez and Martínez-García (1998) but we do not restrict our analysis to patient initiated contacts and we take a different partition of the choices involved. With respect to other studies, we consider both, specialist *and* GP visits and public *and* private visits. More important, we draw a careful distinction among the three possible access situations involved by public and private insurance in Spain, which is done for the first time. Finally, we do not specifically measure equity, but discuss the implications of our results in its light, from an epidemiological perspective.

The present chapter is structured as follows. In the next section the type of insurance status variable is defined. Then, in the third section we outline the theoretical framework behind the analysis. In section four we describe the data used and the potential explanatory variables, as well as present some descriptive statistics. This is followed by the econometric specification and a discussion about the exogeneity of the insurance status variable. The estimations results are commented in section seven. The final section contains discussions of the findings and concludes.

## **2.2. TYPES OF INSURANCE ACCESS**

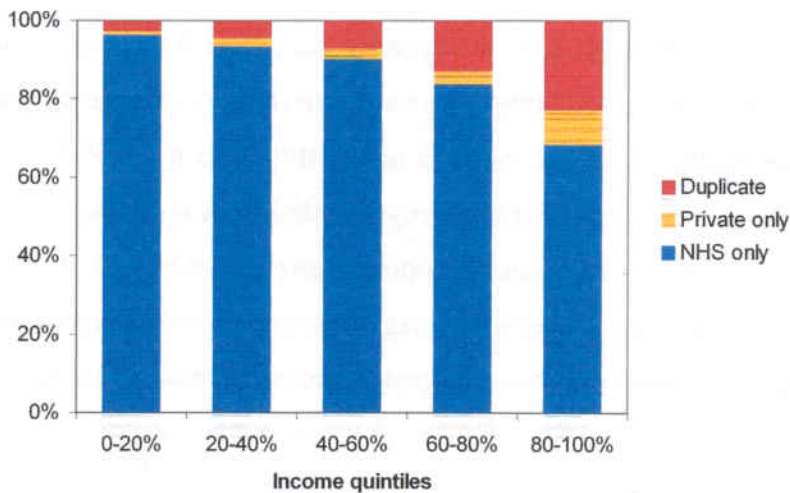
Institutional settings are of prime importance in understanding the incentives that determine the amount and type of medical services used in any country. Chapter 1 offers a detailed description of the organisation and structure of the Spanish Health System (see section 1.3). Here we just want to call up some of its characteristics related to health insurance coverage that are of special relevance for the present study. The National Health System, now financed 100% out of general taxes, is the principal source of health care for almost the entire Spanish population. Civil servants and members of the armed forces are also entitled to the obligatory public coverage, but under a special social security regime. They have the option of choosing their provider of health care between the public NHS and any of the private insurance companies participating in the scheme. If they choose the second option, their private health insurance acts as a substitute to the public one<sup>3</sup>. Finally, approximately 11% of the individuals buy private health insurance. For the majority of these people private insurance is supplementary to the public one, which implies that they enjoy duplicate health coverage. For those not covered by the public insurance buying private health coverage does not mean having duplicate coverage.

---

<sup>3</sup> Appendix A describes the main characteristics of the sub-sample of civil servants.

Therefore, we can define three groups or access situations whose behaviour towards the choice of physician can be compared. The first group includes individuals who have access to the National Health System only, the second one gathers those people whose access is only through a private insurer and the last group consists of individuals who have duplicate coverage and can thus choose between visiting a public or a private physician at zero marginal cost. The majority of our sample belongs to the first group, 86.47%, including civil servants that have chosen the NHS as their provider of care. The second group (“private only”) contains 3.56% of the population made up of the sum of civil servants who opt for a private insurance company as a provider of health care rather than the NHS and the small number of individuals not covered by the public system who buy VHI as substitute cover. The last group (“duplicate”) includes all those that buy voluntary health insurance (either themselves or their employer) on top of their public coverage. They represent 9.97% of our total sample. Precisely because not all the people that purchase private insurance have the possibility of also using the public sector, and not all the people under an statutory scheme have the possibility that civil servants have of choosing to

**Figure 2.1.** Type of insurance access, by income quintiles.



Source: Spanish Health Survey, 1997.

access health care through a private insurance company, we always refer to differences in “access” status and not to differences in “insurance” status. And finally, it should be noted that all three groups can make visits to the private sector through direct payment.

Figure 2.1 shows the distribution of the three groups of access across income quintiles. The percentages of individuals with access to private health care increase with income. There are almost 32% of the individuals in the top quintile who report having private access, a fact that only affects less than 4% of the individuals in the bottom quintile.

### 2.3. THEORETICAL FRAMEWORK

The theoretical framework behind our analysis is a discrete choice model in the spirit of Gertler, Locay and Sanderson (1987) and Cameron *et al.* (1988). Individuals who want to visit a doctor, either because of a health shock (acute illness), a follow up of a chronic condition or a check-up must choose between various health provider alternatives. Based on their health status – measured by self-assessed health, presence of chronic conditions and limitations of usual daily activity, – household income, insurance access and other observable and unobservable characteristics, and the monetary and non-monetary access costs to each type of provider, individuals choose the alternative that yields the highest utility. In our case, we assume that the individual chooses the physician taking into account two sets of attributes: whether to go to a general practitioner or to a specialist, and whether to access through the public sector or through the private one. To what extent the physician takes part in this choice – probably influenced both, by his own constraints and the insurance status of the individual – cannot be observed and its effect will show up in the error term.

Let the vector  $y_{ij} = (y_{i1}, y_{i2}, y_{i3}, y_{i4})$  represent the individual  $i$ 's choice of alternative health care provider  $j$ .  $y_1$  denotes visit to a public general practitioner (GP),  $y_2$  to a public specialist,  $y_3$  to a private GP, and  $y_4$  to a private specialist.

Following the Grossman tradition, the individual  $i$  maximises utility function  $U(\cdot)$ , which is a function of the expected health status of individual  $i$  after receiving care from provider  $j$ ,  $H_{ij}$ , and the expenditures on other goods and services,  $C_i$ . He chooses the type of health care provider,  $y_{ij}$ , and the consumption of other goods and services,  $C_i$ :

$$\begin{aligned} & \max_{C_i, y_{ij}} U_i(C_i, H_{ij}), \\ & \text{s.t.} \left\{ \begin{array}{l} H_{ij} = H(y_{ij} | S_i, \eta_i, \varepsilon_i, Z_j), \\ p_3 \times y_{i3} + p_4 \times y_{i4} + C_i = Y_i - I_i \times \text{Pr}_i, \\ I_i \in \{0, 1\}, \\ y_{ij} \in \{0, 1\}, \\ j = 1, 2, 3, 4. \end{array} \right. \quad (2.1) \end{aligned}$$

The choice of provider depends on both observable ( $S_i$ ) and unobservable ( $\eta_i$ ) individual characteristics, on the existence of a random health shock,  $\varepsilon_i$ , and on health sector characteristics,  $Z_j$ .

The second equation in the constraints of the utility maximisation problem is the individual's budget constraint.  $Y_i$  denotes the individual's modified disposable income;  $I_i$  is a dichotomous variable, which equals 1 for those who hold VHI, and 0 otherwise;  $\text{Pr}_i$  is the insurance premium. The remaining two terms in the budget constraint represent the monetary price associated with private providers under direct payment:  $p_{i3}$  is the price per visit to a private GP and  $p_{i4}$  is the price per visit to a private specialist. Normally, it applies to those who do not possess VHI ( $I=0$ ) or to those who do but visit a doctor outside the insurance company's approved network.



These monetary prices are 0 for visits to a public doctor and for visits to a private doctor belonging to the insurance company's network when  $I=1^4$ . The special case of civil servants with access through a private insurance company is one in which  $I=0$  but  $p_3$  and  $p_4$  are zero, too.

## **2.4. DATA, DESCRIPTIVE STATISTICS AND VARIABLE DEFINITIONS**

### **2.4.1. The data**

The data are obtained from the Spanish Health Survey (Encuesta Nacional de Salud, ENS) conducted in 1997. The survey sample consists of 6,396 randomly selected individuals aged 16 and over for whom we have detailed information on their health status, utilisation of health services, lifestyles and various socio-economic characteristics (referring both to the individual and to the head of the household). After deleting those not responding to one of the relevant questions, the final sample contains 5,896 observations.

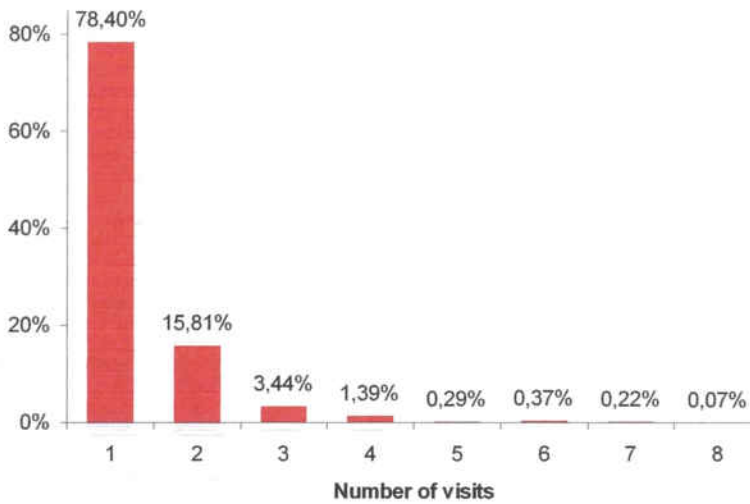
The survey collects data about the utilisation of all types of health services – medical and dental visits, emergency services, and hospitalisations. As our aim is to analyse the choice of general practitioner versus specialist, we only explore the information related to medical visits. Individuals are asked the number of visits to a doctor during the last 14 days prior to the interview. As figure 2.2 shows, almost 78.4% the interviewed, who have visited a doctor during the reference period, had made only one visit. Moreover, details about the reason of the visit, the type of physician visited and the financial mechanism used are available only for the last visit. Thus, we restrict our analysis to this last medical visit or, put it another way, to the individuals

---

<sup>4</sup> Some private insurance companies charge negligible co-payments for visits.

who had at least one visit to the doctor in the fortnight prior to the interview. Their number is 1,441.

**Figure 2.2.** Number of visits to a physician during the last 14 days prior to the interview.



*Source: Spanish Health Survey, 1997.*

#### 2.4.2. Descriptive statistics

Since our primary aim is to highlight possible differences in the behaviour of the individuals belonging to each of the three access groups we have identified, we start by describing their main characteristics (table 2.1). Most variables show important divergences, above all between the group with NHS access only and the other two groups. People with duplicate access or private access tend to be younger, report better health (by all indicators except perhaps acute spells that limit usual daily activities), are more educated, self-employed, professional or managerial staff, and live in bigger cities. Average family monthly income is also higher in these two



**Table 2.1.** Descriptive characteristics of the three insurance access groups.

<b>Variable</b>	<b>NHS only</b>	<b>Private only</b>	<b>Duplicate</b>	<b>Full sample</b>
N	5098	210	588	5896
%	86.50	3.50	10.00	
<b>Self-assessed health status (%)</b>				
Good and very good	67.24	80.00	76.36	68.60
Fair	24.07	17.62	20.75	23.51
Bad and very bad	8.69	2.38	2.89	7.89
<b>Health conditions (%)</b>				
Limited activity last year	22.32	18.10	17.35	21.68
Limited activity last 14 days	16.50	10.95	16.16	16.27
<b>Age (%)</b>				
16 – 35 years	39.10	42.38	44.73	39.77
36 – 65 years	44.31	44.77	44.68	44.37
More than 65 years	16.59	12.86	10.54	15.86
<b>Age (mean)</b>	44.46	43.00	41.40	44.10
<b>Sex (%)</b>				
Female	51.55	50.00	47.45	51.09
Male	48.45	50.00	52.55	48.91
Female in prime fertility age (%)	17.54	18.57	21.09	17.93
<b>Education (%)</b>				
Without studies	7.96	2.38	1.87	7.16
Primary	57.32	27.14	32.31	53.75
Secondary	24.66	34.29	39.80	26.51
University	10.06	36.19	26.02	12.58
<b>Labour status (%)</b>				
Working	43.81	55.78	38.91	36.76
Non-working	56.19	44.22	61.02	63.24
<b>Occupation (%)</b>				
Farmer/Self-employed/Employer	6.49	4.29	9.86	6.75
Professional	4.06	13.33	9.35	4.92
Managerial staff	2.41	7.62	9.01	3.26
Qualifies/Unqualified worker	23.79	18.57	27.55	23.99
<b>Town of residence size (%)</b>				
More than 400,000	15.77	28.10	45.24	19.15
50,001 – 400,000	32.68	42.86	22.79	32.06
10,001 – 50,000	24.95	14.29	17.86	23.86
Less than 10,000	26.60	14.76	14.12	24.93
<b>Income quintile (%)</b>				
Bottom	6.19	5.44	20.13	22.40
20-40%	11.90	9.01	20.05	21.66
40-60%	14.76	14.29	19.96	20.83
60-80%	18.10	25.85	20.00	19.40
Top	49.05	45.41	19.86	15.71
<b>Household income (mean)</b>				
	784.39€	1083.34€	1090.83€	825.60€

Source: Spanish Health Survey, 1997.

groups, although this variable is not very accurately measured. Since household income comes as a six interval categorical variable in the survey, and the rate of “no answer” is around 20%, we computed the household’s monthly income using the interval regression procedure (Stewart, 1983) given in Stata 7.0<sup>5</sup>. In the regression we controlled for possible differences due to age, sex and level of education of the head of household, labour, social and marital status of the respondent, as well as the region and size of the town of residence<sup>6</sup>. Using imputed income variable may introduce bias in the results. However, as Madden (2002) points out, the possible bias is a price worth paying to get a larger sample size.

Figure 2.3 illustrates the “tree” of choices made by each one of the groups, compared to the full sample. Beginning with the full sample, out of the 24.44% of the individuals who visited a physician during the reference period, approximately 71% visited a GP and 29% went to a specialist. With regards to the public/private choice, we observe that 87% used the public sector, while 13% used the private one (30% of those that visited a specialist and slightly more than 5% of those that saw a GP). However, differences by groups are quite dramatic. Individuals with NHS access only are very similar to the full sample. For those people, the probability of consulting a GP is three times the probability of consulting a specialist, and in case of having visited a specialist, 85% of them had gone to the public one. The choices of the “private only” group are rather opposite: 57.45% went to a specialist while 42.55% visited a GP, and the private option dominates in both<sup>7</sup>. People with duplicate coverage are in the middle: they opted for a GP more than the “private only” group but less than the “NHS only” group, and three fourths of those who went to a GP chose a public one (only 10% of them reported “administrative” reasons, i.e.

---

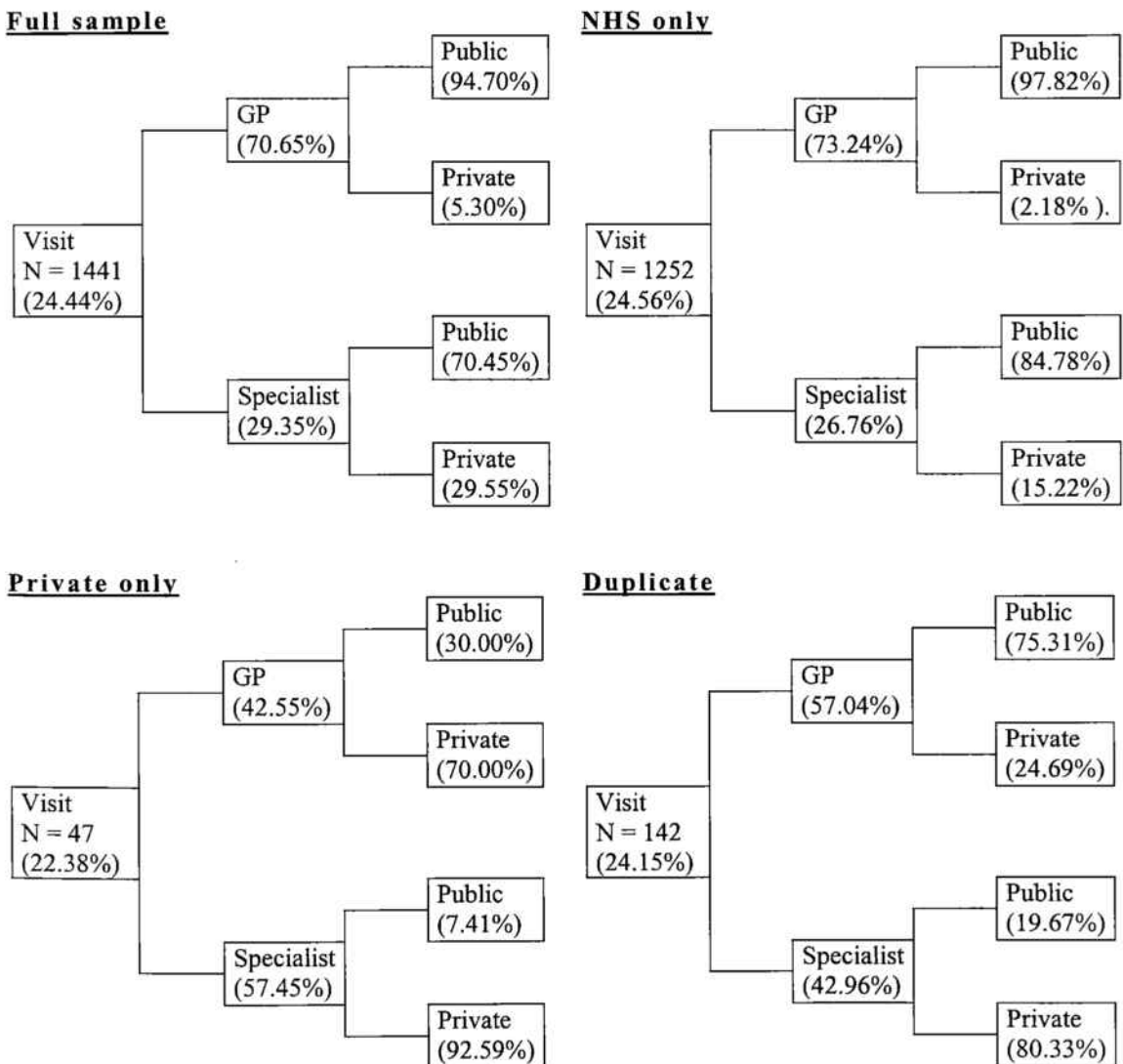
<sup>5</sup> The Stata estimation procedures are based on the method of maximum likelihood and not on the ordinary least squares approximation employed by Stewart (1983).

<sup>6</sup> Details of the interval regression methodology and the results from the estimation of the fitted household monthly income are given in Appendix B.

<sup>7</sup> It may be surprising to observe 14% of the visits to the public sector when theoretically this people cannot use it. One possibility is that these visits are misreporting errors or cases of misclassification of civil servants insurance status. Another possibility is fraudulent use. Given that almost everybody can legally use the public sector and the costs of controlling this fraud would probably outweigh the benefits, the attitude is permissive and such cases do exist.

to obtain official prescriptions that entitle to buy subsidised medicines or to obtain official sickness leaves). However, when individuals from this “duplicate” coverage group visit a specialist, more than 80% go to the private sector.

**Figure 2.3.** Observed provider of the last visit, by insurance access group.



Source: Spanish Health Survey, 1997.

Since one of the leit motives behind this work is the ECuity project and contributing to explain the results obtained by Van Doorslaer, Koolman and Puffer (2002) of an inequitable distribution of specialists visits by income groups, in table 2.2 we present figures for the average income of people making each one of the choices of interest: generalist versus specialist, private versus public and the four disaggregated combinations of these two choices. It is evident from here that people whose last visit was to a specialist enjoy a higher level of income (almost 12% higher) than those that went to a GP, but it is also evident that the difference in income is even higher (36%) when the distinction refers to the choice between private and public sector services. In fact, average monthly income of people that used a public generalist or a public specialist is practically the same, but quite different from people that visited a private GP or specialist.

**Table 2.2.** Average income by type of choice of provider.

<b>GP-Specialist Choice</b>		<b>Mixed Choice</b>	
	Average Income		Average Income
GP (public and private)	734€	Public GP	720€
Specialist (public and private)	822€	Public Specialist	753€
<i>t</i> -statistic	-4.62*	Private GP	990€
		Private Specialist	989€
		<i>F</i> -statistic	35.46*
<b>Public-Private Choice</b>			
	Average Income		
Public (GP and Specialist)	728€		
Private (GP and Specialist)	989€		
<i>t</i> -statistics	-10.20*		

Note: \* statistically significant at 99% level.

Source: Spanish Health Survey, 1997.

Table 2.3 refers to the issue of whether poorer people tend to make more use of medical visits, independently of their insurance assess status. The results confirm this hypothesis. We observe that the pattern of utilisation of medical services

(irrespective of the type of physician consulted, a general practitioner or a specialist) is decreasing with income both for individuals with only public coverage and for those who either enjoy private or public and private insurance access. The ratio between people belonging to the lowest income quintile who have visited a doctor and those from the top income quintile who have been attended by a physician equals 1.8 and 2 for individuals covered by the public insurance only and those having insurance access to a private health care, respectively.

**Table 2.3.** Percentage of people who have visited a doctor, by insurance access and income quintiles

<b>Income quintiles</b>	<b>NHS only</b>	<b>Private/ Duplicate</b>	<b>Total</b>
Bottom quintile	33.36	37.78	33.53
20-40%	28.89	32.05	29.10
40-60%	19.96	26.09	20.56
60-80%	19.11	25.79	20.19
Top quintile	18.85	18.38	18.70
<b>Total</b>	<b>24.56</b>	<b>23.68</b>	<b>24.44</b>

*Source: Spanish Health Survey, 1997.*

*Note:* In each cell we calculate the ratio between the number of individuals with a visit in each income quintile and type of access and the total number of individuals in each income quintile and type of access.

### 2.4.3. Variable definitions

At last, table 2.4 presents the definition of the variables appearing in the econometric model. First, we have included some health variables that, apart from being obviously associated with the consumption of health care, might also influence the choice of provider. Variables reflecting unhealthy lifestyles were initially included, but later taken out since they were not significant. Demographic variables, which could be proxies for need, come next. The combined effect of age and sex for women in fertility age is specifically tested and included in the equations with specialists as a

dependent variable. Then, we find insurance access and a series of socio-economic regressors referring both to the individual (education, labour status and occupation) and the household (income and size of the town of residence). Both, labour status and occupation (for those with working labour status) can be thought of as proxies for the opportunity cost of time and patient's flexibility to make medical appointments.

Finally, we have included two variables that convey information about provider characteristics and have been collected from official sources (Ministerio de Sanidad y Consumo and Informe SESPAS 2000). Regions are divided into those with public expenditures per capita above the mean in 1997 and those below the mean in order to capture the effect of more extensive or better public health care supply on the private-public choice – therefore, it only appears in the equations of the second-stage probits. With regards to primary care, there is an ongoing reform whose main objective is to improve hourly availability (physicians have to take up full time dedication as opposed to two hours daily under the old system) and quality of care (physicians are integrated in primary care teams to foster collaboration and interdisciplinarity). The reform has advanced at a different pace among the regions and to capture these differences we include an index variable representing the percentage of the population covered by the reformed model in 1998 (the closest we have found to the year of the survey). This is expected to make a difference in the alternatives GP versus specialist and public versus private GP since under the reformed model doctors have more time to devote to each patient. Specifically, we would expect less referrals to specialists and better retaining patients that otherwise might go to the private sector.

Although we also thought of including a variable measuring satisfaction with public health care services in the different regions, variability was too low to give any significant results. At last, we tried several ways of including regional dummies, for example, distinguishing between regions with devolved responsibility over health services and those without, or regions with notoriously higher proportion of privately

**Table 2.4.** Definition of Explanatory Variables

<b>Dependent Variables</b>	
Specialist	1 for those who visited a specialist, 0 for those who visited a GP
Private	1 for those who visited a private doctor, 0 for those who visited a public one
<b>Exogenous Variables</b>	
<i>Health and demographic variables</i>	
Health	Self-assessed long-term health. Two dummy variables: FairHealth (fair), BadHealth (bad and very bad). Excluded category: good and very good
Limact1y	1 for those limited in daily activity for more than 10 days during the last 12 months prior to the interview due to illness or chronic conditions, 0 otherwise
Limact2w	1 for those limited in daily activity during the last 14 days prior to the interview due to illness, 0 otherwise
Age	Categorical variables of age of the respondent. Two dummy variables: Age3665 (36-65 years), and Age66 (more than 65 years). Excluded category: less than 36 years
Female	1 for female, 0 otherwise
FFert	1 for female between 26 and 45 years of age, 0 otherwise
<i>Insurance access</i>	
NHsonly	1 for those having access to the NHS only, 0 otherwise
Prvonly	1 for those having access to the private health sector only, 0 otherwise
Duplicate	1 for those having access to both the NHS and the private health sector, 0 otherwise
<i>Socio-economic variables</i>	
Edu	Maximum level of education completed by the respondent. Three dummy variables: Edu1 (primary), Edu2 (secondary), Edu3 (university). Excluded category: without studies
Working	1 for those currently working, 0 otherwise.
Occup	Respondent's occupation. Three dummy variables: Occup1 (farmers, self-employed or employers), Occup2 (professionals), Occup3 (managerial staff). Excluded category: qualified and unqualified workers
LogIncE	Logarithm of the household's monthly income
Tsize	Size of the residence town. Three dummy variables: Tsize1 (less than 10,000 inhabitants), Tsize2 (between 10,001 and 50,000 inhabitants), Tsize3 (between 50,001 and 400,000 inhabitants). Excluded category: more than 400,000 inhabitants
<i>Health Sector Characteristics</i>	
PubExp97	1 if regional public expenditures per capita are above the average (Andalusia, Aragon, Asturias, Cantabria, Catalonia, Galicia, Navarre, and Basque Country), 0 otherwise
Refprimcare	Index representing the percentage of the population covered by the reformed model of primary care in 1998 (the mean for the 17 autonomous regions is 1)



insured (Catalonia, Madrid and the Balearic Islands), but they never came out to be significant.

## 2.5. Econometric specification

For the econometric implementation of the utility maximisation problem described in section 2.3 we have estimated two alternative models: a two-stages probit, corrected for heteroskedasticity, and a multinomial logit. The first mode, the two-stages probit, is based on the assumption that the decision is sequential so that the individual chooses, first, between generalist and specialist, and secondly, between public and private provider conditional on each of the previous alternatives. We could also consider the reverse sequence: first the private-public choice and then between GP and specialist. Both are useful ways to look at the problem, although the perspective and the questions asked change. The first sequence focuses on the type of physician thus allowing, for example, a comparison between public specialists and private ones; the second one emphasises the type of sector and it therefore gives more weight to choices taking place inside each sector (e.g. public generalist-public specialist). We think the first approach has more medical meaning and is more apt to answer the type of questions we want to ask. Finally, one could think that the decision is not sequential and that the individual chooses assessing both kinds of characteristics at the same time. In this case the appropriate econometric specification would be a multinomial regression model. The set of alternative choices would be public GP, public specialist, private GP and private specialist. But “private GP” has too few observations to give a reliable estimation and the two-stages model has the advantage of permitting the specification of different sets of explanatory variables for each equation.

After solving the utility maximisation problem we obtain the empirical demand functions. These functions are in the form of probabilities representing, for the



individuals who decide to visit a doctor, the choice among alternative health care providers. They are also consistent with the usual assumption in the empirical literature on provider choice (Gertler and Van der Gaag, 1990; Mwabu, Ainsworth and Nyamete, 1993; Bolduc, Lacroix and Muller, 1996) that all individuals maximise the indirect utility function,  $v_{ij}$ , which is given by:

$$v_{ij} = v_{ij}(S_i, \eta_i, \hat{\varepsilon}_i, Y_i - I_i \times Pr_i, p_j, Z_j) \quad \text{for } j = 1, 2, 3, 4, \quad (2.2)$$

where the  $\eta_i$  and  $\hat{\varepsilon}_i$  are unobservable to the researcher.

What we get after solving this indirect utility function is the individual health care consumption rather than the improvement in the individual health status after being treated by provider  $j$ . However, given that the individual's health status depends, partly, on the consumption of health care when a health shock is experienced, this is not considered to be problematic.

The econometric estimation requires the assumption of a stochastic indirect utility function, which is split into a systematic,  $v_{ij}^*$ , and unsystematic component,  $\xi_{ij}$ .

$$v_{ij} = v_{ij}^* + \xi_{ij}. \quad (2.3)$$

Following the existing literature we parameterize the deterministic component in the indirect utility function as follows:

$$v_{ij}^* = S_i \beta + Z_j \gamma, \quad (2.4)$$

where  $S_i$  and  $Z_j$  represent the vectors of the individual characteristics and the provider-specific attributes.

## 2.6. Exogeneity of the insurance status

Before turning to the estimation results we should comment on the exogeneity of insurance status variable. Although in the demand for health care literature the insurance status is often treated as an endogenous variable (Pohlmeier and Ulrich, 1995; Vera-Hernández, 1999; Cameron *et al.*, 1988; Edward, Terza and Neslusan, 1995; Holly *et al.*, 1998; Windmeijer and Santos Silva, 1997; López-Nicolas, 1998; Schellhorn *et al.*, 2000), the objective is usually to test for adverse selection or moral hazard. In our case we are interested in the effect of insurance access on the choice of physician at a single point – the last visit – and therefore we think we can keep it as exogenous. Still, there could be some unobserved variables that determined this choice that also influenced the decision to buy VHI. For example, differences in perceived quality of public and private physician visits, differences in preferences for comfort and “prestige” (a private setting versus a public clinic), etc.

One argument in favour of the exogeneity of insurance is the great stability of the personal and geographical characteristics of people that buy VHI in Spain according to different statistics. They tend to be richer people, with better health and predominantly living in three of the seventeen Spanish regions: the Balearic Islands, Catalonia and Madrid. We also examined the Spanish data of the European Community Household Panel (ECHP) and the history of medical visits of those that had bought VHI in 1997 to see if past visits could have caused current insurance status. We found that 85% of those that subscribed anew a private insurance policy in 1997 had done two or less visits to specialists in the previous year (63% had done zero visits) and 78% had done two or less visits to the GP (49% had zero GP visits). Two-year lagged visits exhibited similar figures. Moreover, this behaviour was quite comparable to that of people that had stopped their insurance membership that same year and to the behaviour of those that had maintained their subscription. Finally, we performed the test for exogeneity proposed by Smith and Blundell (1986). As instruments we use the social status of the individual (as in Vera-Hernández, 1999)

and a dummy indicating residence in one of the three regions with higher concentration of private insurance. The test statistics support the hypothesis of exogeneity of all the regressors.

## **2.7. ESTIMATION RESULTS**

### **2.7.1. Probability of visiting a physician**

As a first approximation to our problem we estimate a simple probit model for the probability of having at least one visit to a physician during the last two weeks prior to the interview. The results, presented in table 2.5, reveal that the “need” variables – self- assessed health status and acute or chronic illnesses – have the highest impact in the decision to consult a doctor. Those who assess their health as fair, bad or vary bad have higher probability of seeking medical care than those reporting good or very good health. Having suffered a disease (either acute or chronic) also increases the probability of visiting a physician. Women are more likely to see a doctor than men. Also, people aged over 65 tend to go to a doctor more often than younger adults. Finally, we should remark that having one type of insurance or another, or even having double insurance, does not seem to influence the contact decision itself.

### **2.7.2. Two-stage probit for the choice of health care provider**

Turning to the estimation of the full model regarding the choice of type of physician we refer now to the results presented in table 2.6. According to these results the estimated full model is highly significant. It has good predictive power, too; the percentage of the correctly classified observations is above 72% in the three equations. In the choice of specialist versus generalist eight variables turned out to be significant at the 95% level and three more at the 90% level. Individuals reporting

**Table 2.5.** Probit for the decision to see a doctor.

	Coefficient	t-value
Constant	-0.7743	-1.55
FairHealth	0.4342*	9.02
BadHealth	0.5555*	6.91
Limact1y	0.2768*	5.41
Limact2w	0.8993*	17.67
Prvonly	0.0936	0.90
Duplicate	0.0987	1.48
Age3665	0.0854	1.84
Age66	0.2653*	3.84
Female	0.1394*	3.04
FFert	-0.0224	-0.38
Edu1	0.1051	1.33
Edu2	0.0661	0.70
Edu3	0.0553	0.49
Working	-0.1490	-1.70
Occup1	-0.1077	-1.20
Occup2	-0.0400	-0.37
Occup3	0.1614	1.37
Tsize1	-0.0789	-1.27
Tsize2	-0.1005	-1.63
Tsize3	-0.0368	-0.65
LogIncE	-0.0625	-0.83
N	5896	
Log-likelihood	-1705.89	
Chi-squared	906.97*	
Pseudo R2	0.1550	

Note: \* statistically significant at 95% level.

bad or fair perceived health tend to visit a specialist instead of a GP more than those in good health. Similarly, having had more than 10 days of limited activity in the last year – due to a chronic condition and/or a serious illness episode – is significantly and positively correlated with the probability of seeing a specialist, while an acute illness episode (Limact2w) is not. Compared to those who have less than 65 years, people aged 66 and over tend to consult specialists less often than GPs. Women also see a specialist less often except in the case of women in prime fertility age, most likely due to visits to the obstetrician and the gynaecologist.

**Table 2.6.** Results of the Two-stages Probit: Choice of Specialist (versus GP) and Private Provider (versus Public one).

	Specialist vs. GP choice		Private vs. Public choice (sub-sample with visits to a GP)		Private vs. Public choice (sub-sample with visits to a specialist)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Constant	-0.9985	-0.93	-3.3052	-1.44	-0.1462	-0.06
FairHealth	0.3282**	2.38	0.1366	0.68	-0.5235**	-2.53
BadHealth	0.2514*	1.87	-0.1419	-0.39	-0.5427	-1.50
Limact1y	0.4633**	3.18	-0.1471	-0.75	-0.0943	-0.44
Limact2w	-0.1436	-1.34	0.0465	0.27	0.0785	0.37
Prvonly	0.8538**	4.02	2.6077**	8.64	3.5726**	4.14
Duplicate	0.3539**	2.59	1.1662**	5.54	2.2438**	5.39
Age3665	-0.0279	-0.25	0.2046	0.97	-0.3265	-1.38
Age66	-0.2526*	-1.71	0.6599**	2.57	-0.6823*	-1.85
Female	-0.3023**	-2.40	-0.0183	-0.11	0.6812**	3.61
FFert	0.5137**	2.24			-0.2539	-0.85
Edu1	0.1146	0.69	-0.0759	-0.21	0.6044	1.02
Edu2	0.1713	0.85	0.4288	1.07	1.1490*	1.75
Edu3	0.1274	0.51	0.4574	0.89	1.6839**	2.39
Working	-0.1650	-0.79	0.0676	0.19	0.3179	0.66
Occup1	-0.1634	-0.74	0.1422	0.38	0.2955	0.61
Occup2	0.2712	0.97	0.4451	1.05	0.7036	1.59
Occup3	-0.1989	-0.67	0.0976	0.18	0.4223	0.80
Tsize1	-0.3345**	-2.38	-0.1968	-0.70	0.1967	0.62
Tsize2	-0.2429*	-1.84	0.0708	0.31	0.2813	0.88
Tsize3	-0.1217	-1.02	-0.1861	-0.79	0.1929	0.73
logIncE	0.1901	1.20	0.5544	1.57	-0.3118	-0.82
PubExpc97			-0.3342	-1.41	-0.0148	-0.07
Refprimcare	-0.7336**	-2.18	-2.8881**	-2.85		
Observations	1441		1018		423	
Log-likelihood	-821.85		-135.22		-153.55	
Chi-squared	44.99**		169.21**		48.04**	
Sensitivity	8.51%		35.19%		61.60%	
Specificity	97.84%		99.38%		93.62%	
Correctly classified	71.62%		95.97%		84.16%	
Test for exogeneity	4.35**		0.80**		2.61**	

Note: \* statistically significant at 90% level;

\*\* statistically significant at 95% level.

As expected, the insurance access variables have a very strong effect. Relative to people with NHS coverage only, belonging to the group that has private access only or to the group with duplicate coverage augments clearly and notably the probability of visiting a specialist. The coefficient of “private only” is the highest in the equation.

Among the socio-economic factors, only the size of the town of residence has a significant – negative – effect on the probability of seeing a specialist. Why people living in small towns or villages visit specialists less frequently could be explained because of a lower supply of these professionals outside big urban areas which usually implies more travelling time (non-monetary price) for patients. It is interesting to note that income does not come out to be significant in this decision. Probably because its effect is already picked up by the insurance variable since income is highly associated with the purchase of private insurance. With regards to supplier characteristics, individuals who reside in regions with higher percentage of the population covered by the reformed model of primary care tend to choose specialists significantly less often.

The other two equations in table 2.6 show the estimation results from analysing the probability of choosing the private sector over the public one, first conditional on that the last visit have been to a GP and secondly, conditional on that the last visit have been to a specialist. Not surprisingly, this probability is fundamentally determined by availability of private insurance guaranteeing access to the private health sector. Both, “private only” and “duplicate” have very high coefficients in the two relevant columns. Older age also appears to be significant and positively correlated to the probability of visiting a private GP, but negatively associated with going to a private specialist; the same as fair and bad health although these coefficients are not significant. Living in a region where most of the population is covered by the reformed model of primary care means a strong decline in the probability of choosing a private GP. Interestingly, more years of education have a significant effect only in the choice of private specialist. Why education shows here a

high and distinct impact from insurance can be explained because among the people that have chosen this alternative there are quite a few number of cases of highly educated people that only have NHS coverage but decide to go to a private specialist paying the fee directly.

In table 2.7 we have calculated the predicted average probability of going to each type of physician for the three insurance groups and the full sample. The figures are extremely revealing. The three access groups show great differences in the pattern of consumption of visits. People with NHS insurance only stick to the public sector in about 94% of the cases and predominantly visit a GP. Among individuals with only private insurance access 86% of the visits are to the private sector (why this is not 100% was explained in section 2.4.2, footnote 7); more than half of them to a specialist. Last, people with double coverage go almost fifty per cent of the times to a public doctor and fifty per cent of the times to a private one, but not randomly; quite the opposite, they make a distinct use of both sectors: they go to the public sector to visit a GP but to the private one when they want to see a specialist. The effect of private insurance on the use of specialists is clear: with respect to the “NHS only”, the probability of the last visit having been to a specialist augments by more than 100% for the “private only” group (60% of the visits versus 26%) and by 62% in the case of duplicate coverage.

**Table 2.7.** Predicted mix of physician visits, by type of insurance access.  
(average probabilities in percentage)

	<b>NHS only</b>	<b>Private only</b>	<b>Duplicate</b>	<b>Full sample</b>
Public GP	72.28	10.97	42.76	67.15
Private GP	1.71	29.49	15.32	4.06
Public specialist	20.86	2.60	7.19	18.85
Private specialist	5.15	56.94	34.73	9.94
	100	100	100	100

*Source: Spanish Health Survey, 1997.*



Table 2.8 contains the predicted average probability of visiting each type of physician by income quintiles. The figures show that the pattern of utilisation of GPs' and specialists' services vary considerably across income quintiles. People belonging to the bottom quintile visit mainly the public sector (more than 95% of the cases) and 8 of every 10 visits are to the GP. The individuals belonging to the top income quintile visit private doctors 6 times more than the individuals from the bottom quintile (31% of the visits versus 5%), and a specialist is consulted in 38% of the cases. It should be also noted that although the use of private doctors increases steadily with income, the most important rise (jump) in the consumption of visits to private GPs and specialists is observed between the fourth and the fifth quintile (31% of the visits versus 16%).

**Table 2.8.** Predicted mix of physician visits, by income quintiles. (average probabilities in percentage)

	<b>Bottom quintile</b>	<b>20-40%</b>	<b>40-60%</b>	<b>60-80%</b>	<b>Top quintile</b>	<b>Full sample</b>
Public GP	77.10	72.47	68.88	64.84	52.29	67.15
Private GP	1.62	2.09	2.79	4.30	9.55	4.06
Public specialist	18.05	19.82	20.34	19.52	16.49	18.85
Private specialist	3.23	5.62	7.99	11.34	21.67	9.94
	100	100	100	100	100	100

*Source: Spanish Health Survey, 1997.*

Finally, we disaggregate the information from table 2.8 by type of insurance access. Thus table 2.9 presents the rates of usage of GPs' and specialists' services by income quintiles and by type of access to the health care sector (NHS only versus Private only and Duplicate). The figures reveal the importance of both income and insurance status variables for the choice of one type of physician or another. It should be noted that although the differences in the patterns of consumption across income quintiles are important (especially if we compare the top and the bottom quintiles), these differences are much more prominent by type of insurance access (within quintiles



**Table 2.9.** Predicted mix of physician visits, by income quintiles and type of insurance access. (average probabilities in percentage)

		<b>NHS only</b>	<b>Private/Duplicate</b>
<b>Bottom quintile</b>	Public GP	78.26	47.65
	Private GP	1.00	17.03
	Public specialist	18.44	8.29
	Private specialist	2.30	27.03
		100	100
<b>20-40%</b>	Public GP	74.58	42.57
	Private GP	1.09	16.36
	Public specialist	20.70	7.22
	Private specialist	3.63	33.85
		100	100
<b>40-60%</b>	Public GP	71.97	40.30
	Private GP	1.36	16.02
	Public specialist	21.83	6.64
	Private specialist	4.84	37.04
		100	100
<b>60-80%</b>	Public GP	69.84	38.81
	Private GP	1.90	16.80
	Public specialist	22.10	6.08
	Private specialist	6.16	38.31
		100	100
<b>Top quintile</b>	Public GP	63.99	26.96
	Private GP	3.81	21.96
	Public specialist	21.72	5.19
	Private specialist	10.48	45.89
		100	100
<b>Full sample</b>	Public GP	72.28	34.39
	Private GP	1.71	19.05
	Public specialist	20.86	5.99
	Private specialist	5.15	40.57
		100	100

Source: Spanish Health Survey, 1997.

differences). (Our estimations showed no effect of income on the choice of the type of physician to visit. It is very probable that other variables, such as educational level or occupation, picked up the effect of income. However, income and insurance status are both very significant if only these two are included as explanatory variables in the equations.)

Another useful way of analysing the differences in the patterns of utilisation is to present the probabilities in the form of odds-ratios. This is what we do in table 2.10, distinguishing among several population subgroups. First, we note that in the “NHS only” group the odds of visiting a GP are 2.9 those of going to a specialist. Quite the opposite, in the “private only” group for each 10 persons that visit a specialist just 7 go to a generalist. And in the “duplicate” coverage group the ratio is 1.4 visits to a

**Table 2.10.** Predicted odd-ratios of the main choices involved, by insurance access group and some individual characteristics.

	NHS only		Private only		Duplicate	
	GP / Specialist	Private / Public	GP / Specialist	Private / Public	GP / Specialist	Private / Public
Full sub-sample	2.84	0.07	0.68	6.37	1.39	1.00
Good and very good health	3.35	0.08	0.73	5.50	1.48	0.86
Bad and very bad health	2.45	0.04	0.33	3.00	1.50	0.67
Males	2.65	0.07	0.68	7.68	1.40	1.14
Females	3.05	0.08	0.68	5.40	1.37	0.87
Females 26-45 years old	2.02	0.12	0.68	5.70	1.20	0.97
Individuals 16-35 years old	2.39	0.09	1.00	13.01	0.84	1.28
Individuals 66 and over	4.23	0.03	1.12	5.17	2.13	0.67
Town < 50.000 inhabitants	3.42	0.06	0.95	4.90	1.90	0.77
Town > 50.000 inhabitants	2.37	0.09	0.59	7.20	1.20	1.13
Primary education	3.06	0.04	0.85	3.26	1.70	0.57
University education	2.13	0.23	0.59	12.85	1.16	1.79
Bottom quintile	3.82	0.03	1.13	3.23	2.27	0.45
Top quintile	2.11	0.17	0.56	10.17	1.17	1.43

Source: Spanish Health Survey, 1997.

GP for each visit to a specialist,. The results by population subgroups confirm the importance of the insurance status: differences in the odds-ratios by columns/groups are always more important than differences by rows (individual characteristics). To be sure, the role of insurance status is more important than that of income. Even if at first sight the ratios for the bottom income quintile appear very different from those of the top quintile, these differences are not significant according to our estimations, the reason being the high dispersion of this coefficient in the regression results. University education shows the biggest ratios in favour of the private sector across all three insurance groups while persons 66 and older have the highest – or almost highest – odds in the choice of generalists over specialists.

## 2.8. DISCUSSION AND CONCLUSION

Insurance comes out to be more important in our study than in Van Doorslaer, Koolman and Puffer (2002). Presumably, because we have been able to measure better the insurance and access status than in the ECHP, where the question about private insurance is too generic. However, there could still remain problems with the classification of the insurance status of civil servants since the percentage of those that report having chosen the NHS as their provider is higher in our sample (41%) than in the official records. This affects the sample size of the “private only” group (the rather small number of observations in this group is one of the limitations of our study) and could produce certain contamination of the NHS one. To assess the importance of this problem we re-estimated the models assigning all the civil servants to the private insurance option. Results were very similar.

On the other hand, our result is common, broadly speaking, to all the European countries included in their research. Table 2.11 shows the ratio of the *number* of visits to GPs over the *number* of visits to specialists in several European countries, distinguishing between individuals that also have private insurance and those that do

not have it. The data is taken from the third wave of the ECHP (1996) and weighted using population weights for comparability. Looking first at the column with all the population, we observe relatively high differences among the countries. Association between these differences and the delivery system of health care services in these countries is not straightforward. A priori one would expect that countries where primary care physicians act as gatekeepers (Austria, Denmark, Finland, Ireland, Italy, Portugal, Spain, The Netherlands and United Kingdom) would have higher values in this ratio for all the population. Although it tends to be so, the pattern is not totally clear (Belgium and The Netherlands provide counter examples in both directions).

**Table 2.11.** Number of GP visits over number of specialists visits in several European countries, by having or not having private insurance (PI).

Country	ALL	No PI	PI	No PI – PI
	GP/SP	GP/SP	GP/SP	GP/SP
Austria	1.86	1.90	1.68	0.22
Belgium	2.76	3.55	2.29	1.26
Denmark	2.97	3.18	2.52	0.66
Finland	2.39	2.45	1.83	0.61
Germany	1.55	2.13	1.55	0.58
Greece	1.29	1.31	1.03	0.27
Ireland	5.70	7.64	3.48	4.15
Italy	3.63	3.74	1.92	1.82
Luxembourg	1.40	-	-	-
Portugal	2.59	2.77	1.37	1.39
Spain	2.35	2.49	1.39	1.10
The Netherlands	1.65	-	-	-
UK	3.34	3.54	2.42	1.12

*Source: European Community Household Panel, 1996.*

Looking now at the ratios by having private insurance or not, we can see that in all the countries people that hold private insurance make more visits to specialists relative to GPs than people that do not have private insurance. In some countries the

difference in the ratio is not very big (less than 1) but in other countries the difference is higher than 1 (the outlier is Ireland, with more than 4 points of difference). Unfortunately, the explanation is not easy either. One reason for the lack of a clear pattern could be that private insurance means different things in different countries and the survey does not capture it. Possibly, when private insurance acts mainly as a way to gain faster access and increased choice (supplementary VHI) it makes a greater difference in that ratio than when insurance is complementary (e.g. cover against co-payments) or when it acts as a substitute for public cover.

According to our figures, having private insurance access matters most in the option between private specialists and public ones. People with duplicate coverage choose a private specialist almost five times more often than a public one, and people with only private access fifteen times more. This result points to one of the main deficiencies of the Spanish public health care system, that is, not too easy nor too good organisation of access to specialists in the public sector. In fact, specialised ambulatory care received the lowest mark (compared to primary care and hospital care) as far as satisfaction with health care services in the “Health Barometer” of 1998. A closer look in the data set to all the visits to specialists done by the “NHS only” group is very explanatory. As much as 21% went to a private specialist (presumably under direct payment), 25% went to the emergency or the outpatient department of a hospital, and 50% went to a specialist in a health care centre. Public hospital specialists are very well reputed in Spain, and that explains the high proportion of people that use this alternative. But access to them is not straightforward. Gervas and Ortún (1995) remark that Spain is the only country where the patient and the GP cannot decide jointly and freely on the best specialist or hospital to which to refer the patient. As we mentioned in chapter 1, generalist are bureaucratically linked to a defined network of specialists and hospitals for referral services.

Similarly, the low use of private GPs by the two groups with private insurance access reflects, both, a relative lack of this type of professionals in private practice and the

fact that insurance companies do not assign them a gatekeeping role. One of the main advertising slogans private insurance companies use is straight access to the specialist of your choice among a wide network of “preferred providers”.

The role of the health variables is quite interesting. From equation one in table 3 we conclude that having fair or poor health, as well as more than 10 days of limited activity in the last year has a positive and significant impact on the chance of observing a visit to a specialist. Looking at the corresponding ratios in table 10, (and examination of the results from the reverse sequence probits, not shown here), reveals that this finding is mainly driven by the fact that it is in the public sector where poor health makes a difference for choosing or being referred to a specialist, while apparently in the private sector the use of specialists is less related to the level of health. Interestingly, when going from good to bad health, the ratio private/public decreases for all the insurance groups; this, together with the signs of these health variables in equation three seems to indicate that having not good health increases the probability of opting for public sector specialists no matter the insurance status.

Gender results are also worthy of note. Females have lower probability of visiting a specialist than males (except in the obvious case of females in prime fertility age). The interesting question is whether this is out of choice or because they are less referred to specialists by their GPs. The sign and significance of this variable in equation three in favour of private specialists and the comparison of the ratios of GP/specialists for males and females in table 2.10 gives a clear hint that there may be certain discrimination in the access of women to specialist care in the public sector. Scrutiny of the original data confirms that the percentage of women in the “NHS only” group that go to specialists paying the fee directly is twice that of their male counterparts. All that apart the fertility argument, since this variable is not significant in equation three. Discrimination in the treatment of women has been documented elsewhere (e.g. García Olmos *et al.*, 1995; Iversen and Lurås, 2000), although evidence supporting the contrary can also be found.

Another interesting effect is that of age. The negative relationship with the probability of visiting a specialist is apparent in all three insurance groups. Notoriously, people over 65 with duplicate coverage and no problem of “gatekeeping” have a ratio of GP/specialists more than twice that of young people in the same insurance group (2.13 compared to 0.84 in table 2.10). We think this is because GPs are more apt to deal with co-morbidity, a frequent situation in old age. In order to confirm and expand this interpretation, we have crossed the age and health (self-assessed and limited activity) variables. Bivariate statistics corroborate that older people have a higher proportion of visits to GPs than the other two age groups for any level of health. Bad health increases the proportion of visits to specialists for all the age groups, but only marginally (and not significantly) in the case of people over 65 while for the other two age groups the proportion rises significantly. Among specialists, preference for public sector specialists gets higher as health gets worse, which is consistent with the sign of the health status variables in equation three. The combination of age and health gives rise to striking differences in the ratio of public/private specialists. Taking the extremes, if you are an older person with fair or bad health you go to a public specialist instead of a private one at a rate of seven to one, while if you are young (16 to 35) and in good health the choice is one to one.

The findings about the reformed model of primary care are very important given that the new model had not been observed from this public-private mix angle before. The fact that it augments significantly the preference of public GPs over private ones – and somewhat also the choice of GPs in general over specialists – can be interpreted as supporting the success of the reform. By the same token, it also raises questions about geographical inequalities due to the different pace of the reform in the various regions, which only now is being completed. A statistical issue is whether there is some ecological bias in this result given that an aggregate regional variable is assigned to a micro-level decision model. It is hard to say, but an argument for trusting that this is not a spurious relationship is that as much as half of the visits to private GPs took place precisely in three of the five regions where the extension of



the reform of primary care was lower (less than 75% of the population covered by the new model); one of them with high concentration of private insurance but two with low level of private insurance.

We should remark that we cannot make any value judgements regarding the “equity” of the patterns of use that emerge since we could not test for it – we are only looking at the last visit and not total utilisation. Mossialos and Thomson (2002) have expressed concerns about unequal access to voluntary health insurance due to exclusions based on factors such as age, health status, low income, risk selection and risk rating. But if the public sector did its job of ensuring equal access to *good* health care for equal need for *all*, irrespective of income or other variables not related to need, probably we would not worry much about unequal access to VHI. The problem arises if we think that the public sector is not performing its duty well and that private insurance is bought, mainly, to compensate those deficiencies in performance. Or if we believe that the care that VHI facilitates is better – in outcome terms – than the care obtained in the public sector. Indeed, the equity concern expressed by Van Doorslaer, Koolman and Puffer (2002) about the higher (after adjusting for need) number of visits to specialists by the rich implies two underlying assumptions: that specialist visits are superior from a quality point of view – impact on health – to GP visits, and that more visits to specialists is better than less visits. These assumptions require some discussion.

The epidemiological literature on the topic of specialists care compared to GP care is very abundant<sup>8</sup>. Some studies (e.g. Franks, Clancy and Nutting (1992) for the American system) point to the fact that primary care is often viewed merely as a strategy for providing health care to underserved populations as one of the reasons behind the assumption that primary care is not as good as specialist care. Another reason for mistrust is the GP role, under many institutional forms of care, as

---

<sup>8</sup> The articles by Franks, Clancy and Nutting (1992), Reagan (1987), Donohoe (1998), Starfield (1998), Engström, Foldevi and Borgquist (2001) and Pérez-Fernández and Gervas (2002) are just a few examples.

gatekeeper of the system. As a gatekeeper, the physician faces the complex challenge of being both, the patient's advocate and the guardian of the economic benefits of the institutions for which they work (Reagan, 1987). If, in addition, the physician's income is directly related to his/her contribution to those benefits, the suspicion of undertreatment drags the opinion about the care they provide. In this respect, in the European public health care systems one could think that this risk is minimised because there is not a profit constrain and financial involvement is less direct. Finally, there is the opinion that generalists are less well prepared and therefore, provide not as good care as specialists. The fact that in some countries (Spain till recently) to work as a GP does not require the additional years of formal education as are required to specialists, and the view that GPs are less exposed to technological changes than specialists and therefore they do not need continuous updating of their knowledge, has helped to develop this opinion.

Advocates of the role of primary care physicians answer by enunciating the many functions and advantages of GPs' performance. General practitioners take into account physical, psychological and social problems in making their diagnosis, their services are characterised by continuity (the follow up of a specific health problem, in principle during the patient's life) and longitudinality (the treatment and follow up of a wide variety of one patient's health problems) (Gérvás and Ortún, 1995), they develop a strong relationship with their patients that spurs trust and gives them a better ability to match patients' needs and preferences with the appropriate and judicious use of medical services, finally they are in a better position to co-ordinate care, integrating advice so that there are not conflicting recommendations that could cause harm, and guarding patients against the fragmentation of medical services that result from overspecialisation, (Donohoe, 1998; Starfield, 1998).

Looking at quality of care and costs, many studies (for a review see Engström, Foldevi and Borgquist, 2001) highlight that generalists contribute to better health – by protecting patients against sometimes unnecessary and potentially dangerous specialised care – and lower costs – through less use of expensive diagnostic and

therapeutic interventions. It is true that specialists possess in depth, expert knowledge of a limited number of diseases in their area of specialisation, and that they are more directly exposed to scientific and technological advances. But precisely because of that, and because of a biased interpretation of these advances by the physicians and the population, specialists are more prone to unconsciously initiate a cascade of clinical interventions, necessary many times, but sometimes unnecessary, that it is difficult to stop and occasionally may cause harm (Engström, Foldevi and Borgquist, 2001). In this respect, Franks and Clancy (1992) cite in their article that there is no evidence that ultrasound screening for ovarian cancer reduces mortality, but its use predictably results in laparotomies in women with benign lesions.

Given that controversy, there is not a clear answer to what we think is the crucial question stemming from our research, namely, if patterns of utilisation by insurance status are so different, who is doing it right from a medical perspective? It may be that Spaniards that only have public insurance access are better protected against unnecessary and potentially harmful care by specialists than people with private insurance only or duplicate coverage. But they could be experiencing unnecessary pain or higher risks from delayed treatment, too. Because, having the widest choice, they have a more balanced consumption, we are inclined to think that the pattern of those with double coverage is perhaps closest to the answer. Given our results, to equate the ratio of GP to specialists visits in the NHS group to that of people with duplicate coverage would require approximately a 25% increase in visits to specialists by that group. Of course, one could think that the publicly insured may be consuming too many visits to the GP and that the ratio could be equated by lowering this type of visits. We should recall here that Spanish authorities, most likely responding to preferences by its citizens, are taking steps in the direction of enlarging access and choice of specialists in the public sector.

## **APPENDIX A – Descriptive Characteristics of the Sub-Sample of Civil Servants**

As already mentioned before (section 1.3.2 in the introductory chapter) Spanish civil servants are given the possibility of choosing their health care provider between the NHS and the private insurance companies in the beginning of every year. Official statistics reveal that only about one fifth of all civil servants choose to be treated in the public sector. In order to shed some light on what makes civil servants decide on one type of health provider or another, we describe the characteristics of the civil servants in our sample in table A.1. According to the data from the 1997 Spanish Health Survey, half of the civil servants choose a private insurance company, and the other half choose the public sector as their provider of health care. Since that diverges from what other official sources report and because of the small number of observations in each group, we should be cautious when interpreting the figures presented in this table.

Contrary to our intuition the health related characteristics back the idea of private insurance companies being subject of adverse selection. Civil servants, who perceive that their health status is less than good and report a long-term impairment in daily activities due to an illness or chronic conditions, are more likely to choose a private health care provider than a public one. Interestingly, and unlike what is observed for the entire population, civil servants with university degree choose the public sector option more than the private one. The same holds for those belonging to the top income quintile. However, there are no significant differences related to the residence town between the two groups of civil servants. And finally, despite the fact that the two groups differ in their perceived health status, the reported utilisation of health services is almost the same (21 persons having NHS as health care provider and 19 having private insurance company as health provider have consulted a physician during the last 14 days prior to the interview).

**Table A.1.** Descriptive characteristics of the sub-sample of civil servants, by the type of health care provider chosen.

<b>Variable</b>	<b>NHS</b>	<b>Private insurance company</b>	<b>Full sub-sample</b>
N	99	99	198
%	50.00	50.00	
<b>Self-assessed health status (%)</b>			
Good and very good	50.64	49.36	100
Fair, bad and very bad	47.62	52.38	100
<b>Health conditions (%)</b>			
Limited activity last year	36.11	63.89	100
Limited activity last 14 days	58.33	41.67	100
<b>Age (%)</b>			
16 – 35 years	53.03	46.97	100
36 – 65 years	50.00	50.00	100
More than 65 years	42.86	57.14	100
<b>Age (mean)</b>	43.72	46.06	
<b>Sex (%)</b>			
Female	45.00	55.00	100
Male	55.10	44.90	100
Female in prime fertility age (%)	27.27	18.18	
<b>Education (%)</b>			
Without studies	0	100	100
Primary	52.83	47.17	100
Secondary	41.67	58.33	100
University	53.68	46.32	100
<b>Town of residence size (%)</b>			
More than 400,000	50.00	50.00	100
50,001 – 400,000	46.88	53.13	100
10,001 – 50,000	51.65	48.35	100
Less than 10,000	48.98	51.02	100
<b>Income quintile (%)</b>			
Bottom	55.56	44.44	
20-40%	43.75	56.25	
40-60%	51.43	48.57	
60-80%	44.12	55.88	
Top	51.92	48.08	
<b>Household income (mean)</b>			
	1122.61€	1095.56€	1109.08€
<b>Visit to a doctor last 2 weeks (%)</b>	52.50	46.06	100

Source: Spanish Health Survey, 1997

## APPENDIX B – Estimation of the household monthly income

In the Spanish Health Survey individuals do not report the precise amount of their household monthly income, but the income interval in which it fits. Even so, the proportion of missing data is substantial (around 20%). A recommended strategy for overcoming this problem is the estimation of an interval regression model, which is a generalisation of the tobit model for censored data, initially developed by Stewart (1983).

The dependent variable for the  $i$ -th individual,  $y_i$ , is observed to lie somewhere in the interval

$$y_i^l \leq y_i \leq y_i^u \quad i = 1, \dots, N \quad (2.5)$$

on the real line, where  $y_i^l$  is the lower limit of the interval and  $y_i^u$  is the upper limit. In our data,  $y_i$  is the  $i$ -th household monthly income. If this observation falls in the highest band of the income interval, then  $y_i^u$  will be equal to  $+\infty$ , and if it falls in the lowest band of the interval  $y_i^l > 0$ , rather than  $y_i^l \geq -\infty$  as in the general formulation of the interval regression model (Forth and Millward, 2000).

The latent structure of the model to be estimated is assumed to be given by:

$$y_i^* = x_i' \beta + u_i \quad i = 1, \dots, N, \quad (2.6)$$

where  $y_i^*$  is the unobserved dependent variable (in our case, the household monthly income),  $x_i$  is the vector of the covariates and  $\beta$  is the vector of the parameters to be estimated. The error terms are assumed to be i.i.d. random variables, which follow

a normal distribution with zero mean and variance  $\sigma_u^2$  and to be independent of the regressors.

Maximising the likelihood function

$$L = \sum_{j=1}^J \sum_{i \in j} \log \left[ \Phi \left( \frac{y_i^{ul} - x_i' \beta}{\sigma_u} \right) - \Phi \left( \frac{y_i^{ll} - x_i' \beta}{\sigma_u} \right) \right], \quad (2.7)$$

where  $j$  indexes interval bands and  $\Phi(\cdot)$  is the cumulative standard normal distribution, gives consistent estimates of  $\beta$  and  $\sigma_u$  (Stewart, 1983).

The estimation results of the income interval regression are summarised in table B.1. As a measure of the goodness-of-fit of the model we calculated the percentage of individuals correctly classified within their original household monthly income bands. We find that in about 42% of the cases the band is correctly predicted and, in 82% of the cases, the prediction is exact or within one income band. These figures are comparable to the percentages of correctly classified within the original bands cases (ranging from 31% to 39%) reported in Forth and Millward (2000).



**Table B.1.** Household monthly income interval regression.

	<b>Coefficient</b>	<b>Std. Error</b>
Constant	4.3053**	0.053
Married	0.2229**	0.026
Single	0.1836**	0.031
Divorced	-0.0785*	0.047
Age2635	-0.0801**	0.022
Age3645	-0.1157**	0.024
Age4655	-0.1088**	0.026
Age5665	-0.2340**	0.028
Age66	-0.3013**	0.031
Female	-0.0299**	0.012
Self-employed or Employer HH	0.2936**	0.030
Professional HH	0.2879**	0.036
Managerial staff HH	0.4418**	0.033
Qualified worker HH	0.1702**	0.027
Unqualified worker HH	0.0062	0.028
EduHH1 (primary)	0.0885**	0.022
EduHH2 (secondary)	0.2333**	0.027
EduHH3 (university)	0.5477**	0.032
Working HH	0.1745**	0.019
Unemployed HH	-0.2853**	0.030
Tsize1	-0.0897**	0.022
Tsize2	-0.0415**	0.021
Tsize3	-0.0464**	0.020
Aragon	0.1853**	0.036
Asturias	0.4985**	0.036
Balearic Islands	0.2033**	0.043
Canary Islands	-0.0618*	0.032
Cantabria	0.1240**	0.059
Castilla y León	0.0860**	0.028
Castilla - La Mancha	0.0362	0.030
Catalonia	0.1231**	0.021
Valencia	0.0103	0.022
Extremadura	0.0489	0.035
Galicia	0.0272	0.027
Madrid	0.1612**	0.023
Murcia	0.0353	0.040
Navarre	0.3266**	0.051
Basque Country	0.1717**	0.039
Rioja	0.3626**	0.075
$\sigma_u$	0.3763	0.005
N	4697	
Log likelihood	-6188.27	
LR chi-squared (38)	3280.02**	

Source: Spanish Health Survey, 1997.

Notes: \* statistically significant at a 90% level, \*\* statistically significant at 95% level.

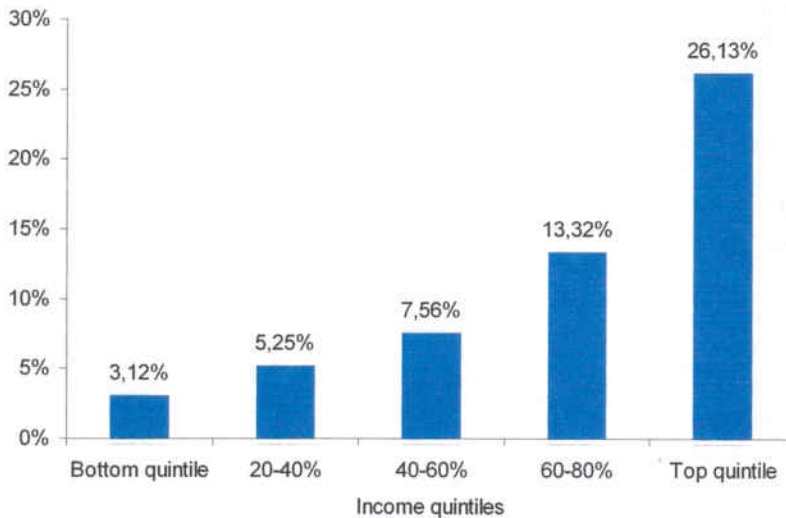
HH indicates that the variable refers to the head of household.

Reference category is: Widowed; Aged less than 26; Farmer HH; HH without studies; Tsize4 (more than 400,000 inhabitants); Andalusia.

## APPENDIX C – Preliminary Analysis of the decision to purchase Voluntary Health Insurance (VHI)

The basic conclusion we derive from the present study is that the pattern of utilisation of health care services depends on the type of access to health care, determined by the health coverage. With the exception of civil servants choosing the private provider alternative, belonging to the “private only” or “duplicate” groups indicates that voluntary health insurance have been purchased. Indeed, almost 11% of the individuals included in the analysis have bought VHI either as a substitute or as a supplementary to the public health coverage. The present appendix offers some preliminary analysis of the decision to contract a private health insurance policy<sup>9</sup>.

**Figure C.1.** Purchase of voluntary health insurance (VHI), by income quintile.



Source: Spanish Health Survey, 1997.

<sup>9</sup> The questions related to the decision to buy VHI are treated in more detail in the next chapter.

As figure C.1 shows the rates of purchase of VHI substantially differ across income quintiles. While the percentage of individuals who subscribe a private insurance policy is only around 3 per cent for individuals belonging to the bottom income quintile, it continually rises up to over 26 per cent for those in the top quintile.

If the purchase of VHI was endogenous in the equation for the choice of health care provider, the appropriate econometric specification would have been the simultaneous equations model as in Cameron *at al.* (1988). However, since the purchase of VHI was not the primary objective of our study and because of all the arguments supporting the hypothesis of the exogeneity of the insurance variable provided in section 2.6, we have not undertaken that task here. We have estimated a simple discrete choice model for the demand of VHI. We believe that this model suffices to get some idea about the decision to purchase VHI.

Table C.1 contains the results from the probit estimation of the demand for VHI. They confirm previous findings by González (1995) for Spain and Vera-Hernández (1999) for Catalonia that the main determinants of the decision to contract private health insurance policy are some socio-economic factors. Among them the head of household's personal characteristics (like level of educational and current labour status) and the household's monthly income appear to significantly affect the probability of purchasing VHI. Heads of household with higher educational qualifications are more likely to hold VHI than those with less or no studies. Unlike Vera-Hernández, we do not observe significant correlation between the level of education of the respondent and the probability of being privately insured. This finding, however, backs the hypothesis, defended in González (1995), that the decision to undertake a VHI is usually taken by the head of the household.

Heads of household who are self-employed, employers, or belong to the managerial staff tend to privately insure more compared to those who are farmers, qualified or unqualified workers. The high opportunity cost of time of the first group is a plausible explanation for this fact. Office waiting times in the public and the private

**Table C.1.** Probit for the decision to buy VHI.

	Coefficient	t-value
Constant	-8.1128*	-7.60
FairHealth	0.0385	0.60
BadHealth	-0.2871*	-2.16
Limact1y	0.0275	0.40
Age3665	0.0346	0.56
Age66	0.1114	0.94
Female	0.0121	0.19
Edu1 (primary)	-0.2375	-1.39
Edu2 (secondary)	0.0219	0.12
Edu3 (university)	-0.1105	-0.58
Retired	-0.0801	-0.71
Unemployed	-0.2355*	-2.42
Housewife	-0.0538	-0.60
Student	-0.2908*	-3.13
Log Household Income	1.0158*	6.45
Head of Household	0.0291	0.34
EduHH1 (primary)	0.3505*	2.05
EduHH2 (secondary)	0.4690*	2.56
EduHH3 (university)	0.4902*	2.32
Retired HH	0.2379	2.67
Unemployed HH	0.1721	1.04
HH farmer, self-employed or employer	0.1142	1.20
HH professional	-0.2858*	-2.29
HH managerial staff	-0.0686	-0.60
Balearic Islands	0.6902*	5.13
Catalonia	0.4077*	7.07
Navarre	-0.8688*	-2.63
Basque Country	-0.0933	-0.80
Tsize1	-0.4432*	-5.84
Tsize2	-0.5073*	-7.10
Tsize3	-0.5005*	-7.97
N	5896	
Log-likelihood	-1705.89	
Chi-squared	573.45*	
Pseudo R-squared	0.1671	

Source: Spanish Health Survey, 1997.

Note: \* statistically significant at a 95% level.

HH indicates the variable refers to the head of household.

Reference category is: Interviewed in good health; Interviewed less than 35; Interviewed without studies; Interviewed working; HH without studies; HH qualified or unqualified worker; Tsize4 (more than 400,000 inhabitants).

sector are not much different, but to get an appointment, above all with specialists, may take longer in the public sector. One alternative to buying private insurance can be visiting a private specialists and paying the entire costs. The inconvenience of this alternative is that it may take more time, since it involves some searching time (to find the appropriate doctor), and is less “certain” as far as cost of treatment<sup>10</sup> is concerned.

The income variable is significant and positively correlated to the decision to buy VHI. This confirms the results found by Murillo, Calonge and González (1991), Murillo and González (1992), and González (1995), that in the presence of statutory public insurance, it is mostly the wealthier who buy VHI. Using data from the 1998 Continuous Household Expenditure Survey, Rodríguez, Calonge and Stoyanova (1998) show that the percentage of households where at least the head of household is covered by VHI is more than 10 times lower in the poorest income level than in the highest income level.

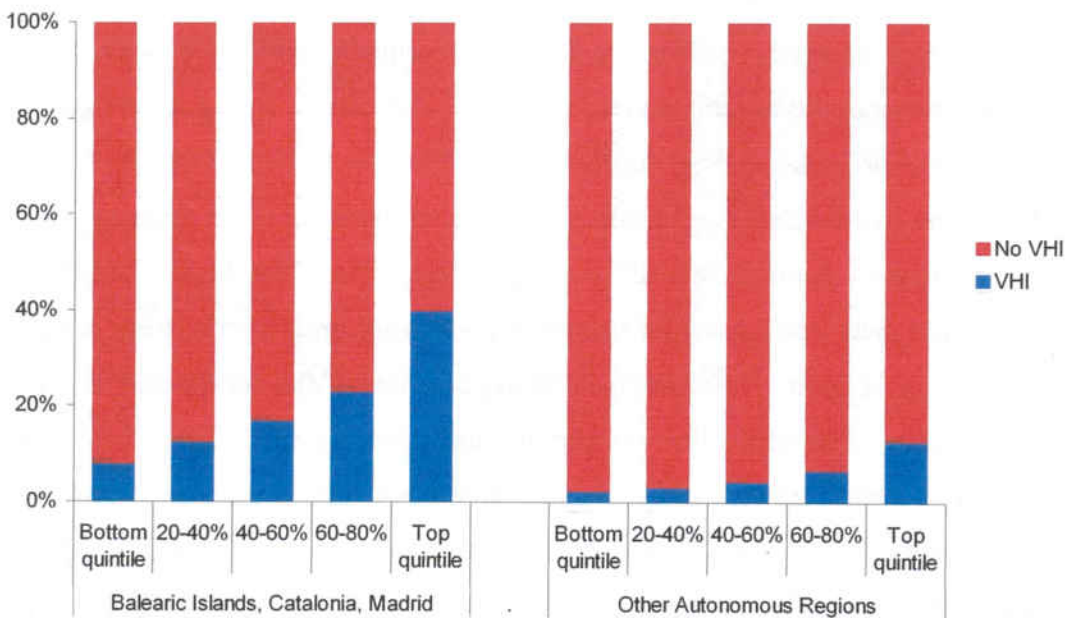
The privately insured population in Spain is not equally distributed across its regions (or Autonomous Communities) (see figure C.2 and table C.2). As it has been already observed in previous studies, the probability of buying private insurance is higher for those who live in Balearic Islands, Catalonia, or Madrid. These three regions share some common features related to the purchase of a VHI: higher income of the population, better perceived health status, and higher level of education compared to the average of Spain. However, the rate of purchase of VHI for Madrid in our data is much higher, than what other sources of data show. We think that the concentration of civil servants in the capital may be disturbing this figure, since some of the respondents, for example, a son of the civil servant, may get mixed up the private provision status of his health coverage with the *public* nature of the mutuality of his father. Given doubts about the precision of this variable, and the problems it gave in the estimations, we finally decided not to include Madrid in the equation. Besides,

---

<sup>10</sup> There are no price regulations and restrictions for health services in Spain. The only source of comparison prices available are the Physician’s Union recommended prices.

we also include in the estimation two regions (Navarre and the Basque Country) with high income and high standard of living, but low percentage of insured people to see if there was a distinct “region” effect from the effect of regional income. The coefficients for these regional dummies support the idea that there is a “region” effect apart from the pure effect of regional income. The public health care sector in Navarre has been governed by the Autonomous authorities for many years and it is well-known to offer high-quality health services. This fact comes to explain the negative correlation between the dummy for Navarre and the decision to purchase VHI. Living in the Basque Country is not significant for the decision to purchase a VHI. The lack (or the insufficiency) of branches of the insurance companies in the small towns and villages explains, at least in part, the negative relationship between the size of the town of residence and the purchase of VHI.

**Figure C.2.** Purchase of VHI, by income quintile and region.



Source: Spanish Health Survey, 1997.



An interesting result from our estimation is the effect of the health related variables. Most of the studies exploring the demand for VHI find that there is no significant correlation between the decision to buy health insurance and the health status variables. Vera-Hernández (1999) and Ettner (1997) do not find evidence for the adverse selection hypothesis based on observable variables, but argue that there is adverse selection based on poor unobservable health conditions. Somewhat surprisingly, we find a significant positive relation between the self-assessed health status and the probability of buying VHI. (Nolan and Wiley (2000) also observe for Ireland that those with VHI report better health than those without VHI.) This supports the reversed from the adverse selection hypothesis, which is quite plausible in countries with widespread public insurance that covers against financial losses derived from illness. An explanation for this finding could be that the healthier individuals in our sample are also the wealthier ones (with an average monthly

**Table C.2.** People holding VHI, by Autonomous Region.

<b>Region (EHP)</b>	<b>Autonomous Region</b>	<b>VHI (%)</b>
North-East	Galicia	2.60
	Asturias	6.28
	Cantabria	4.82
North-West	Basque Country	6.78
	Navarre	2.38
	Rioja	4.55
	Aragon	5.39
Madrid	Madrid	29.10
Centre	Castilla y León	9.45
	Castilla - La Mancha	4.67
	Extremadura	6.25
East	Catalonia	20.33
	Valencia	4.70
	Balearic Islands	24.00
South	Andalusia	5.56
	Murcia	1.83
Canary Islands	Canary Islands	2.94
<b>Spain</b>		<b>10.96</b>

*Source: Spanish Health Survey, 1997.*



income well above the average of any other health group and of the total sample). They also possess higher level of education (about 23% hold an university degree compared to 6% university graduates among those with a fair perceived health status) and they are more frequently self-employed or employers.

**REFERENCES**

Abásolo, I., Manning, R., and A. Jones (2001), "Equity in Utilization of and Access to Public-Sector GPs in Spain", *Applied Economics*, **33**, 349-364.

Álvarez, B. (2001), "La demanda atendida de consultas médicas y servicios urgentes en España", *Investigaciones Económicas*, **XXV(1)**, 93-138.

Bolduc, D., Lacroix, G., and C. Muller (1996), "The Choice of Medical Providers in Rural Bénin: A Comparison of Discrete Choice Models", *Journal of Health Economics*, **15**, 477-498.

Cameron, A.C., Trivedi, P.K., Milne, F., and J.A. Pigott (1988), "Microeconomic Model of the Demand for Health Care and Health Insurance in Australia", *Review of Economic Studies*, **55**, 85-106.

Centro de Investigaciones Sociológicas. Encuesta Nacional de Salud, 1997.

Centro de Investigaciones Sociológicas. Barómetro Sanitario, 1998.

Donohoe, M.T. (1998), "Comparing Generalist and Specialty Care. Discrepancies, Deficiencies, and Excesses", *Archives of Internal Medicine*, **158**, 1596-1608.

Edward Coulson, N., Terza, J., and C. Neslusan (1995), "Estimating The Moral-Hazard Effect of Supplemental Medical Insurance in the Demand for Prescription Drugs by the Elderly", *AEA Papers and Proceedings*, **85(2)**, 122-126.

Engström, S., Foldevi, M., and L. Borgquist (2001), "Is General Practice Effective?", *Scandinavian Journal of Primary Health Care*, **19(2)**, 131-144.

Ettner, S.L. (1997), "Adverse Selection and the Purchase of Medigap Insurance by the Elderly", *Journal of Health Economics*, **16**, 543-562.

Forth, J., and N. Millward (2000), "The Determinants of Pay Levels and Fringe Benefit Provision in Britain", Discussion Paper No.171, National Institute of Economic and Social Research (NIESR), London.

Franks, P., Clancy, C.M., and P.A. Nutting (1992), "Gatekeeping Revised – Protecting Patients from Over-treatment", *New England Journal of Medicine*, **327**, 424-429.

García Olmos, L., Abaira, V., Gervas, J., Otero, A., and M. Pérez Fernández (1995), "Variability in GPs' Referral Rates in Spain", *Family Practice*, **12(2)**, 159-162.

Gertler, P., Locay, L., and W. Sanderson (1987), "Are User Fees Regressive? The Welfare Implications of Health Care Financing Proposals in Peru", *Journal of Econometrics*, **36**, 67-88.

Gertler, P., and J. Van der Gaag (1990), *The Willingness to Pay for Medical Care: Evidence from two Developing Countries*, Johns Hopkins University Press, Baltimore.

Gervas, J., and V. Ortún (1995), "Caracterización del trabajo asistencial del médico general / de familia", *Atención Primaria*, **16(8)**, 501-506.

González, Y. (1995), "La demanda de seguros sanitarios", *Revista de Economía Aplicada*, **3(8)**, 111-142.

Holly, A., Gardiol, L., Domenighetti, G., and B. Bisig (1998), "An Econometric Model of Health Care Utilization and Health Insurance in Switzerland", *European Economic Review*, **42**, 513-522.

Instituto Nacional de Estadística, European Community Household Panel (ECHP), Spain.

Iversen, T., and H. Lurås (2000), “The Effect of capitation on GPs’ referral decisions”, *Health Economics*, **9**, 199-210.

Jiménez-Martín, S., Labeaga, J., and M. Martínez-Granado (2002), “Latent Class versus Two-part Models in the Demand for Physician Services across the European Union”, *Health Economics*; **11**, 301-321.

Kalisch, D., Aman, T., and L. Bucéele (2003), “Social and Health Policies in OECD Countries: A Survey of Current Programmes and Recent Developments”, Labour market and social policy - occasional paper N°33. DEELSA/ELSA/WD(98)4, <http://www.oecd.org/EN/documents> [15 January 2003].

López-Nicolás, A. (1998), “Unobserved Heterogeneity and Censoring in the Demand for Health Care”, *Health Economics*, **7**, 429-437.

Madden, D. (2002), “Sources of Health Inequality for Irish Women”, October 2002. CER WP02/27.

Ministerio de Sanidad y Consumo. Cuentas satélite del gasto sanitario público 1995-99, 2001.

Mossialos, E., Thomson, S. *et al.* (2002), “Voluntary Health Insurance in the European Union”, Report Prepared for the Directorate General for Employment and Social Affairs of the European Commission. European Commission website. [http://europa.eu.int/comm/employment\\_social/soc-prot/social/prot/social/index\\_en.htm](http://europa.eu.int/comm/employment_social/soc-prot/social/prot/social/index_en.htm) [27 February 2002].

Murillo, C., Calonge, S., and Y. González (1991), “Los seguros privados de asistencia sanitaria”, *XI Jornadas de Economía de la Salud*, Alicante, p. 419-428.

Murillo, C., and Y. González (1992), “Health Insurance in Spain”, *XXXV International Conference: Econometrics of Social Security*, Applied Econometric Association, San José de Costa Rica, pp. 667-686.

Mwabu, G., Ainsworth, M., and A. Nyamete (1993), “Quality of Medical Care and Choice of Medical Treatment in Kenya: An Empirical Analysis”, *Journal of Human Resources*, **28(4)**, 838-862.

Pérez-Fernández, M., and J. Gérvas (2002), “El efecto cascada: implicaciones clínicas, epidemiológicas y éticas”, *Medicina Clínica (Barcelona)*, **118(2)**, 65-67.

Pohlmeier, W., and V. Ulrich (1995), “An Econometric Model of the Two-Part Decision Making Process in the Demand for Health Care”, *Journal of Human Resources*, **XXX**, 339-361.

Puig-Junoy, J., Sáez, M., and E. Martínez-García (1998), “Why Patients Prefer Hospital Emergency Visits? A Nested Multinomial Logit Analysis for Patient Initiated Contacts”, *Health Care Management Science*, **1**, 39-52.

Ortún, V., and J. Gérvas (2002), “Potenciar la atención primaria de salud. Informe SESPAS 2000”, [http://www.sespas.es/fr\\_inf.html](http://www.sespas.es/fr_inf.html) [20 February 2002].

Reagan, M.D. (1997), “Physicians as Gatekeepers. A Complex Challenge”, *New England Journal of Medicine*, **317**, 1731-1734.

Rodríguez, M., Calonge, S., and S. Reñé (1993), “Spain”, in E. Van Doorslaer, A. Wagstaff, and F. Rutten (Eds.) *Equity in the Finance and Delivery of Health Care*, Oxford University Press, Oxford, pp. 201-218.

Rodríguez, M., Calonge, S., and A. Stoyanova (2001), “Análisis del mercado de seguros sanitarios privados. Análisis descriptivo de la Encuesta Continua de Presupuestos Familiares”, Mimeo, Centre de Recerca en Economia del Benestar (CREB), Universitat de Barcelona.

Schellhorn, M., Stuck, A., Minder, C., and J. Beck (2000), “Health Services Utilization of Elderly Swiss: Evidence from Panel Data”, *Health Economics*, **9**, 533-545.

Smith, R., and R. Blundell (1986), “An Exogeneity Test for a Simultaneous Equation Tobit Model with an Application to Labour Supply”, *Econometrica*, **54(3)**, 679-685.

Starfield, B., (1998), “Primary Care: Balancing Health Needs, Services and Technology”, Oxford University Press, New York.

Stata Corporation (2001), STATA 7, Stata Statistical Software.

Stewart, M. (1983), “On Least Squares Estimation when the Dependent Variable is Grouped”, *Review of Economic Studies*, **50(4)**, 737-753.

Urbanos-Garrido, R.M. (2001a), “Explaining Inequality in the Use of Public Health Care Services: Evidence from Spain”, *Health Care Management Science*, **4**, 143-157.

Urbanos-Garrido, R.M.(2001b), “Measurement of Inequality in the Delivery of Public Health Care: Evidence from Spain”, FEDEA Working Paper 2001-15 (Fundación de Estudios de Economía Aplicada), <http://www.fedea.es/hojas/publicaciones.html> [12 January 2003].

Van Doorslaer, E, Wagstaff, A., Van der Burg, H., Christiansen, T., De Grave, D., Duchesne, I., Gerdtham, U.-G., Gerfin, M., Geurts, J., Gross, L., Häkkinen, U., John,

J., Klavus, J., Leu, R.E., Nolan, B., O'Donnell, O., Propper, C., Puffer, F., Schellhorn, M., Sundberg, G., and O. Winkelhake (2000), "Equity in the Delivery of Health Care in Europe and the US", *Journal of Health Economics*, **19(5)**, 553-583.

Van Doorslaer, E., Koolman, X., and F. Puffer (2002), "Equity in the Use of Physician Visits in OECD Countries: Has Equal Treatment for Equal Need Been Achieved?", in *Measuring Up: Improving Health Systems Performance in OECD Countries*, OECD, Paris, France, pp. 225-248.

Vera-Hernández, A.M. (1999), "Duplicate Coverage and Demand for Health Care. The Case of Catalonia", *Health Economics*, **8**, 579-598.

Windmeijer, F., and J. Santos Silva (1997), "Endogeneity in Count Data Models: An Application to Demand for Health Care", *Journal of Applied Econometrics*, **12**, 281-294.



## **CHAPTER 3**

### **THE DEMAND FOR SUPPLEMENTAL HEALTH INSURANCE IN PUBLIC HEALTH CARE SYSTEMS**

#### **3.1. INTRODUCTION**

##### **3.1.1. Preliminary discussion**

The main purpose of insurance is to cover against financial uncertainty. From the point of view of the individual, it is a way to convert an *uncertain big* loss into a *certain small* one. The theoretical basis of the analysis of the demand for insurance is the theory of expected utility under uncertain conditions developed by Von Neumann and Morgenstern (1944). The individual will buy insurance if the expected utility of the uncertain situation is lower than the expected utility of the certain one.

Nevertheless, with respect to health care, in countries with national health insurance and universal coverage the objective of getting financial certainty is essentially already granted by the public system. Therefore, in these countries buying private health insurance can play two distinct roles, using the terminology by Mossialos and Thomson (2002). Private insurance is either *complementary* with the public system – covering against risks not covered, or not covered in full, by public insurance – or it is *supplementary*, meaning that private insurance offers coverage for the same risks as the public one, but the services provided have different attributes from those of the public sector, usually, increased choice, direct access to specialists, less waiting list, better amenities, more pleasant atmosphere, etc.

As we previously mentioned, although, the Spanish Health System guarantees universal health coverage, there are about 11% of the population who contracts voluntary health insurance (VHI)<sup>1</sup>. Moreover, the share of privately insured has been relatively stable over the last two decades. The great majority of private insurance policies bought are of supplementary nature. Therefore, most individuals that buy VHI enjoy duplicate health coverage. The main exceptions are the 0,5% of the population not covered by the public sector for whom private insurance provides and acts as a substitute. Dental insurance policies subscribed by some people are of complementary nature.

### 3.1.2. Previous studies using Spanish data

Although the idea of supplemental insurance is closely linked to public sector care and its characteristics, the first studies in Spain analysing the decision to purchase private insurance were based solely on the characteristics of individuals and their families. The best known among these studies is that of Yolanda González (1995).

---

<sup>1</sup> Our definition of VHI includes private policies from insurance companies as well as some residual kind of “insurance contract”, called *igualada médica*, which usually refers to an agreement between the individual and the general practitioner for the provision of health care services, mostly in rural areas. Their importance is now almost negligible.

She estimates the probability of buying private health insurance using a probit model on cross-sectional data from the Family Expenditures Survey of 1990-91. According to her results, age, income level, education, occupation (being professional or self-employed), size of the town of residence and region (Balearic Islands, Catalonia and Madrid) are the main variables determining this probability.

Vera-Hernández (1999) analyses the effect of duplicate coverage on the demand for specialist visits and on the selection process of the private insurance market in Catalonia. The author briefly discusses the results from a discrete choice model for the decision to purchase voluntary health insurance. His basic conclusion is that the principal determinants of the decision to contract voluntary health insurance are socio-economic variables such as income, education, social class, occupation and employment rather than health related characteristics.

Two recent studies that do include some variables indicating differences between public and private sector attributes are those of Jofre-Bonet (2000) and Costa and García (2003). Jofre-Bonet concentrates on the role of waiting lists for surgery in public hospitals (a very well known problem in countries with National Health Systems like Spain, Sweden or the UK<sup>2</sup>) on the demand for private insurance. She finds a positive effect for this variable – just as Besley, Hall and Preston (1999) had found for the UK. The other variables she includes in her model (a logit specification) are individual variables taken from the Spanish Health Survey of 1993. All these variables have the expected signs. Particularly, the importance of living in the regions of Catalonia, the Balearic Islands and Madrid is confirmed.

---

<sup>2</sup> Public health care systems respond to two basic models: 1) the Social Security or Bismark model, where financing is through social insurance contributions but services are provided mainly by private doctors or hospitals which are contracted out by the social insurance bodies, with individuals having a great degree of choice; 2) the National Health Service/System model, where financing is through general taxes and services are provided mostly by doctors or hospitals which belong or are directly employed by the public sector, and individuals have a very low degree of choice. Germany, France and Belgium are examples of the first type of model, the UK, Sweden, Spain (health services are totally financed out of taxes since 1999, although affiliation is still done through the Social Security) and Italy are examples of the second type of model. Waiting lists are usually present in NHS countries, but not SS ones. Conversely, the percentage of public health expenditures over the GDP is generally lower in NHS countries than in SS ones.

Costa and García (2003) focus on the “quality” gap between the public and the private sector as a leit motive for the demand for private insurance. As the authors point, quality is understood in a narrow sense of perceived quality that does not include actual treatment performance or clinical quality. Perceived quality is measured as the response in a 1 to 10 scale to a question about general judgment on NHS and private health care in a survey of 400 individuals in Catalonia. For our purposes, their main conclusion is that the demand for private insurance increases with the widening of the “quality gap” between the private and the public sector. This widening can happen because of an improvement or a deterioration in the quality of any one of both sectors, but they do not include any “objective” measure beyond that *perceived* general quality. Net income, age and size of the town of residence (specially being a provincial capital) all have the usual positive effect.

### 3.1.3. Previous international studies

Cameron *et al.* (1988) are the first to analyse the demand for health care and health insurance simultaneously using data for Australia. They find that income is more important in the decision to purchase health insurance than health, while the opposite holds for the utilisation for health care services. Other international studies that analyse the demand for voluntary health insurance (VHI) in countries with similar public health care systems to the Spanish one are those of Propper (1989 and 1993), Propper, Rees and Green (2001) and Besley, Hall and Preston (1998 and 1999) for the UK; Nolan and Wiley (2000) and Harmon and Nolan (2001) for Ireland; Christiansen, Lauridsen and Kamper-Jørgensen (2002) for Denmark and Johannesson, Johansson and Söderqvist (1998) focus on the effect of waiting lists as a measure of public health sector quality in Sweden.

Propper (1989) studies the demand for private health insurance in the UK. She finds that income is a significant determinant of insurance demand. She also suggests that being self-employed reduces the probability of purchasing private health insurance.

No other variables turn out to be significant in her model. The same author in a paper of 1993 models the demand for private medical insurance as a two stage process. At the first stage, individuals determine which options may be included within their choice set. Second, individuals choose between contracting supplementary medical insurance and being covered only by the public health coverage within an expected utility framework, defined over future income and health states. Her results suggest that political belief, in addition to standard economic concerns, determine the decision to buy private health insurance. She also finds that individual's health status influences the demand for supplementary health insurance.

In their study based on regional data from the UK Besley, Hall and Preston (1998) suggest that the length of waiting lists in the public hospitals – actual or perceived – affects the demand for private care and private health insurance (although the effect is not well determined). Using individual data Besley, Hall and Preston (1999) study the demand for private health insurance as a function of quality of public sector provision and other individual characteristics. They show that health insurance demand rises with age, tailing out those older than 65 when insurance premia tend to be higher. Income and the purchase of private insurance are found to exhibit strong positively correlation. Moreover, the authors observe that larger households are less likely to contract private insurance. They argue that this fact reflects the equivalent income effect that larger households may have lower standards of living than smaller households with the same income. Owner occupation and educational attainment are also positively associated with the probability of purchasing private insurance, while being employed in the public sector is negatively associated. The authors suggest that increases in the long-term NHS waiting lists (a measure of public health sector quality) augment the demand for private health insurance.

The demand for private health insurance in the United Kingdom from 1978 to 1996 is also a subject of a recent study by Propper, Rees and Green (2001). Using a pseudo-cohort panel constructed from an annual household survey the authors try to evaluate the impact of changes in NHS and private sector quality, controlling for

household income and demographic characteristics, on the private insurance purchase. Their results show that the increased share of privately insured can be explained by demographics, income, the quality of the public and private sectors, and generational change. Contrary to the study commented in the previous paragraph (Besley, Hall and Preston, 1999), NHS waiting lists are not found to significantly affect the purchase of private insurance decision. Instead, the authors find that other measures of the difference in the “quality” of care provided by the public and private sectors (the availability of NHS doctors to the private sector and the supply of private sector facilities) influence the decision. Regarding the propensity to buy private insurance, the results indicate that younger generations are more likely be insured than older ones. Habits are also shown to play some role in the decision to purchase private coverage.

Nolan and Wiley (2000) study the complex public-private mix of provision and financing of health services in Ireland. The authors estimate the share of “private” care received in the public hospitals, the characteristics of those individuals who receive that services and the associated costs of treatments. They also analyse the impact of the stated public policy intention of moving towards charging the full economic cost of private service in public hospitals. The cost consequences of pursuing this objective, together with the potential impact on the demand for health insurance, are also considered.

Harmon and Nolan (2001) examine the continuous growth in private insurance coverage in Ireland and investigate in more detail the factors underlying the demand for insurance. The individual characteristics are shown to have a direct effect on the probability of choosing private insurance. Older people appear to be less likely to contract private health policy, while women have higher probabilities of being insured than men. Marital status (being single) and household composition (number of children, number of prime-age adults and number of elderly individuals in the household) are found to be negatively associated with the probability of choosing private insurance. On the other hand, wealthier individuals are more likely to



contract VHI than those belonging to lower socio-economic groups. The authors also test the adverse selection hypothesis. Their findings do not suggest significant self-selection of those in poor health into insurance.

Christiansen, Lauridsen and Kamper-Jørgensen (2002) explore the determinants of membership in the Danish private health insurance association. They find that the probability of being insured increases with income, length of school education and length of vocational education. The probability is higher for females than for males and increases with age up to the age of 60, which is the age limit of enrolling in the private insurance scheme. These author also show that poor health reduces the probability of being insured. The main conclusion is that both income related and health related distributions of membership in the private health insurance association are unequal.

The effect of the length of waiting lists in Swedish public hospitals on the demand for voluntary health insurance guaranteeing almost immediate access to some pre-specified types of surgery is analysed in Johannesson, Johansson and Söderqvist (1998). The authors find that the probability of purchasing health insurance is higher for those who believe that there is a very great or fairly great chance that they will make use of the insurance. The effect of income on the insurance purchase is positive but it is significant (at 10% level) only in one of the studied scenarios. The coefficients of the age and age squared variables are significant and negative and positive, respectively. The authors argue that retired people value time spent on waiting list (relatively) high. Swedish adults with higher educational degrees show lower probabilities of contracting private health insurance. The authors claim that those people believe that they know the way of getting faster “service” from the public sector.

In a different context, that of the US, Gruber and Poterba (1994) study an issue we will also deal with: the role of tax incentives in the decision to purchase private insurance by the self-employed. They find that changes in after-tax prices of



insurance significantly affect individuals' insurance purchase decisions. This finding supports the hypothesis that price elasticity of demand for health insurance is considerably high.

#### **3.1.4. Why study further the demand for VHI?**

Our objective is to explore further the demand for supplemental health insurance in Spain contributing to the existing literature in several ways: 1) we use a panel of individuals which allows for the testing of some dynamic effects (although one limitation is the somewhat short period our data covers – see below), 2) we account for changes in public and private health sector supply, 3) we analyse price elasticity of demand taking advantage of the exogenous change in the tax treatment of health care expenditures occurred in 1999 and 4) we go one step further in the investigation of the role of the “region” variable by including several specific regional variables instead of just having a dummy for each region<sup>3</sup>.

After this introduction, we present the theoretical model in section 2; section 3 discusses the econometric specification and the explanatory variables; the data is described in section 4 and section 5 offers the results and their discussion. The decision to purchase private health insurance stands out as stemming not just from a few factors, but a wide variety of considerations that include price, personal characteristics – including “tradition” of VHI in the region of residence- and regional public and private health sector features.

---

<sup>3</sup> The fact that living in certain regions matters is already too obvious. Descriptive statistics from any source and year about the percentage of the population that hold voluntary health insurance in each of the 18 autonomous regions in Spain are conclusive about the existence of a clear and sustained difference between Catalonia, the Balearic Islands and Madrid on one side, and the rest of the regions on the other (see table 3.2 below).

## 3.2. THEORETICAL FRAMEWORK

### 3.2.1. Theoretical model

Following the general theoretical basis of the analysis of the demand for insurance, the theoretical framework behind our model is that of risk averse individuals who maximise their expected utility. Voluntary health insurance is purchased if the expected utility of being insured is greater than the expected utility of being uninsured. In this, we follow the approach by Besley, Hall and Preston (1999), Jofre-Bonet (2000), Propper, Rees and Green (2001) and Costa and García (2003).

Let  $p$  be the probability of being healthy. Healthy individuals do not need medical care and their utility function depends only on their disposable income,  $U(y)$ , where  $y$  is the difference between the individual's gross income,  $Y$ , and the individual taxes  $t$ . The utility function has the standard property that the utility is increasing with income but at a decreasing marginal rate,  $\frac{\partial U(\cdot)}{\partial y} > 0$  and  $\frac{\partial^2 U(\cdot)}{\partial y^2} \leq 0$ . When sick, individuals need a treatment,  $m$ , to recover their health status. This treatment can be provided either by the public sector,  $m^{pu}$ , or by the private one,  $m^{pr}$ . The utility function of a sick individual depends on the characteristics of the treatment received and on the individual's income,  $u(m, y)$ . This function is concave and increasing in both arguments,

$$\frac{\partial u(m, y)}{\partial m} > 0, \quad \frac{\partial u(m, y)}{\partial y} > 0, \quad \frac{\partial^2 u(m, y)}{\partial y^2} \leq 0 \quad \text{and} \quad \frac{\partial^2 u(m, y)}{\partial m^2} \leq 0. \quad (3.1)$$

Following Besley; Hall and Preston (1999) we assume that the sick-individual utility function also satisfies  $\frac{\partial^2 u(m, y)}{\partial m \partial y} \geq 0$ , which ensures that medical treatment is a normal good in the model. Further, as Zweifel and Breyer (1997) we assume that being healthy is better (brings higher utility) than being sick ( $U(\cdot) \geq u(\cdot)$ ). Public health care is free of charge at the point of service, while private care is financed either through voluntary health insurance or through direct payments<sup>4</sup>.

Those who purchase voluntary health insurance need to pay a premium  $\pi$  which reduces their disposable income independently of their health status. We assume that the insurance companies charge the actuarially fair insurance premium, which equals  $\pi = pM^{pr} \beta$ , where  $M^{pr}$  refers to the expected cost of treatment and  $\beta$  is a multiplicative loading factor representing administrative costs and mark-ups.

The expected utility of an uninsured individual<sup>5</sup> is:

$$V_N = pU(y) + (1 - p)u(m^{pu}, y), \quad (3.2)$$

where  $y = Y - t$  is the uninsured individual's after-tax income.

The expected utility of the privately insured is:

$$V_I = pU(y - \pi) + (1 - p)u(\max(m^{pr}, m^{pu}), y - \pi), \quad (3.3)$$

where  $y = Y - t + \delta\pi$  is the privately insured individual's after-tax income. As we

---

<sup>4</sup> All individuals, irrespective of their insurance status, may "self-insure" or directly purchase private health care services. We do not model this alternative here since our data does not clearly distinguish between the two private options: through VHI and through out-of-pocket payments.

<sup>5</sup> In fact, the uninsured individuals are actually individuals covered only by public insurance.

pointed out in the introduction being covered by a private insurance in Spain, actually means enjoying a duplicate health coverage. Thus, when sick the insured individual can choose between being treated in the private sector or in the public one depending on his/her perception of the expected benefits of each type of treatment.

The parameter  $\delta$  is the tax deduction allowed for medical expenditures, including the purchase of a VHI policy. Up to 1999 people who purchased voluntary health insurance in the individual market could reduce their personal income tax payment in an amount equal to 15% of the premia paid during the previous year. For these individuals, the after-tax cost of purchasing health insurance was  $(1-\delta)\pi$ . The deduction was abolished by the 1999 Personal Income Tax Reform (Law 40/1998 of 9 of December), making the tax-deductible share of health insurance costs,  $\delta$ , equal to zero. The policy of reducing or abolishing tax relieves for VHI has been also adopted by other European countries (Denmark, Finland and the United Kingdom). Policy makers defend the removal of tax relief on VHI claiming that such policy does not seem to stimulate the demand for VHI and at the same time it constitutes an expensive and regressive subsidy<sup>6</sup> to the wealthier population strata (Mossialos and Thomson, 2002).

Individuals buy a voluntary health insurance if

$$V_I - V_N \geq 0. \quad (3.4)$$

---

<sup>6</sup> Using data from the 1994 Catalan Health Survey López Nicolás and Vera-Hernández (2002) construct a simulation routine based on a microeconomic discrete choice model and calculate that the foregone tax revenue arising from deductions related to the purchase of individual private health insurance before 1999 amounted to € 69.2 M. per year. At the same time, the elimination of the subsidies to private policies is estimated to generate an extra cost of about € 5.6 M. per year.

### 3.2.2. Expected effect of the factors determining the decision to purchase VHI

Thus, the determinants of the decision to purchase voluntary health insurance are disposable income, the (net) insurance premium, the probability of illness, the type (characteristics) of treatment and a range of individual characteristics, some of which are observable but others are not. Among the unobserved ones we can include the opportunity cost of time, ideological reasons that mark a certain preference for public or private, willingness to signal social status and separate oneself from the common public system, etc.

As already noted by Besley, Hall and Preston (1999) net income is expected to exhibit positive correlation with the probability of purchase of voluntary health insurance. This can be seen if we differentiate the expected utility gain of purchasing VHI ( $V_I - V_N$ ) with respect to disposable income.

$$\begin{aligned} \frac{\partial(V_I - V_N)}{\partial y} = & p[U_y(y - \pi) - U_y(y)] \\ & + (1 - p)[u_y(\max(m^{pr}, m^{pu}), y - \pi) - u_y(m^{pu}, y)] \end{aligned} \quad (3.5)$$

The difference between the first two terms on the right-hand side of the above equation is positive, given that  $\frac{\partial^2 U(\cdot)}{\partial y^2} < 0$ . The sign of the last two terms depends on which sector – the private or the public one – offers better health services.

1) If  $m^{pr} \leq m^{pu}$ <sup>7</sup>, then we get  $u_y(m^{pu}, y - \pi) - u_y(m^{pu}, y)$ , which is positive because of the concavity of the sick-individual utility function.

<sup>7</sup> This may be the case of complicated surgery, not provided by the private sector.

2) If  $m^{pr} > m^{pu}$ <sup>8</sup>, then we can rewrite the last two terms in the following way

$$[u_y(m^{pr}, y - \pi) - u_y(m^{pr}, y)] + [u_y(m^{pr}, y) - u_y(m^{pu}, y)].$$

Again, the first term is positive because of the concavity of the sick-individual utility function, while the second one is positive because of the fact that the second cross derivative of the utility function is positive and because of the assumption  $m^{pr} > m^{pu}$ .

Thus, the overall impact of income on the probability of contracting VHI is positive.

The probability of illness has an ambiguous effect on the decision to purchase VHI. On one hand, insurance companies may ask people with higher illness probabilities higher insurance premia. Thus, lower  $p$  (probability of being healthy) decreases the demand for VHI through the insurance premium. On the other hand, those with higher probabilities of being ill (assuming that people know their own probability of getting ill) contract private insurance more relative to people with lower probabilities of getting ill (adverse selection). Formally, we substitute the disposable income in the expected utility function of the uninsured individual with  $y = Y - t$  and of the insured one with  $y = Y - t + \delta\pi$ . Then we differentiate the difference ( $V_I - V_N$ ) with respect to the probability of illness,  $p$ .

$$\begin{aligned} \frac{\partial(V_I - V_N)}{\partial p} &= U(Y - t + \delta\pi - \pi) + pU_y(Y - t + \delta\pi - \pi)(-\beta M^{pr}) \\ &\quad - u(\max(m^{pr}, m^{pu}), Y - t + \delta\pi - \pi) \\ &\quad + (1 - p)u_y(\max(m^{pr}, m^{pu}), Y - t + \delta\pi - \pi)(-\beta M^{pr}) \\ &\quad + U(Y - t) - u(m^{pu}, Y - t) \end{aligned} \quad (3.6)$$

<sup>8</sup> The assumption that  $m^{pr} > m^{pu}$  does not imply that the quality of *clinical* treatment in the private sector is superior to that in the public one. It just reflects the existence of other non-clinical attributes of private health care – like faster and direct access to specialist care, shorter waiting times for an appointment to see a doctor, more “personalised” care, hotel comfort in hospitals – that make it more desirable.

This sign of the right-hand side of the above expression (and thus, the effect of the probability of sickness on the decision to buy VHI) is indeterminate. The second and the fourth terms are negative, while the sign of the remaining terms is positive. This can be easily seen if we rearrange these terms to get the following differences,

$$U(Y - t + \delta\pi - \pi) - u(\max(m^{pr}, m^{pu}), Y - t + \delta\pi - \pi) \text{ and } U(Y - t) - u(m^{pu}, Y - t).$$

These are positive, given the assumption that  $U(\cdot) \geq u(\cdot)$ .

With regard to the impact of the tax reform, we obtain that tax deductibles and the probability of purchasing of voluntary health insurance by the individuals move in the same direction. A reduction in the tax-deductible share of insurance costs will lead to a decrease in the probability of contacting of VHI, and vice versa. This can be shown by differentiating the expected utility gain of purchasing VHI with respect to the tax deductible parameter,  $\delta$ .

$$\frac{\partial(V_I - V_N)}{\partial\delta} = pU_y(y - t + \delta\pi - \pi)\pi + (1 - p)u_y(\max(m^{pr}, m^{pu}), Y - t + \delta\pi - \pi)\pi \quad (3.7)$$

This expression is positive, given the assumption about the first and second derivatives of the utility function.

A positive difference between the characteristics of care received from private and public sector providers is expected to have a positive effect on the decision to purchase voluntary health insurance. For example, longer waiting lists and waiting time or fixed attendance hours (appointments coinciding with patient's working hours) in the public health facilities may increase the probability of contracting private health insurance in order to be treated in the private sector where waiting lists are unusual, waiting times are negligible and physicians' attendance hours are much more flexible.



### 3.3. ECONOMETRIC SPECIFICATION

In this section we present the econometric specification which should allow us to analyse the determinants of the demand for voluntary health insurance, exploiting the panel structure of our data set. We also describe the explanatory variables used in the estimation.

#### 3.3.1. Econometric model

Binary response panel data estimator is the appropriate candidate for the econometric analysis of the probability of holding voluntary health insurance. The dependent variable,  $y_{it}$ , which indicates whether the individual  $i$  is a VHI holder during the quarter  $t$ , is defined as:

$$y_{it}^* = x_{it}' \beta + v_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T$$

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases}, \quad (3.8)$$

where  $y_{it}^*$  is the latent process that guides the purchase decision,  $i$  indexes individuals,  $t$  indexes time periods and  $x_{it}$  is a  $(k \times 1)$  vector of individual characteristics. Observable covariates are assumed to be “jointly” exogenous conditional on the individual effects.

Given the panel nature of the model we can specify the following error component structure:

B.U.B. Secció d'Econòmiques  
Diagonal, 690, 08034 Barcelona  
Tel. 102 19 66

$$v_{it} = \eta_i + u_{it}$$

$$\text{with } \text{Var}(v_{it}) = \sigma_\eta^2 + \sigma_u^2 \quad \text{and} \quad \text{Corr}(v_{it}, v_{is}) = \frac{\sigma_\eta^2}{\sigma_\eta^2 + \sigma_u^2}. \quad (3.9)$$

The  $u_{it}$  is the transitory error term which is assumed to be independently and identically distributed over units and time periods and is independent of the regressors. The  $\eta_i$  is an unobserved individual-specific effect, which is assumed to be normally distributed with zero mean and variance  $\sigma_\eta^2$  and independent of  $u_{it}$ . This term captures the individual unobserved heterogeneity (permanent differences across individuals) in variables such as health status, opportunity cost of time and attitudes towards “private” versus “public” services, specifically health care services. It allows for different individuals having permanently different propensities to purchase VHI.

We have chosen to estimate a random effects logit model. According to Wooldridge (2002) one of the advantages of the random effects logit model over the random effects probit model is that the underlying assumptions of the logit model permit to obtain consistent estimates of the  $\beta$  coefficients without specifying any additional assumptions about the relation between the individual-specific effect,  $\eta_i$ , and the observed covariates,  $x_{it}$ <sup>9</sup>.

In the random effects logit specification we assume that the idiosyncratic error,  $u_{it}$ , is distributed according to a continuous distribution with density probability function and cumulative density function  $\lambda(\cdot)$  and  $\Lambda(\cdot)$ , respectively:

---

<sup>9</sup> In the random effects probit model  $\eta_i$  and  $x_{it}$  are assumed to be independent.

$$\lambda(x_{it}'\beta + \eta_i) = \frac{\exp(x_{it}'\beta + \eta_i)}{[1 + \exp(x_{it}'\beta + \eta_i)]^2}, \quad \Lambda(x_{it}'\beta + \eta_i) = \frac{\exp(x_{it}'\beta + \eta_i)}{1 + \exp(x_{it}'\beta + \eta_i)}. \quad (3.10)$$

Since the unobserved individual effect is assumed to be normally distributed, the probability of the observed sequence of the indicator variable  $Y_i = [Y_{i1}, Y_{i2} \dots Y_{iT}]$  can be defined as:

$$\Pr(y_i | x_i) = \int_{-\infty}^{\infty} \frac{\exp(-\eta_i^2 / 2\sigma_\eta^2)}{\sqrt{2\pi}\sigma_\eta} \left\{ \prod_{t=1}^{n_i} F(x_{it}'\beta + \eta_i) \right\} d\eta_i, \quad (3.11)$$

where

$$F(x_{it}'\beta + \eta_i) = \begin{cases} \frac{1}{1 + \exp(x_{it}'\beta + \eta_i)} & \text{if } y_{it} > 0 \\ 1 - \frac{1}{1 + \exp(x_{it}'\beta + \eta_i)} & \text{otherwise.} \end{cases} \quad (3.12)$$

Consistent and asymptotically efficient estimator can be obtained by maximising the likelihood function

$$L = \sum_{i=1}^N \log \{ \Pr(y_i | x_i) \}, \quad (3.13)$$

using a Gauss-Hermite quadrature procedure, suggested by Butler and Moffitt (1982), that approximates and evaluates the integrals. The quadrature procedure requires that the integrated function be well-approximated by a polynomial. This is the case when the number of time periods does not exceed 50.

We use a simple likelihood ratio test to compare statistically the random effect logit model to the simple logit model. The later constitutes a particular version of the

random effects logit model when  $\rho = 0$ , or, in other words, when there is no individual-specific effects. The statistic of this test is written down as follows:

$$LR = 2(\log L_U - \log L_R) \rightarrow \chi_{(1)}^2 \quad (3.14)$$

The  $L_U$  is the log-likelihood of the unrestricted model (random effects logit) and  $L_R$  is the log-likelihood of the restricted model (simple logit). The LR statistic follows the chi-square distribution with one degree of freedom, corresponding to the unique, in this case, restriction imposed by the null hypothesis that  $\rho = 0$ .

Wald statistic is used to test the null hypothesis of all parameters, except the constant, being equal to zero (Long, 1997).

$$W = \hat{\beta}' (\hat{V}(\hat{\beta}))^{-1} \hat{\beta} \rightarrow \chi_{(k-1)}^2, \quad (3.15)$$

where  $\hat{V}(\hat{\beta})$  represents the variance-covariance matrix of the estimated coefficients vector,  $\hat{\beta}$ .

At last, we calculate the average partial effects of the covariates on the response probability using the method proposed by Wooldridge (2002). Given that  $\eta_i \sim N(0, \sigma_\eta^2)$ , the average partial effects for both continuous and discrete explanatory variables can be obtained as  $[\beta_j / (1 + \sigma_\eta^2)^{1/2}] \phi[\mathbf{x}_i \beta / (1 + \sigma_\eta^2)^{1/2}]$ . Thus, we only need to estimate the population-averaged parameters  $\beta_\eta = \beta / (1 + \sigma_\eta^2)^{1/2}$ .

### 3.3.2. Explanatory variables

In this section we discuss the explanatory variables we chose to include in our model. The definitions of these variables appear in table 3.1. Given that the Continuous Family Expenditures Survey does not contain any health indicators (like subjective health status, presence of chronic conditions, disability constraints, etc.) we follow the common practice in health research and use age (and its square) and gender as proxy measures of individual health status and expected medical use. Educational level, which is also associated with health status and with preferences for type of provider is included in the form of three dummy variables indicating highest educational level achieved by the respondent. Size of the town of residence captures the availability of health care supply both public and private although, since they do not have to abide by geographical equity considerations, the concentration in higher urban areas is specially a feature of private providers. Given the importance of time-price as a rationing mechanism in public health care systems, we include a continuous variable reflecting the number of working hours per week as an indicator of the opportunity cost of time. Its expected sign in the equation is positive. And we also control for household income<sup>10</sup> since earnings obviously influences the decision to purchase VHI.

The 1998 Personal Income Tax Reform (affecting the 1999 income-tax returns and onwards) provides a natural experiment for the analysis of the impact of price variation. There are two issues here, though. First, it is open to question when do common citizens visualise this reform and change accordingly their behaviour: do they realise immediately upon the approval of the law, that is, at the beginning of

---

<sup>10</sup> Unfortunately, questions on income in household surveys are usually badly or not responded. However, we do know the household total expenditures. Also, the INE (National Institute for Statistics) has elaborated the 1998 Annual Family Expenditure Survey (which is based on four consecutive quarters of the CFES for each individual between the 3<sup>rd</sup> quarter of 1997 and the 2<sup>nd</sup> quarter of 1999), which contains information on household income. Thus, we estimated an OLS regression of income on household total expenditure in 1998 and we used the estimated parameters to impute income in our data set. The income equations is as follows:  
 $\log(\text{Income}) = 2.86 + 0.68\log(\text{Household Expenditures})$ .

**Table 3.1.** Variable definitions

<b><i>Dependent variable</i></b>	
Vhi	1 for those reporting to have voluntary health insurance, 0 otherwise
<b><i>Explanatory variables</i></b>	
Age	Age of the respondent
Age2	Age squared
Female	1 for female, 0 otherwise
Edu	Maximum level of education completed by the respondent. Three dummy variables: Edu1 (primary), Edu2 (secondary), Edu3 (university). Excluded category: without studies
WHours	Number of working hours per week of those occupied
LnIncE	Logarithm of the household monthly income, estimated from household total expenditures
Tsize	Size of the town of residence. Three dummy variables: Tsize1 (Provincial capital), Tsize2 (more than 50,000 inhabitants), Tsize3 (between 10,001 and 50,000 inhabitants). Excluded category: less than 10,000 inhabitants
SPlag	A lagged variable indicating positive visits to specialists. 1 for those who have visited a specialist during the previous quarter, 0 otherwise
<b><i>Regional variables</i></b>	
LnPublHExp	Logarithm of lagged public health expenditures per capita in each autonomous region. (Expenditures in 1998 for the four quarters of 1999 and expenditures in 1999 for the three quarters of 2000.)
HTbeds	Proportion of the number of beds in private hospitals with high technology equipment* to the total number of beds in hospitals, both private and public, with high technology equipment in the autonomous region (Proportion in 1998 for the four quarters of 1999 and proportion in 1999 for the three quarters of 2000.)
Vhi90	Deviation of the percentage of the population with VHI in 1990 in the autonomous region of residence with respect to the Spanish average
<b><i>Tax reform variable</i></b>	
Ref100	1 for the three quarters of 2000, 0 otherwise

Note: \* A hospital with high technology equipment is defined as a hospital equipped with at least one of the following: Computerised Axial Tomography, Magnetic Resonance, Gamma Camera, Hemodynamics Room, Digital Subtraction Angiography, Extracorporeal Shock Wave Litotripsy, Cobalt Bomb, Particles accelerator. The information is extracted from the Catálogo Nacional de Hospitales, 1998 and 1999.

1999<sup>11</sup>? Is the reform not visualised till June 2000, when Spaniards fill their 1999 taxes and the tax forms reflect this change for the first time? Do they realise somewhere in between? For our estimation purposes the main difficulty is thus fixing the *before* and *after* periods, depending on when we think individuals become aware of the reform and change their behaviour. Given that the law was passed in December 1998, we think that individuals probably realise sometime during the 1999 year, but many of them take their decisions to continue or cancel their health insurance contracts at the beginning of next year<sup>12</sup>. Therefore, we chose as a reference point the first quarter of 2000 and our explanatory variable capturing the effect of the reform is a dummy variable that equals 1 for the three quarters after January 1<sup>st</sup> 2000, and 0 in the four quarters before that.

The second issue related to the reform is that fiscal incentives were not actually suppressed, but they were instead passed on to companies. The same law that abolished *personal* deductions for these type of expenditures made it possible for companies and enterprises to deduct as running costs health insurance premia paid on behalf of their workers. Thus, fiscal incentives apply now to policies bought by employers. Additionally, employees do not have to count this benefit as salary in kind or taxable income when paying their taxes<sup>13</sup>.

Now, the impact of the deduction on the individual can be thought of as either a price effect (the abolishment of the deduction would mean an increase of the net price of the premium) or an income effect (annual disposable income is reduced after the removal if the individual renews his/her health insurance contract). In both cases the expected impact is a reduction in the demand for voluntary health insurance

---

<sup>11</sup> We think this is unlikely because the government or the insurance companies have few incentives to widely publicise this type of tax reform.

<sup>12</sup> Because insurance companies incentivate annual payment of insurance premia through price discounts, there may be a significant percentage of individuals that pay their premia annually.

<sup>13</sup> Another argument in favour of fixing the “before” and “after” periods in the first quarter of 2000 is that both, employees who held individually bought policies and their employers, would need some time to negotiate mutually beneficial modifications in their contract, exchanging part of their monetary wage (or expected rise in wage) for an employer provided private health insurance policy. Changes in contract conditions take place more often at the beginning of each year.



contracted individually. However, the final impact of the 1999 tax reform on total VHI coverage is ambiguous because the expected decrease in the individual demand for VHI might be surpassed, compensated, or dominated by an increase in the number of employer-provided VHI policies.

One of the well known reasons people give to buy private health insurance is to gain direct access (without need of a referral from their general practitioner) to a specialist of their choice. If an individual has shown to be a user of specialists services in the past, this may influence his decision to buy VHI in order to facilitate the utilization of this type of doctor<sup>14</sup>. To test this effect we have included a lagged dummy variable (SPlag) indicating whether there have been any visits to specialists or not. In the initial period SPlag is assigned a value of 1 if the mean of the specialists' visits over the seven quarters equals or is above 0.5, and it is assigned 0 if this mean is below 0.5.

Finally, three regional variables capturing specific health sector characteristics and the "tradition" in the purchase of VHI were included in the estimation (their descriptive values are shown in table 3.2). The variable representing public health expenditures is expected to show negative correlation with the demand for VHI because we associate higher public expenditures with better public sector quality<sup>15</sup>. The availability of private hospitals with at least some high technology equipment surely contributes to making it worthy to contract a private insurance policy (otherwise, for complex care you will have to go to public hospitals – usually better equipped – and then holding private insurance becomes less attractive). Moreover, the availability of high technology equipment may be a good indicator of private health sector quality. Thus, we expect the HTbeds variable to affect positively the individual decision to purchase VHI. There could be an issue here about the possible

---

<sup>14</sup> The causality could be reversed if we were speaking of the same time period.

<sup>15</sup> This would not be so if higher expenditures just meant paying more for the same, although even in this case higher wages should ultimately show up in better quality service. Nevertheless, there are considerable differences in the number of physicians and public beds per 1000 inhabitants among the Spanish regions.

**Table 3.2.** Lagged regional variables

Autonomous region	Public Health Expenditure per capita (euros) <sup>a</sup>		Proportion of beds in private hospitals with HTE to beds in hospitals (private and public) with HTE <sup>*b</sup>		Percentage of heads of household with VHI <sup>c</sup>	
	1998	1999	1998	1999	1990	1999
Andalusia	621	650	0.1518	0.1566	6.97	8.82
Aragon	694	730	0.0932	0.0818	10.86	8.43
Asturias	689	737	0.1527	0.1539	2.26	4.20
Balearic Islands	569	599	0.3504	0.3573	21.91	21.50
Canary Islands	641	638	0.2485	0.2978	4.02	7.57
Cantabria	693	742	0.0627	0.0836	12.43**	19.62**
Castilla y Leon	636	679	0.1047	0.1194	7.91	7.69
Castilla - La Mancha	598	639	0.0940	0.0995	6.93	6.29
Catalonia	644	690	0.2823	0.2757	28.53	23.84
C. Valencia	600	648	0.1632	0.1791	5.86	6.22
Extremadura	639	679	0.0228	0.0306	12.41	8.31
Galicia	653	698	0.2226	0.2023	3.39	1.68
Madrid	668	693	0.2131	0.2095	22.38	21.90
Murcia	626	674	0.1254	0.1329	5.13	5.77
Navarra	765	809	0.2918	0.2912	6.81	3.45
País Vasco (Basque Country)	737	785	0.2012	0.1847	11.54	12.88
Rioja	654	692	0	0	14.85	9.72
Towns of Ceuta and Melilla	1264	1364	0	0	7.24	5.88
<b>Spain</b>	<b>644</b>	<b>682</b>	<b>0.1856</b>	<b>0.1891</b>	<b>9.87</b>	<b>11.08</b>

Notes:

\* HTE – high technology equipment

\*\* The case of Cantabria is a special one, because of the high percentage of people who pay “iguales”.

Sources:

a) *Ministerio de Sanidad y Consumo. Cuentas satélite del gasto sanitario público 1995-1999 and Memoria del INSALUD 1999.*b) *Catálogo Nacional de Hospitales, 1998 and 1999.*c) *Encuesta de Presupuestos Familiares 1990-91 and ECPF 4<sup>th</sup> quarter 1999.*

endogeneity of this variable. That is, that private hospital bought high technology equipment in order to attract private insurance companies' beneficiaries. If this were so, the causality could be reversed and the estimated coefficient biased. However, we think that although private hospitals may take private patients into account, their

decision to buy high technology equipment is mainly driven by their willingness to gain contracts as providers to the public sector. Private demand would be insufficient<sup>16</sup>, in most cases, to turn the investment profitable. In fact in more than 50% of the private hospitals included in our variable do have contracts or “conciertos” with the public sector. In sum, for an individual who is deciding whether to buy or not private supplemental health insurance, the availability of such high technology equipment in private hospitals can be treated as exogenous. At last, it is an extended view – see Triadó (2002) – that “tradition” (you are raised in a family who has always had private insurance and you keep this when you get independent) as well as social prevalence in your kin group is one of the most important determinants of the demand for VHI in Spain. To test this hypothesis we included a variable representing the percentage of population with VHI in 1990 in each autonomous region in deviation from the total average for Spain.

### **3.4 DATA AND DESCRIPTIVE ANALYSIS**

#### **3.4.1. The data**

The empirical analysis is based on data from the Spanish Continuous Family Expenditures Survey (CFES), which is a quarterly panel survey that the National Institute for Statistics (INE) started in the third quarter of 1997. Here, we have used 7 waves at 3-months intervals, covering a 21-month period starting at the 1<sup>st</sup> quarter of 1999 and ending at the 3<sup>rd</sup> quarter of 2000. The sample consists of 8,064 households that are rotated by 12.5% every quarter. The survey contains wide information on the socio-economic characteristics of the household, insurance take up and payments on premia, as well as some data on the utilization of health care services.

---

<sup>16</sup> According to the Spanish Health Survey 1997, only 12% out of all hospital admissions in 1997 were to hospitals belonging to the private sector.

However, there are some drawbacks in the use of the CFES data set for the analysis of the demand for VHI. One limitation is the lack of health variables like self-reported health status, chronic illness, limited conditions, and harmful habits (smoking and alcoholism). The use of age and sex variables as proxies for health status is an usual practice when no health information is available. In this paper we adopt the same strategy. Second, the fact that most of the individual characteristics are only collected for the heads of the household restricts our analysis to the subsample of heads of household. Third, the data does not provide a distinction between those that hold an individually purchased private health insurance policies and those with employer-provided private health insurance. This is especially inconvenient for the evaluation of the impact of the tax reform.

### **3.4.2. Descriptive statistics**

Our final sample includes 4,539 heads of household who participated in the survey for five, six or seven quarters between the first quarter of 1999 and the third quarter of 2000. Tables D.1 through D.7 in the Appendix D describe the characteristics of these individuals in each quarter, distinguishing between those with VHI (almost 11% of the sample we work with) and those without, in terms of possible covariates discussed in the previous section and usually employed in the analysis of the demand for VHI. Individuals with private health insurance are on average a bit younger than those only publicly insured (54 versus 55 in the first quarter of 1999), although the difference is not statistically significant. The percentage of women among the privately insured is between 3 and 4 points higher than among those with public health coverage only. Compared with the individuals who do not buy VHI, those who do so are on average more educated. Indeed, almost one fourth of the individuals with VHI are university graduates, while the percentage of those holding university degree among the only publicly insured is between 6% and 7%. As for the current labour situation, VHI holders are clearly more heavily concentrated amongst those working. There are more people occupied (64% versus 50% in the first quarter)

and less individuals retired (27% versus 36% in the first quarter) among the privately insured. Furthermore, one third of the voluntarily health insured are self-employed, while it is less than 25% in the other group. As it was expected, and had already been observed in previous studies, people who buy VHI have higher income compared to people who do not buy it. They are also more likely to reside in highly populated urban areas (almost half live in provincial capitals). Those with VHI have higher probability of having visited a specialist (they do not need a GP referral); however, there is no significant difference in the average number of visits to specialists (of those with positive visits in the previous period) between the two groups<sup>17</sup>.

### 3.4.3. Longitudinal descriptive analysis

Descriptive statistics reported in tables D.1 through D.7 do not exploit the longitudinal aspect of the data, nor do they give any indication for how the past history of VHI holding is related to the current probability of contracting VHI. Following are some descriptive statistics highlighting the dynamic aspects of VHI holding. Table 3.3 shows that the percentage of voluntary health insurance coverage changes slightly over the seven quarters, ranging between 10.07% and 11.56%. More interestingly, although the global figure remains relatively stable, there is a considerable flow of individuals in and out of private insurance.

An impression about the dynamics (persistence) of VHI holding can be obtained from the figures presented in the last two rows of table 3.3. The figures provided in the fifth row reveal that between 85 and 94 per cent of the individuals with VHI coverage in any quarter have been covered by private insurance in the previous quarter. Opposite to this, the probabilities of contracting private health insurance in any quarter conditional on not being insured in the previous quarter are rather small.

---

<sup>17</sup> This could hint at no moral hazard existing among these doubly insured population, although we have not tested for it since this is not the objective of our study.

**Table 3.3.** Quarterly evolution of heads of household voluntary health coverage.

	1999				2000		
	1 <sup>st</sup> quart.	2 <sup>nd</sup> quart.	3 <sup>rd</sup> quart.	4 <sup>th</sup> quart.	1 <sup>st</sup> quart.	2 <sup>nd</sup> quart.	3 <sup>rd</sup> quart.
Individuals holding VHI	288	413	467	490	510	381	328
% holding VHI	10.07	11.15	10.66	10.96	11.44	10.23	11.56
Inflow ( $VHI_{t-1}=0$ to $VHI_t=1$ )		38	40	45	51	26	51
Outflow ( $VHI_t=1$ to $VHI_{t+1}=0$ )	23	58	41	30	61	16	
Prob( $Insured_t Insured_{t-1}$ )		0.919	0.851	0.911	0.938	0.851	0.944
Prob( $Insured_t Uninsured_{t-1}$ )		0.015	0.013	0.012	0.013	0.008	0.020

Source: Continuous Family Expenditure Survey 1999-2000.

These probabilities range from 0.8 to 2 per cent. Consequently, in any quarter the effect of state dependence conditions is the main determinant of the percentage of individuals with VHI coverage. There are two potential explanations for the persistence in discrete outcomes that have been emphasised in the literature (Heckman, 1981a and 1981b). On one hand, individuals might be heterogeneous with respect to characteristics which are relevant for the decision to purchase VHI and persistent over time. This case refers to the process of unobserved heterogeneity. Accordingly, an individual who holds VHI at time  $t$  because of (possibly unobserved) adverse characteristics, will also be likely to hold VHI in any other period because of the same adverse characteristics. Instead, it may be that the fact of being a VHI holder in a specific time period, in itself, is likely to affect the probability of undertaking VHI in subsequent periods. If this is the case, we say that the process exhibits structural or “true” state dependence (Heckman, 1978).

The pattern of VHI holding observed in the data is shown in table 3.4. The impression that one can obtain from these figures is that the process of VHI holding exhibits considerable persistence over time. The vast majority of individuals have private health coverage in either all or none of the sample periods. Consequently, it seems very likely that the underlying process of VHI holding is not independent over time. To check this hypothesis we performed a preliminary analysis of the dynamics of the demand for voluntary health insurance. The estimation results from a model including a lagged dependent variable are presented in the Appendix E.

**Table 3.4.** Actual sequence of VHI holding.

Individuals observed over 7 periods		Individuals observed over 6 periods		Individuals observed over 5 periods	
Sequence	Freq.	Sequence	Freq.	Sequence	Freq.
0000000	957	0000000	1339	0000000	1652
1111111	77	111111.	50	11111..	63
0111111	5	.111111	62	..11111	65
1101111	3	.111101	8	.11111.	9
1111100	3	.011111	2	..11101	9
1111000	2	.111100	3	11011..	8
0000111	3	001111.	2	..11101	9
1110000	2	001110.	2	..01111	5
1100000	4	111000.	2	01111..	4
Miscellaneous	37	Miscellaneous	85	Miscellaneous	67
	1093		1555		1891

Source: *Continuous Family Expenditure Survey 1999-2000*.

Notes: A "1" in the  $t^{\text{th}}$  position indicates VHI coverage in the  $t^{\text{th}}$  period, while "0" indicates no VHI coverage. The "." stands for non-participation in the  $t^{\text{th}}$  period. The rows labelled "Miscellaneous" represent all other sequences of VHI holding.



### 3.5. RESULTS AND DISCUSSION

The results of the estimation of the probability of purchasing VHI are presented in table 3.5. First of all, we should remark that almost all the variables included in the equation are significant. This implies that the decision to purchase private health insurance stems from a wide variety of considerations that include price, personal characteristics – including “tradition” of VHI in the region of residence – and regional attributes of the public and private health sectors.

The signs of the coefficients and the partial effect of the educational variables and, to a lesser extent, the household monthly income are in line with the results found by Cameron *et al.* (1988) for Australia, González (1995) for Spain, Vera-Hernandez (1999) for Catalonia, and Nolan and Wiley (2000) for Ireland that the main determinants of the decision to buy a VHI are socio-economic factors. The higher the level of education, the higher the probability of purchasing VHI; in fact, university graduates are around 50% more likely to contract VHI than those without a university degree. Also, our results lend support to the argument put forward by Murillo *et al.* (1991), Murillo and González (1992), and González (1995) that in the presence of a statutory public insurance system, it is mostly the better off who buy VHI.

Nevertheless, we find a positive, but at a decreasing rate, relationship between an individual’s age and the decision to buy VHI<sup>18</sup>. Since age is used as a proxy for health, this could be interpreted as suggesting the existence of certain degree of adverse selection (Akerlof, 1970; Arrow, 1985). The same could apply to the positive sign of the female variable since women are known to be higher users of health care. Considering individuals at their average characteristics, a woman has 3 percentage points higher probability of contracting voluntary health insurance than a man.

---

<sup>18</sup> However, the purchase of private insurance declines for ages 75 and older, probably because premiums get much more expensive.

**Table 3.5.** Random-effects logit estimation of the demand for voluntary health insurance.

Variables	Coefficient	St. Error	Average Partial Effects
Constant	-4.4955	6.759	
Age	0.3172**	0.039	0.0003
Age2	-0.0020**	0.001	-0.0001
Female	0.5145**	0.225	0.0313
Edu1	1.4370**	0.299	0.0823
Edu2	5.9026**	0.399	0.3207
Edu3	8.3928**	0.436	0.4970
WHours	-0.0056	0.004	-0.0003
LnIncE	0.6341**	0.138	0.0306
Tsize1	0.9252**	0.247	0.0563
Tsize2	-1.2599**	0.304	-0.0766
Tsize3	-0.5093*	0.261	-0.0310
Ref100	0.2716**	0.119	0.0165
SPlag	0.6121**	0.140	0.0373
LnPublHExp	-4.0419**	1.106	0.0000
HTbeds	6.8049**	1.013	0.4123
Vhi90	0.2761**	0.013	0.0167
$\ln(\sigma_{\eta}^2)$	3.7367		
$\sigma_{\eta}$	6.4777		
$\rho = \sigma_{\eta}^2 / (\sigma_{\eta}^2 + \pi^2 / 3)$	0.9273**		
N observations	26436		
N individuals	4539		
N periods (avg.)	5.8		
Log likelihood	-3200.01		
Wald chi-squared (16)	930.20**		
Likelihood ratio test of $\rho = 0$	8928.59**		

Note: \* statistically significant at 90% level;

\*\* statistically significant at 95% level.

However, in the case of gender there are good alternative (to the adverse selection argument) explanations. Two features highly valued by women are faster access to

gynaecologists and obstetricians of their choice and availability of a private room when giving birth, both of which are readily advertised by private insurance companies while almost all rooms are double rooms in the public sector. This behaviour is confirmed, for example, by our finding in chapter two that women in prime fertility age tend to visit private specialists more often than men and more often than women in other age groups.

Still, in order to offer some further insight on this issue, we explored in the data set the composition of total household expenditures of those holding VHI and of those covered by public insurance only. These figures provide some interesting clues. In particular, household expenditures in cigarettes and alcohol are lower in percentage terms where the head of the household enjoys private health insurance than where he/she does not. This fact can be interpreted as an indicator of healthier lifestyles and the purchase of VHI would then suggest higher preferences for health rather than adverse selection.

With regards the size of the town of residence and the probability of contracting VHI we encounter a U-shape relationship between. People who live in provincial capitals have almost 6% higher probability of buying VHI compared to those who live in small towns and villages. This might be due to the fact that most of the private health facilities are concentrated in the cities. On the other hand, we find that the residents of middle-size towns buy VHI less often than the inhabitants of smaller towns and villages (less than 10,000 inhabitants). The difference in the probability of being a VHI holder for an average citizen of a big town that is not a provincial capital and that for an average citizen residing a small village is around 8%. As already observed by Rodríguez (1988) for Catalonia, this could be due to a certain feeling in small towns of being “underserved” by the public sector. If forced to travel to the capital for specialised care, one might as well go to the private sector. In their case, the monetary price of the private insurance policy constitutes a lower percentage of the total price they have to pay (including time and transportation prices) and therefore, following Phelps and Newhouse (1974), they show lower monetary price elasticity.

We turn now to the price variation induced by the tax reform. Economic theory predicts that the demand for normal goods, such as VHI, is decreasing with the price of the good. Thus, one should expect that a tax reform that indirectly augments insurance premia (or lowers net income) would reduce the purchase of VHI. That is, elasticity should be negative. However the sign of the reform variable is positive, significant and not negligible. A plausible explanation lies in the nature of the tax reform and the characteristics of our data: since we cannot distinguish between individually and employer purchased policies<sup>19</sup>, this result indicates that the effect on individuals (reduction) has probably been more than compensated by a positive effect on the number of employer-provided health insurance policies. This would mean that the tax reform was indeed successful in incentivating the latter type of policies.

The above explanation is compatible with recent evidence from other sources. Comparing the Spanish Health Survey of 1997 and that of 2001, both conducted by the Centre for Sociological Investigations (CIS), one can detect that the total percentage of people with private health insurance in Spain has kept stable<sup>20</sup> or slightly diminished but there has been a certain switch between individually bought policies, which have decreased, and employer-paid policies, which have increased. The percentage of people holding individually bought health insurance has gone down from 8.9% in 1997 to 7.6% in 2001. Meanwhile, the percentage of people with employer-provided insurance has increased from 2% in 1997 to 2.7% in 2001. That represents exactly 14.3% less, a figure that, although not straightforward comparable, is similar to the 15% increase in the after tax price.

---

<sup>19</sup> The questionnaire does not separate between both possibilities. We tried to discriminate by comparing the answer to this question with the presence or absence of positive expenditures on health insurance premia. This attempt was unsuccessful because the expenditures variable refers to the whole household instead of the individuals. Moreover, this expenditure figure refers to the quarter, but there are households that pay their premia annually and therefore a zero here does not necessarily mean that no payments are involved.

<sup>20</sup> The global figure is, on the other hand, very similar to that offered by our data source, the Continuous Family Expenditures Survey.

Our estimation provides support for the hypothesis that frequent use of specialists services in the past encourages the purchase of private insurance in the present. Individuals who have visited a specialist in the previous quarter have about 4% higher probability of being covered by VHI in the present quarter. “Tradition”, captured by the variable representing the percentage of VHI holders in the region in 1990, also turned out to influence significantly the probability of having VHI in 1999-2000. Individuals who enjoyed VHI coverage in the beginning of the 1990s have, on average, 2% more probability of being VHI holders 10 years later than those who were not privately covered in 1990.

Finally, as we argued, the analysis of some regional characteristics of both health sectors together, public and private, is one of the novel contributions of our study. Their importance in the decision to contract VHI stands out clearly with significant estimation coefficients. They demonstrate that in those autonomous regions where public health expenditures per capita are high, people tend to stick to the services provided by the public sector that are covered by their taxes. On the other hand, in the autonomous regions where private medical facilities have high technology equipment available people tend to buy VHI relatively more. Indeed, this variable exhibits the second highest partial effect in the equation (41.23%).

In sum, the decision to purchase private health insurance when access to medical services is already granted for free at the point of consumption by the public sector comes out to be the result of a wide variety of considerations that include price, personal characteristics and regional public and private health sector features. But our results (the significantly different from zero coefficient  $\rho$ , the proportion of the total error variance accounted for by the individual-specific component) also suggest that the unobserved individual heterogeneity, and hence idiosyncratic influences, also plays an important role in explaining individuals’ decision to contract private health coverage. Further research and richer data is needed to identify to exact nature of these.

## APPENDIX D – Descriptive characteristics of the sample of heads of household in each quarter

**Table D.1.** Characteristics in the 1<sup>st</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	288	2573		2861
%	10.07	89.93		
<b>Age (mean)</b>	54.38	55.28	-0.98	55.19
<b>Sex (%)</b>				
Female	23.61	18.58	4.25*	19.08
Male	76.39	81.42		80.92
<b>Education (%)</b>				
Without studies	7.29	17.61	98.29**	16.57
Primary	33.33	46.37		45.05
Secondary	33.68	28.53		29.05
University	25.69	7.50		9.33
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	26.19	21.95	3.19**	22.38
Those currently occupied	41.21	41.53	0.48	41.49
<b>Labour status (%)</b>				
Working	64.44	50.00	9.29**	55.23
Unemployed	1.06	3.39		3.03
Retired	26.76	36.28		31.77
Housewife	5.99	6.20		6.18
Other	1.76	4.01		3.78
<b>Occupation (%)</b>				
Self-employed	29.86	25.15	2.30	25.62
Employee	63.89	68.29		67.84
Other	6.25	6.57		6.54
<b>Household size (mean)</b>	3.19	3.20	-0.05	3.20
<b>Income quintile (%)</b>				
Bottom	3.32	96.68	73.06**	100
20-40%	6.47	93.53		100
40-60%	10.31	89.69		100
60-80%	13.81	86.19		100
Top	16.43	83.57		100
<b>Household income (mean)</b>	5843€	4456€	8.72**	4596€
<b>Size of town of residence (%)</b>				
Provincial capital	50.35	35.41	24.33**	36.91
More than 50,000	12.50	12.63		12.62
10,000-50,000	16.67	23.40		22.72
Less than 10,000	20.49	28.57		27.75
<b>Visit to a specialist (%)</b>				
Yes	26.74	20.37	67.13**	21.01
No	73.26	79.63		78.99
<b>Average number of positive visits to specialists</b>	2.36	2.12	0.60	2.15

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.

**Table D.2.** Characteristics in the 2<sup>nd</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	413	3291		3704
%	11.15	88.85		
<b>Age (mean)</b>	54.37	55.29	-1.18	55.19
<b>Sex (%)</b>				
Female	21.79	18.44	2.69	18.82
Male	78.21	81.56		81.18
<b>Education (%)</b>				
Without studies	5.08	17.14	148.89**	15.79
Primary	34.38	46.28		44.95
Secondary	35.84	29.08		29.83
University	24.70	7.51		9.42
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	26.51	22.23	3.79**	22.71
Those currently occupied	42.11	42.12	-0.02	42.12
<b>Labour status (%)</b>				
Working	63.26	54.16	8.32**	55.19
Unemployed	0.73	3.20		2.92
Retired	27.25	33.16		32.49
Housewife	7.06	6.34		6.42
Other	1.70	3.14		2.98
<b>Occupation (%)</b>				
Self-employed	30.99	25.16	4.28*	25.81
Employee	62.47	68.37		67.71
Other	6.54	6.47		6.48
<b>Household size (mean)</b>	3.15	3.19	-0.42	3.19
<b>Income quintile (%)</b>				
Bottom	4.72	95.28	101.44**	100
20-40%	8.37	91.63		100
40-60%	10.12	89.88		100
60-80%	10.93	89.07		100
Top	21.62	78.63		100
<b>Household income (mean)</b>	5856€	4514€	10.10**	4664€
<b>Size of town of residence (%)</b>				
Provincial capital	48.91	34.85	25.22**	36.42
More than 50,000	11.86	13.73		13.53
10,000-50,000	16.71	22.82		22.14
Less than 10,000	22.52	28.59		27.92
<b>Visit to a specialist (%)</b>				
Yes	31.48	23.25	13.61**	24.16
No	68.52	76.75		75.84
<b>Average number of positive visits to specialists</b>	2.30	2.06	1.13	2.09

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.



**Table D.3.** Characteristics in the 3<sup>rd</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	467	3915		4382
%	10.66	89.34		
<b>Age (mean)</b>	54.78	55.63	-1.16	55.54
<b>Sex (%)</b>				
Female	23.13	19.03	4.47*	19.47
Male	76.87	80.97		80.53
<b>Education (%)</b>				
Without studies	5.35	17.73	187.10**	16.41
Primary	32.98	46.33		44.91
Secondary	37.69	29.22		30.12
University	23.98	6.72		8.56
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	23.98	19.30	4.40**	19.80
Those currently occupied	42.08	42.47	1.29	42.55
<b>Labour status (%)</b>				
Working	61.41	49.94	14.27**	51.16
Unemployed	1.18	3.38		3.15
Retired	28.47	36.15		35.33
Housewife	6.35	7.01		6.94
Other	2.59	3.52		3.42
<b>Occupation (%)</b>				
Self-employed	31.91	24.62	8.39**	25.40
Employee	61.67	68.66		67.91
Other	6.42	6.72		6.69
<b>Household size (mean)</b>	3.11	3.19	-1.17	3.18
<b>Income quintile (%)</b>				
Bottom	5.36	94.64	94.03**	100
20-40%	7.76	92.24		100
40-60%	9.35	90.65		100
60-80%	11.53	88.47		100
Top	19.29	80.71		100
<b>Household income (mean)</b>	6024€	4600€	11.49**	4752€
<b>Size of town of residence (%)</b>				
Provincial capital	47.32	34.81	25.53**	36.15
More than 50,000	13.06	13.44		13.40
10,000-50,000	16.70	22.96		22.30
Less than 10,000	22.91	28.79		28.16
<b>Visit to a specialist (%)</b>				
Yes	28.27	22.96	6.53*	23.53
No	71.73	77.04		76.47
<b>Average number of positive visits to specialists</b>	1.92	1.97	-0.28	1.96

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.

**Table D.4.** Characteristics in the 4<sup>th</sup> quarter of 1999 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	490	3980		4470
%	10.96	89.04		
<b>Age (mean)</b>	55.21	55.84	-0.88	55.77
<b>Sex (%)</b>				
Female	22.86	18.99	4.16*	19.42
Male	77.14	81.01		80.58
<b>Education (%)</b>				
Without studies	4.90	17.46	225.29**	16.09
Primary	33.67	46.51		45.10
Secondary	36.73	29.20		30.02
University	24.69	6.83		8.79
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	27.93	19.35	2.49*	19.63
Those currently occupied	42.81	42.10	1.36	42.19
<b>Labour status (%)</b>				
Working	57.31	50.00	15.24**	50.78
Unemployed	1.14	3.39		3.15
Retired	32.42	36.28		35.86
Housewife	7.31	6.89		6.93
Other	1.83	3.44		3.27
<b>Occupation (%)</b>				
Self-employed	32.24	24.50	15.01**	25.35
Employee	60.61	68.94		68.03
Other	7.14	6.56		6.62
<b>Household size (mean)</b>	3.10	3.17	-1.05	3.16
<b>Income quintile (%)</b>				
Bottom	4.03	95.97	144.01**	100
20-40%	8.28	91.72		100
40-60%	9.62	90.38		100
60-80%	11.97	88.03		100
Top	20.92	79.08		100
<b>Household income (mean)</b>	6030€	4465€	12.84**	4637€
<b>Size of town of residence (%)</b>				
Provincial capital	49.59	35.10	39.81**	36.69
More than 50,000	11.43	13.67		13.42
10,000-50,000	16.94	22.86		22.21
Less than 10,000	22.04	28.37		27.67
<b>Visit to a specialist (%)</b>				
Yes	30.61	22.46	16.19**	23.36
No	69.39	77.54		76.64
<b>Average number of positive visits to specialists</b>	2.08	1.95	0.76	1.96

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.

**Table D.5.** Characteristics in the 1<sup>st</sup> quarter of 2000 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	510	3947		4457
%	11.44	88.56		
<b>Age (mean)</b>	55.50	56.02	-0.74	55.96
<b>Sex (%)</b>				
Female	22.35	18.77	3.73*	19.18
Male	77.65	81.23		80.82
<b>Education (%)</b>				
Without studies	4.51	17.41	220.12**	15.93
Primary	33.14	46.31		44.81
Secondary	36.86	29.49		30.33
University	25.49	6.79		8.93
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	25.96	21.76	4.12**	22.24
Those currently occupied	42.99	42.00	2.23*	42.13
<b>Labour status (%)</b>				
Working	61.11	53.15	10.02**	54.07
Unemployed	1.19	3.03		2.82
Retired	29.76	34.20		33.68
Housewife	6.55	6.17		6.21
Other	1.39	3.45		3.21
<b>Occupation (%)</b>				
Self-employed	32.94	24.35	12.21**	25.33
Employee	60.59	69.01		68.05
Other	6.47	6.64		6.62
<b>Household size (mean)</b>	3.09	3.18	-1.39	3.17
<b>Income quintile (%)</b>				
Bottom	3.70	96.30	136.72**	100
20-40%	6.17	93.83		100
40-60%	14.01	85.99		100
60-80%	14.25	85.75		100
Top	19.08	80.92		100
<b>Household income (mean)</b>	5758€	4308€	11.48**	4472€
<b>Size of town of residence (%)</b>				
Provincial capital	48.82	35.04	33.53**	36.62
More than 50,000	12.55	13.61		13.48
10,000-50,000	17.25	22.95		22.30
Less than 10,000	21.37	28.40		27.60
<b>Visit to a specialist (%)</b>				
Yes	28.82	21.86	12.51**	22.66
No	71.18	78.14		77.34
<b>Average number of positive visits to specialists</b>	2.07	1.84	1.47	1.88

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.

**Table D.6.** Characteristics in the 2<sup>nd</sup> quarter of 2000 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	381	3344		3725
%	10.23	89.77		
<b>Age (mean)</b>	55.97	55.96	-0.02	55.96
<b>Sex (%)</b>				
Female	20.47	19.05	0.45	19.19
Male	79.53	80.95		80.81
<b>Education (%)</b>				
Without studies	2.62	17.34	144.97**	15.84
Primary	37.27	45.45		44.62
Secondary	37.01	30.23		30.93
University	23.10	6.97		8.62
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	25.97	22.11	3.29**	22.50
Those currently occupied	43.59	42.10	2.89**	42.27
<b>Labour status (%)</b>				
Working	60.70	53.56	5.76*	54.29
Unemployed	1.07	2.92		2.73
Retired	29.95	33.56		33.19
Housewife	6.42	6.52		6.51
Other	1.87	3.44		3.28
<b>Occupation (%)</b>				
Self-employed	35.43	24.76	17.34**	25.85
Employee	59.32	68.66		67.70
Other	5.25	6.58		6.44
<b>Household size (mean)</b>	3.11	3.16	-0.61	3.15
<b>Income quintile (%)</b>				
Bottom	3.62	96.38	99.86**	100
20-40%	7.52	92.48		100
40-60%	9.26	90.74		100
60-80%	12.08	87.92		100
Top	18.66	81.34		100
<b>Household income (mean)</b>	5856€	4377€	10.76**	4529€
<b>Size of town of residence (%)</b>				
Provincial capital	48.03	34.57	23.23**	35.95
More than 50,000	11.81	13.91		13.69
10,000-50,000	18.64	22.76		22.34
Less than 10,000	21.52	28.77		28.03
<b>Visit to a specialist (%)</b>				
Yes	29.66	22.49	9.89**	23.22
No	70.34	77.51		76.78
<b>Average number of positive visits to specialists</b>	2.02	1.86	0.74	1.88

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.

**Table D.7.** Characteristics in the 3<sup>rd</sup> quarter of 2000 of the heads of household observed over five, six, or seven quarters, by voluntary health insurance status.

<b>Variables description</b>	<b>VHI</b>	<b>No VHI</b>	<i>t</i> -test / <i>F</i> -test	<b>Full sample</b>
N	328	2509		2837
%	11.56	88.44		
<b>Age (mean)</b>	56.63	56.37	0.30	56.40
<b>Sex (%)</b>				
Female	21.65	17.29	1.02	19.56
Male	78.35	80.71		80.44
<b>Education (%)</b>				
Without studies	5.18	17.74	125.27**	16.28
Primary	34.76	45.76		44.48
Secondary	36.28	30.49		31.16
University	23.78	6.02		8.07
<b>Working hours (mean)</b>				
Total sample (including retired and non-working)	20.26	18.85	1.11	19.01
Those currently occupied	43.14	42.45	1.09	42.53
<b>Labour status (%)</b>				
Working	54.42	48.99	1.29	49.59
Unemployed	0.35	3.51		3.16
Retired	35.34	37.47		37.23
Housewife	7.42	6.88		6.94
Other	2.47	3.16		3.08
<b>Occupation (%)</b>				
Self-employed	35.98	24.67	15.13**	25.98
Employee	58.54	69.03		67.82
Other	5.49	6.30		6.20
<b>Household size (mean)</b>	3.03	3.14	-1.35	3.13
<b>Income quintile (%)</b>				
Bottom	3.52	96.48	102.13**	100
20-40%	8.47	91.53		100
40-60%	10.92	89.08		100
60-80%	12.17	87.83		100
Top	22.75	77.25		100
<b>Household income (mean)</b>	6231€	4462€	11.84**	4667€
<b>Size of town of residence (%)</b>				
Provincial capital	45.73	34.16	11.56**	35.50
More than 50,000	10.98	14.27		13.89
10,000-50,000	18.90	22.40		22.00
Less than 10,000	24.39	29.17		28.62
<b>Visit to a specialist (%)</b>				
Yes	13.41	9.13	6.14*	9.62
No	86.59	90.87		90.38
<b>Average number of positive visits to specialists</b>	2.16	1.90	1.11	1.95

Note: \* statistically significant at 90% level; \*\* statistically significant at 95% level.

Source: Continuous Family Expenditure Survey 1999-2000.

## APPENDIX E – A preliminary dynamic analysis of the demand for VHI

### E.1. Conditional fixed effects logit model

An example of a dynamic binary response panel data model of the demand for VHI that allows for both unobserved heterogeneity and first-order state dependence is given by:

$$y_{it}^* = \alpha y_{it-1} + x_{it}'\beta + \eta_i + u_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T$$

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases}, \quad (3.16)$$

where  $y_{it}^*$  is the latent process that guides the purchase decision,  $x_{it}$  is a  $(k \times 1)$  vector of individual characteristics,  $\eta_i$  is an unobserved individual-specific effect and  $u_{it}$  is a transitory error, which is assumed to be i.i.d. over time. In this context, the parameter  $\alpha$  is of a particular interest since it indicates the presence of true state dependence in the demand for VHI after controlling for the unobserved heterogeneity,  $\eta_i$ <sup>21</sup>. A positive  $\alpha$  would imply that holding VHI in the previous period increases the probability of having VHI coverage in the current period.

We estimate the conditional fixed effects logit model suggested by Chamberlain (1985) and extended by Honoré and Kyriazidou (2000). This model does not require any assumptions on either the unobserved heterogeneity or the initial conditions, and both of them are allowed to have arbitrary relationship with the explanatory

<sup>21</sup> The unobserved individual-specific effect allows for the possibility that different individuals have permanently different propensities to purchase VHI.

variables. The only assumption behind the fixed effects model is that the transitory error term is i.i.d. distributed over time with logistic distribution function. Chay and Hyslop (2000) point out that although less restrictive than the random effects model, the fixed effects approach absorbs a significant amount of the variation in the data, some of which may contain important information, and this makes it less efficient than a correctly specified random effects estimator.

Honoré and Kyriazidou (2000) derive a conditional fixed effect logit estimator that is consistent and asymptotically normal in the presence of strictly exogenous *discrete* explanatory variables. Additionally, they assume that the covariates satisfy  $\Pr(x_{iT-2} = x_{iT-1}) > 0$ . In this case, conditional probabilities that are independent of the individual-specific effect exist, and the coefficient  $\alpha$  and  $\beta$  can be identified.

## E.2. Estimation results

The estimation results from the fixed effects logit model are presented in table E.1. The most noteworthy comment about these findings refers to the time persistence on the individual decisions about VHI holding. The positive and significant estimation coefficient of the lagged private insurance variable is a sign of the existence of state dependence. It means that previous choices about undertaking VHI affect the current decisions about having or not having private health insurance coverage.

The general pattern of the remaining estimates does not substantially differ from those obtained from the random effects logit model. We still find a positive relation between age and the demand for VHI. Moreover, unlike the predictions from the random effects model, insurance coverage increases with age at an increasing rate. If we believe the fixed effects model estimation, this result may be interpreted as



evidence for the existence of adverse selection<sup>22</sup>. The effect of the gender variable is the expected one. Women are more likely to purchase private health coverage than men. The level of education has among the strongest positive impacts on the individual decision to contract VHI. The variable containing the number of working hours, which is used as a measure of the opportunity cost of time, is now replaced by a dummy indicating that the individual is currently working. Opposite to the result from the random effects model, here we find that those currently working have higher probabilities of buying VHI policies compared to those not working (unemployed, retired, housewives or students). The income quintile variables validate the hypothesis of the existence of strong positive correlation between income and the demand for VHI. The effect of regional variability in the purchase of private insurance policies is captured by a dummy indicating residence in Balearic Islands, Catalonia or Madrid. Living in any of these autonomous regions augments the probability of being privately insured. Contrary to what we found in the random effects specification, residing in a provincial capital does not have a significant impact on the probability of contracting VHI. The sign and significance of the other variables indicating size of residence town confirm our findings from the random effects estimation. Having visited a specialists in the previous quarter affects positively the likelihood of holding VHI in the current quarter. Finally, we should mention that the variable capturing the effect of the 1998 fiscal reform tuned out insignificant in the fixed effects specification.

---

<sup>22</sup> Numerous studies have shown that older people tend to be relatively heavy health care consumers.

**Table E.1.** Conditional fixed-effects logit estimation of the demand for voluntary health insurance.

Variables	Coefficient	St. Err.
Insured in t-1	1.6834**	0.066
Age 26-35	1.3693*	0.698
Age 36-45	1.4856*	0.694
Age 46-55	1.7540**	0.695
Age 56-65	2.1378**	0.696
Age 66 and more	2.5241**	0.701
Female	0.4046**	0.081
Edu1	1.0454**	0.128
Edu2	1.7869**	0.140
Edu3	2.4992**	0.160
Working	0.1904*	0.090
Tsize1	-0.1269	0.086
Tsize2	-0.4870**	0.117
Tsize3	-0.3239**	0.097
Balearic, Catalonia, Madrid	1.9419**	0.144
Income quintile II	0.5545**	0.122
Income quintile III	0.6062**	0.120
Income quintile IV	0.9007**	0.121
Top income quintile	1.2514**	0.123
Ref100	-0.0761	0.060
Splag	0.3476**	0.071
N observations	8180	
N individuals	2226 <sup>a</sup>	
N periods (avg.)	3.7	
Log likelihood	-1948.32	
LR chi-squared (17)	1991.02**	

Note: \* statistically significant at 90% level.

\*\* statistically significant at 95% level.

Some new explanatory variables definition:

- Working equals 1 for heads of household who are currently working and 0 otherwise;
- Balearic, Catalonia, Madrid indicates residence in one of the three autonomous regions;
- Income quintile: Bottom income quintile is the reference category.

<sup>a</sup> The estimations are performed over a reduced sample. Individuals who have private health insurance coverage in either all or none of the sample periods were excluded.

**REFERENCES**

Akerlof, G. (1970), "The Market For "Lemons": Qualitative Uncertainty and the Market Mechanism", *Quarterly Journal of Economics*, **74**, 488-500.

Arrow, K. (1985), "The Economics of Agency", in J. Pratt and R. Zeckhauser (Eds.), *Principles and agents: The structure of business*. Harvard Business School Press, Cambridge, Massachusetts, pp. 37-51.

Besley, T., Hall, J., and I. Preston (1998), "Private and Public Health Insurance in the UK", *European Economic Review*, **42**, 491-497.

Besley, T., Hall, J., and I. Preston (1999), "The Demand for Private Health Insurance: Do Waiting Lists Matter?", *Journal of Public Economics*, **72**, 155-181.

Buttler, J.S., and R. Moffitt (1982), "A computationally Efficient Quardature Procedure for the One Factor Multinomial Probit Model", *Econometrica*, **50**, 761-764.

Cameron, A.C., Trivedi, P.K., Milne, F., and J.A. Pigott (1988), "Microeconomic Model of the Demand for Health Care and Health Insurance in Australia", *Review of Economic Studies*, **55**, 85-106.

Chamberlain, G. (1985), "Heterogeneity, Omitted Variables Bias, and Duration Dependence", in J. Heckman and B. Singer (Eds.), *Longitudinal analysis of labour market data*, Cambridge University Press, Cambridge.

Chay, K.Y., and D.R. Hyslop (2000), "Identification and Estimation of Dynamic Binary Response Panel Data Models: Empirical Evidence Using Alternative Approaches", Working paper, August 2000.

<http://emlab.berkeley.edu/users/kenchay/ftp/binresp/hyslop.pdf> [15 January 2004].

CIS (1997), Encuesta Nacional de Salud 1997.

CIS (2003), Encuesta Nacional de Salud 2001. Avance de resultados.

[http://www.msc.es/salud/epidemiologia/ies/encuesta2001/avance\\_resultados.htm](http://www.msc.es/salud/epidemiologia/ies/encuesta2001/avance_resultados.htm)  
[12 November 2003].

Costa, J., and J. Garcia (2003), "Demand for private health insurance: how important is the quality gap?", *Health Economics*, **12**, 587-599.

Christiansen, T., Lauridsen, J., and F. Kamper-Jørgensen (2002), "Demand for Private Health Insurance and Demand for Health Care by Privately and Non-privately Insured in Denmark", Health Economics Paper 2002:1, Institute of Public Health, University of Southern Denmark.

González, Y. (1995), "La demanda de seguros sanitarios", *Revista de Economía Aplicada*, **3(8)**, 111-142.

Gruber, J., and J. Poterba (1994), "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-employed", *The Quarterly Journal of Economics*, **109(3)**, 701-733.

Harmon, C., and B. Nolan (2001), "Health Insurance and Health Services Utilization in Ireland", *Health Economics*, **10**, 135-145.

Heckman, J.J. (1978), "Simple Statistical Models for Discrete Panel Data Developed and Applied to Test the Hypothesis of True State Dependence Against the Hypothesis of Spurious State Dependence", *Annales de l'INSEE*, 30-31.

Heckman, J.J. (1981a), “Statistical Models for Discrete Panel Data”, Chapter 3 in C. Manski and D. McFadden (Eds.), *Structural Analysis of Discrete Data*, MIT Press, Cambridge, Massachusetts.

Heckman, J.J. (1981b), “Heterogeneity and State Dependence”, in S. Rosen (Ed.), *Studies in Labour Markets*, University of Chicago Press, Chicago, pp.91-139.

Honore, B.E., and E. Kyriazidou (2000), “Panel Data Choice Models with Lagged Dependent Variables”, *Econometrica*, **68(4)**, 839-874.

Jofre-Bonet, M. (2000), “Public Health Care and Private Insurance Demand: The Waiting Time as a Link”, *Health Care Management Science*, **3**, 51-71.

Johannnensson, M., Johansson, P.O., and T. Söderqvist (1998), “Time Spent on Waiting Lists for Medical Care: An Insurance Approach”, *Journal of health economics*, **17(5)**, 627-644.

Long, J.S. (1997), *Regression Models for Categorical and Limited Dependent Variables*, Sage Publications, Thousand Oaks, California.

López Nicolás, A., and M. Vera-Hernández (2002), “Are Tax Subsidies for Private Medical Insurance Self-financing? Evidence from a NHS Outpatient Microsimulation Model”, Working Paper No.632, Universitat Pompeu Fabra.

Mossialos, E., Thomson, S. *et al.* (2002), “Voluntary Health Insurance in the European Union”, Report Prepared for the Directorate General for Employment and Social Affairs of the European Commission. European Commission website.

[http://europa.eu.int/comm/employment\\_social/soc-prot/social/prot/social/index\\_en.htm](http://europa.eu.int/comm/employment_social/soc-prot/social/prot/social/index_en.htm), [27 February 2002].

Murillo, C., Calonge, S., and Y. González (1991), “Los seguros privados de asistencia sanitaria”, *XI Jornadas de Economía de la Salud*, Alicante, p. 419-428.

Murillo, C., and Y. González (1992), "Health Insurance in Spain", *XXXV International Conference: Econometrics of Social Security*, Applied Econometric Association, San José de Costa Rica, p. 667-686.

Nolan, B., and M.M. Wiley (2000), *Private Practice in Irish Public Hospitals*, Oak Tree Press in association with the Economic and Social Research Institute, Dublin.

Phelps, C.E., and J.P. Newhouse (1974), "Coinsurance, the Price of Time and the Demand for Medical Care", *Review of Economics and Statistics*, **56(3)**, 334-342.

Propper, C. (1989), "An Econometric Analysis of the Demand for Private Health Insurance in England and Wales", *Applied Economics*, **21**, 727-792.

Propper, C. (1993), "Constrained Choice Sets in the U.K. Demand for Private Medical Insurance", *Journal of Public Economics*, **51**, 287-307.

Propper, C., Rees, H., and K. Green (2001), "The Demand for Private Medical Insurance in the UK: A Cohort Analysis", *The Economic Journal*, **111**(May), C180-C200.

Rodríguez, M. (1988), "El gasto sanitario en Cataluña. Análisis del gasto sanitario privado y su contribución a la política sanitaria". Tesis doctoral, Universitat de Barcelona.

Triadó, X. (2002), "La doble cobertura sanitaria: un análisis de la preferencias y oportunidades del mercado", *El Médico*, **840**, 52-61.

Stata Corporation (2001), STATA 7, Stata Statistical Software.

Vera-Hernández, A.M. (1999), "Duplicate Coverage and Demand for Health Care. The Case of Catalonia", *Journal of Health Economics*, **8**, 579-598.

Von Neumann, J., and O. Morgenstern (1944), *Theory of Games and Behaviour*, Princeton University Press, Princeton.

WHO (2000), *The World Health Report 2000. Health systems: improving Performance*, World Health Organization, Geneva.

Wooldridge, J.M. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge, Massachusetts, pp.483-491.

Zweifel, P., and F. Breyer (1997), *Health Economics*, Oxford University Press, New York.



# **CHAPTER 4**

## **MEASURING INEQUALITIES IN DENTAL HEALTH AND DENTAL CARE UTILISATION**

### **4.1. INTRODUCTION**

#### **4.1.1. Preliminary discussion**

Dental health is integral to overall health. Oral diseases and dysfunctions are chronic conditions that may have an important impact on individual's well-being and are often causing financial<sup>1</sup> and social costs that significantly diminish quality of life. Dental disorders are no different from disorders affecting other body parts and systems; they cause pain and discomfort and can affect many usual daily life

---

<sup>1</sup> According to the World Oral Health Report 2003, the oral disease is the fourth most expensive disease to treat in most industrialized countries (WHO 2003).

activities like eating, speaking, interacting with other people, sleeping, etc. The absence of oral healthiness or good oral conditions (like having missing or unfilled teeth) can lead to poor performance, low self-esteem and lack of self-confidence, and even to difficulty in getting and keeping a job. Despite all these, dental health and dental services utilisation have received little attention in the health economics literature on equity and inequality in health and health care (Van Doorslaer, Wagstaff, *et al.*, 2000).

#### **4.1.2. Review of previous studies on inequalities**

Evidence from the late eighties suggested that inequity in the delivery of health care, in general existed in most of the developed countries investigated (Van Doorslaer, Wagstaff, *et al.*, 1992). Later, the same international team, using more updated datasets, found little evidence of overall health care distribution in Europe being inequitable, but detected a significant pro-rich inequity in half of the countries for physician visits due to differential use of GP and specialist by the rich and the poor (Van Doorslaer, Wagstaff, *et al.*, 2000). In almost all the countries GP visits are more intensively used by the lower income groups, while specialists' services are disproportionately concentrated in the higher-income groups. Van Doorslaer, Koolman and Puffer (2002) include non-need factors, such as private health insurance coverage and regional access differences, in the analysis of inequity. After confirming that GP visits are distributed according to need (or show a pro-poor distribution in some countries), while specialist visits show significant indexes of inequity favouring the rich everywhere except in Luxembourg, the authors conclude that adjusting for private insurance and regional variables lowers the degree of inequity, but does not totally remove it. Public GP and specialists services are free-at-point of delivery in most of the countries included in the above works. In those countries, where GP act as a gatekeeper, direct access to specialists care (without previous referral from the GP) is financed out-of-pocket or through a privately purchased health insurance. Unlike GP and specialists services, dental care is not

publicly provided, which means that dental visits are usually financed out-of-pocket. In this sense and because of being a kind of special care, we may consider that dental care resembles much more private specialists than GP care. Thus, we expect that if socio-economic inequality exists, dental care utilisation will show pro-rich distribution.

Koolman and Van Doorslaer (2002) study the relationships between alternative measures of income-related inequality in health care utilisation. The empirical illustration is done using data on dental services use in several European countries taken from the third wave, 1996, of the European Community Household Panel (ECHP) Survey. Concentration indices associated with dental visits are positive and significantly different from zero, indicating pro-rich inequality in all countries. The authors observe that the degree of inequality is highest in Portugal, followed by Ireland and Italy. Spain has the fourth largest index of inequality. This study, however, is not relevant in terms of deriving policy implications, as the lack of dental need indicators does not allow for the application of any standardisation procedure.

There have been several studies on inequalities in the utilisation of health care services in Spain. Rodríguez, Calonge and Reñé (1993) report a U-shaped distribution of health care expenditures across income groups caused by a change in the type of doctor visited in the fourth quintile. Using data for 1987, they find that individuals belonging to the top income quintile visited specialists twice as much as those belonging to the bottom quintile. As specialist visits were estimated to be five times more expensive than GP visits, total expenditures were higher in that top end. The reason for the high level of expenditures at the lower end of the income distribution was, however, a higher number in the quantity of visits and hospitalisations.

Urbanos-Garrido (2001a and 2001b) estimates the degree of inequality in the utilisation of public health care services amongst individuals with similar need in several years (1987, 1993, 1995 and 1997) following the method proposed by

Wagstaff and van Doorslaer (2000a) for calculating need. Her results suggest the existence of pro-poor inequity in GP visits and a certain degree of pro-rich inequity in specialist visits, but only for 1987; in both cases inequity becomes not significant in the two more recent years studied.

As regards health inequalities, a recent study by Regidor *et al.* (2002) analyses the trend in social inequalities in less-than-good health and four chronic conditions in Spain between 1987 and 1995/97. The authors conduct separate analysis for men and women by two types of socio-economic characteristics – educational level and social class (based on the occupation of the head of household). Their results show that the degree of health inequalities is higher by educational level than by social class and is much larger in women than in men. An increasing trend in health inequalities in Spain during the study period is also reported.

### **4.1.3. Reasons to study inequalities in dental health and dental care utilisation**

None of the studies discussed in the previous section, however, try to assess the degree of inequality in dental health or dental services utilisation. The main reason may be the fact that the importance of dental health for the individual's overall health and well-being has always been underestimated not only by the health authorities, but also by people. It is very difficult, if not impossible, to isolate illness episodes caused by dental health problems only. As a consequence, the effect of dental maladies on the level of general health expenditures cannot be estimated. However, there is no doubt that dental health problems may lead to an increase in these expenditures. Moreover, in most countries dental care, in contrast to other health services, is almost completely privately financed<sup>2</sup>. While equity concerns are justifiable in the context of public health services, this may not be the case when

---

<sup>2</sup> In Spain dental care (except for molar extractions and diagnostic services during pregnancy) is not included in the package of health services covered by the mandatory public health insurance. Thus, patients have to pay for the majority of dental care treatments they need.

private health care is considered. The concept of equitable distribution of the utilisation of a private good, like dental care, is not that easily defensible from a social point of view. Should people with equal need for dental care, but belonging to different social groups, be treated equally? Most will agree that the answer to this question should be positive. However, if income is a prior determinant of dental services utilisation, then individuals with equal needs, but with different levels of income (ability to pay), will not receive equal treatments. All the above justifies the necessity of a formal analysis of inequalities and inequities in dental health and dental care utilisation as a previous step to a more basic policy question: should dental care be included in the benefits package of the public sector?

The objective of the study presented in this chapter is to fill the existing gap in the analysis of inequalities in dental health and dental health care in Spain. We use data from the 1997 Spanish Health Survey, which allows for a rather accurate definition of need for dental care and also contains information on socio-economic characteristics of the individuals. The methodology used in the analysis of inequalities is described in the next section. In section three we describe the data and the variables involved in the analysis and offer some descriptive statistics. Inequalities in dental health are discussed in section four. This is followed by the analysis of inequalities in dental services utilisation. The final section outlines the main conclusions.

## **4.2. METHODOLOGY**

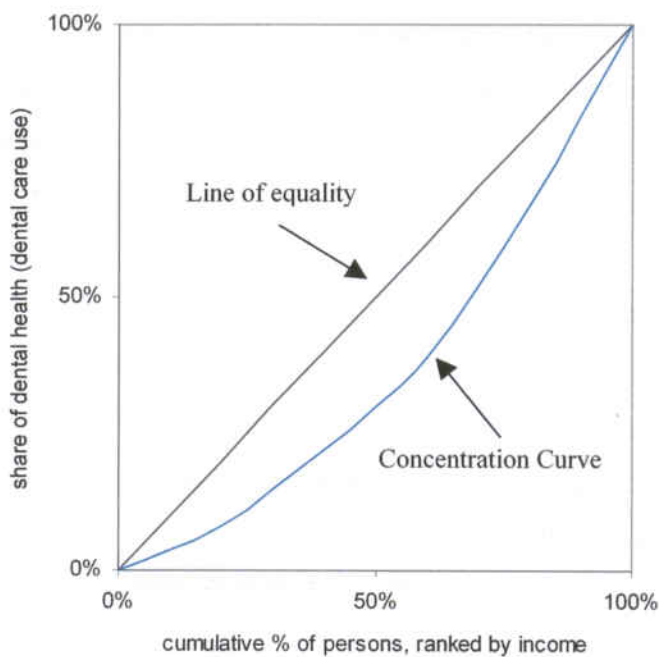
In the analysis of inequity we follow the methodology developed by Wagstaff, Paci and van Doorslaer (1991), and consequently modified by Wagstaff and van Doorslaer (1994), Kakwani, Wagstaff and van Doorslaer (1997) and Wagstaff and van Doorslaer (2000a). This methodology is based on the egalitarian principle of horizontal equity, according to which individuals with equal needs should be treated

equally, irrespective of characteristics such as income, social status, place of residence, race, ethnicity, etc. The inequity is defined as the difference between the observed distribution of health across income and the expected distribution of health; or the observed and the need-expected distribution of health care utilisation.

#### 4.2.1. The concentration curve

The commonly used concentration curves and indices are used to quantify the degree of income-related inequality in dental health and dental care utilisation. The concentration curve,  $L_M(r)$  plots the cumulative percentage of the dependent variable (good dental health or dental care utilisation) against the cumulative percentage of the population, ranked by socio-economic status (income), beginning with the most disadvantaged (see Figure 4.1 and World Bank, Technical Notes #6 and #7). The line

**Figure 4.1.** Concentration curve.



of equality represents the absolute equality of the health variable irrespective of the individual living standards (income, wealth, etc.). If the concentration curve lies below the line of equality it means that the health variable takes lower values amongst the poorer people. The further the curve is below the line of equality, the more concentrated health (or health care use) is amongst the rich.

#### 4.2.2. The concentration index

The concentration index,  $C_M$ , associated with  $L_M(r)$  is twice the area between the concentration curve and the diagonal (the line of equality). If dental health (or dental care) exhibits no income-related inequality, the concentration index will be zero. The concentration index takes positive (negative) values if the concentration curve lies below (above) the line of equality, indicating income-related inequality in dental health or dental care use favouring the rich (the poor). Formally, the concentration index is measured as:

$$C_M = 1 - 2 \int_0^1 L_M(r) dr, \quad (4.1)$$

If we want to assess the degree of *inequity* in dental health or dental care utilisation, we need to compare the inequality in actual dental health or utilisation of dental care to the inequality in expected dental health or dental care need (Van Doorslaer, Koolman and Puffer, 2002). Expected dental health level of an individual is the average level of dental health of all persons with similar characteristics (Rothman, 1986). Dental care need is defined as the predicted amount of dental care the individual would have received if he/she had been treated similarly to others with the same individual characteristics. The concentration index of expected health or dental care need,  $C_N$ , corresponding to the expected-health or the need concentration curve,  $L_N(r)$ , is analogously calculated as:



$$C_N = 1 - 2 \int_0^1 L_N(r) dr. \quad (4.2)$$

In calculating the above concentration indices (the one representing actual health (actual utilisation),  $m_i$ , and the expected (need-predicted) one,  $m_i^*$ ) we follow the “convenient” regression approach proposed by Kakwani, Wagstaff and van Doorslaer (1997). Thus,  $C_M$  can be computed using:

$$2\sigma_r^2 \left[ \frac{m_i}{\bar{m}} \right] = \alpha_1 + \beta_1 r_i + u_{1i}, \quad (4.3)$$

where  $\bar{m} = \frac{1}{n} \sum_{i=1}^N m_i$  and  $\sigma_r^2$  is the variance of the relative rank variable,  $r$ . The OLS estimator of  $\beta_1$  equals the concentration index  $C_M$ . The concentration index of expected dental health or need-predicted dental care use is calculated analogously as the  $\beta_2$  coefficient of the following regression equation:

$$2\sigma_r^2 \left[ \frac{m_i^*}{\bar{m}^*} \right] = \alpha_1 + \beta_1 r_i + u_{1i}, \quad (4.4)$$

where  $\bar{m}^*$  is the sample mean of the expected health (need-predicted utilisation).

### 4.2.3. Horizontal inequity measure

The degree of horizontal inequity in dental health (dental care utilisation) can be measured by comparing the concentration curve for unstandardised raw dental health (dental care utilisation) to the concentration curve for expected dental health (need-predicted dental care use). If both curves coincide, horizontal equity applies. If  $L_N(r)$  lies above (below)  $L_M(r)$ , the higher income groups enjoy better (worse) dental health

(obtain a higher (lower) share of dental care than they need), and there is horizontal inequity favouring the better-off (worse-off). At last, if the actual and expected dental health (the actual and the need-predicted utilisation) curves cross, it is not possible to determine if pro-rich or pro-poor inequity applies.

The index measuring horizontal inequity in the dental health (dental care utilisation) equals twice the area between the expected and actual dental health (need and actual dental care) concentration curves and can be computed as the difference between the corresponding concentration indices:

$$HI_{WV} = 2 \int_0^1 [L_N(r) - L_M(r)] dr = C_M - C_N. \quad (4.5)$$

If observed and expected health coincide (in the case of dental health) or if observed health care utilisation (in the case of dental care utilisation) is distributed according to need, the concentration index will be zero, indicating equitable distribution of dental health or of dental care use. Positive (negative) values of the concentration index indicate the existence of inequity in dental health or dental care utilisation favouring the rich (poor).

$HI_{WV}$  can also be computed by the means of convenient regression:

$$2\sigma_r^2 \left[ \frac{m_i}{\bar{m}} - \frac{m_i^*}{\bar{m}^*} \right] = \alpha + \beta r_i + u_i. \quad (4.6)$$

The above regression procedure gives an inaccurate estimate of the concentration index standard errors (due to the autocorrelation pattern of the data induced by the rank variable). The autocorrelation, as well as any heteroskedasticity, can be corrected by the use of a Newey-West regression estimator (Stata, 2001).

### **4.3. DATA, VARIABLE DEFINITION AND DESCRIPTIVE STATISTICS**

The data used in the empirical analysis come from the Spanish Health Survey (SHS) conducted in 1997. The survey comprises two different samples – the first one is a representative sample of the adult population and the second one is a representative sample of children up to 15 years old. In the present study, we focus only on the adults sample. The analysis of the sample of children will be addressed in a future work. The complete adults sample consists of 6396 randomly selected individuals aged 16 and over. The SHS contains information on individual's health status, utilisation of health services, life-styles and various demographic and socio-economic characteristics. We have restricted the sample to those individuals responding to all relevant questions for the present study. Thus, the final sample consists of 6237 observations.

Table 4.1 presents the definition of the variables used in the analyses that follow.

#### **4.3.1. Defining good dental health**

Till the 1980s most of the measures of oral health have been predominantly based on clinical indicators (diseases and tissue destruction). The most widely used measures are the DMFT and DMFS indices. These two indices measure the caries prevalence and are obtained by calculating the number of Decayed, Missing and Filled teeth (T) or surfaces (S). Unfortunately, the detailed information necessary for the construction of these indices is rarely available in Population Health Surveys. Because of this, economists usually measure oral health by the number of missing teeth (e.g. Lien Nguyen, Häkkinen, and Rosenqvist, 2002; Álvarez and Delgado, 2002). During the last two decades attempts were made to develop “socio-dental” indicators to capture non-clinical aspects of oral disease. And eventually, questions

**Table 4.1.** Variable definitions and descriptive statistics.

<b>Variables</b>	<b>Definition</b>	<b>Mean</b>	<b>Std. dev.</b>
<b>Dental care utilisation variables</b>			
<i>dent3m</i>	1 for those who visited a dentist within the past 3 months	0.16	0.36
<i>dvis</i>	number of dental visits within the last 3 months	0.32	1.03
<i>dent1y</i>	1 for those who visited a dentist within the past 12 months	0.31	0.46
<i>dentvisit1</i>	1 if the reason for the last dental visit was check-up	0.26	0.44
<i>dentvisit2</i>	1 if the reason for the last dental visit was tooth filling	0.23	0.42
<i>dentvisit3</i>	1 if the reason for the last dental visit was mouth-cleaning	0.27	0.44
<i>dentvisit4</i>	1 if the reason for last dental visit was tooth extraction	0.29	0.45
<i>dentvisit5</i>	1 if the reason for the last dental visit was dental prosthesis	0.18	0.39
<i>dentvisit6</i>	1 if the reason for last dental visit was gum treatment	0.02	0.14
<i>dentvisit7</i>	1 if the reason for last dental visit was different from the above	0.03	0.18
<b>Dental health and demographic variables</b>			
<b>Dental health</b>			
<i>gooddh</i>	1 for those not having decays, gum disease, extracted and not restored teeth or missing teeth or being impaired in their daily activities due to oral conditions	0.18	0.38
<i>allteeth</i>	1 for those who preserve all natural teeth	0.28	0.45
<i>decayed</i>	1 for those who have caries	0.38	0.48
<i>extracted</i>	1 for those with extracted teeth due to caries or because of being unsound	0.68	0.47
<i>filled</i>	1 for those who have filled teeth	0.55	0.50
<i>gums</i>	1 for those who suffer from gum disease	0.21	0.41
<i>unsound</i>	1 for those with unsound teeth	0.08	0.28
<i>denture</i>	1 for those wearing crowns, bridges or other type of prosthesis	0.34	0.47
<i>missing</i>	1 for those with tooth loss	0.38	0.49
<b>Age and sex</b>			
<i>fage1</i>	1 for females aged 16-34	0.19	0.39
<i>fage2</i>	1 for females aged 35-44	0.08	0.27
<i>fage3</i>	1 for females aged 45-64	0.14	0.35

**Table 4.1.** Variable definitions and descriptive statistics. (contd.)

<i>fage4</i>	1 for females aged 65-74	0.06	0.25
<i>fage5</i>	1 for females aged 75 and more	0.03	0.18
<i>mage1</i>	1 for males aged 16-34	0.20	0.40
<i>mage2</i>	1 for males aged 35-44	0.08	0.28
<i>mage3</i>	1 for males aged 45-64	0.13	0.34
<i>mage4</i>	1 for males aged 65-74	0.05	0.21
<i>mage5</i>	1 for males aged 75 and more	0.03	0.16
Unhealthy lifestyles			
<i>smoker</i>	1 for those who smoke	0.36	0.48
<b>Socio-economic variables</b>			
<i>dins</i>	1 for those who buy dental health insurance	0.04	0.19
<i>logIncE</i>	logarithm of household monthly income	6.63	0.40
Education			
<i>Edu0</i>	1 for those without studies (reference category)	9.50	4.52
<i>Edu1</i>	1 for those with primary education	0.54	0.50
<i>Edu2</i>	1 for those with secondary education	0.27	0.44
<i>Edu3</i>	1 for those with university education	0.13	0.33
Marital status			
<i>Single</i>	1 for those single	0.32	0.47
<i>Separated</i>	1 for those separated	0.02	0.12
<i>Divorced</i>	1 for those divorced	0.01	0.08
<i>Widowed</i>	1 for those widowed	0.07	0.25
<i>Married</i>	1 for those married (reference category)	0.58	0.50
Labour status			
<i>Working</i>	1 for those working (reference category)	0.38	0.49
<i>Retired</i>	1 for those retired	0.19	0.40
<i>Unemployed</i>	1 for those unemployed	0.11	0.32
<i>Housewife</i>	1 if the individual is a housewife	0.19	0.40
<i>Student</i>	1 if the individual is a student	0.11	0.31
<i>Other</i>	1 if the individual's labour status is different from the above	0.01	0.08
<b>Supply-side and regional variables</b>			
<i>dpr</i>	dentist per 100,000 population ratio, by province	0.38	0.11
Size of residence town			
<i>Tsize1</i>	1 if less than 10,000 inhabitants in residence town	0.25	0.43
<i>Tsize2</i>	1 if 10,001-50,000 inhabitants in residence town	0.24	0.43
<i>Tsize3</i>	1 if 50,001-400,000 inhabitants in residence town	0.32	0.47
<i>Tsize4</i>	1 if more than 400,000 inhabitants in residence town (reference category)	0.19	0.39

about pain and psychological comfort related to oral diseases and impairments in normal daily activities (e.g. eating, talking, sleeping, and doing usual job or household chores) due to oral health problems have been included in health surveys.

The definition of good dental health adopted in this paper follows the construction of general health indicators in the health economics literature. Our dental health measure is based on the objective oral health indicators available in the Spanish Health Survey. The survey contains two types of dental health indicators – medical and functional ones (Blaxter; 1992)<sup>3</sup>. The “medical” ones, which we call “dental”, include a dummy variable accounting for the fact that an individual preserves all his/her natural teeth and a set of dummy variables indicating the presence of one of the following oral conditions: tooth decays (*caries*); extracted teeth because of being badly decayed or unstable (*extracted*); filled teeth (*filled*); gum bleeding (*gingivitis*); unsound teeth (*unsound*); wearing of crowns, bridges or dentures (*dentures*) and missing teeth (*missing*). The functional indices are derived from two questions about impaired daily activities due to teeth or gum problems during the fortnight prior to the interview and the number of days that activities had to be restricted<sup>4</sup>.

We define good dental health as the state of being free of oral diseases. *Thus, a person has good dental health if he/she reports not having decays, gum disease, extracted and non-restored teeth or missing teeth or not being impaired in their daily activities due to oral maladies.* According to the above definition, less than one fifth (17.83%) of the Spanish adults have good oral health. Although, the percentage of men having good oral health is slightly higher than that of women (19% versus 17%), this difference is not significant. Individuals having good dental health are, on average, younger (aged 35 versus 46), more educated (11 years of schooling versus

---

<sup>3</sup> The author defines three types of health indicators – medical, functional and subjective. Medical indicators measure health as defined in terms of deviation from medical norms, such as the presence of certain diseases, conditions or handicaps. Functional indicators define health in terms of lack of ability to perform daily life activities. Subjective indicators capture the individual’s overall perception of his or her health, or the changes therein, relative to that of other people.

<sup>4</sup> Only 25 individuals report being hampered in their daily activities by oral health problems.

9), and dispose of higher monthly income (935€ versus 798€) than those with no good dental health.

#### 4.3.2. Determinants of dental care need

The decision on the variables that should be used as proxies for need is a normative one. If people with similar characteristics are to be treated equally, then one should choose the “socially acceptable” set of individual characteristics that justify the equal treatment. Most people would agree that chronically ill individuals should receive more medical care than those who do not suffer any chronic disease. At the same time, many would consider that smokers should never receive more care than non-smokers. And indeed, smokers should not receive more care just because they smoke, but if a person, who smokes, suffers an illness and is not treated, then he/she is being discriminated on the basis of his/her health status, not because of being a smoker. Following the above argument, researchers usually base the definition of need on variables which cause differences that are considered fair (age, sex, health status). However, we believe that all variables that influence health care use should be taken into account. Moreover, O’Donnell and Propper (1991) show that relying on raw health status measures only (e.g. self-assessed health or chronic conditions) leads to ignoring within-need inequity.

In this study need for dental care is proxied by five dental health indicators (*caries, extracted, gingivitis, unsound, missing*), plus age, sex and unhealthy lifestyles. We have defined nine age-sex dummies (*fage1, fage2, fage3, fage4, fage5, mage2, mage3, mage4, mage5*), which represent females and males in age groups 16-34, 35-44, 45-64, 65-74 and 75 or over, respectively; the excluded category is males younger than 35).

As we pointed out before, unhealthy lifestyles are usually excluded from the standardisation equations since their influence on the demand for health care is



considered unfair. However, precisely because of being an important determinant of the demand for dental care<sup>5</sup>, we consider that smoking should be included in the calculations of the expected dental health (dental care use) level. Our variable capturing unhealthy lifestyles is the dummy *smoker*. It equals one for those who say they smoke cigarettes, cigars or pipes both daily and occasionally.

Variables related to the family structure (marital status or household size) of the individual are considered important determinants of health care utilisation (Cameron *et al.*, 1988; Jiménez, Labeaga, Martínez-Granado, 2001; Álvarez and Delgado, 2002). The SHS does not contain information of the composition and size of the household, but does provide information about the individual's marital status. We include four dummy variables, regarding individual's marital status (*single, separated, divorced, and widowed*) as control variables in the standardisation procedures.

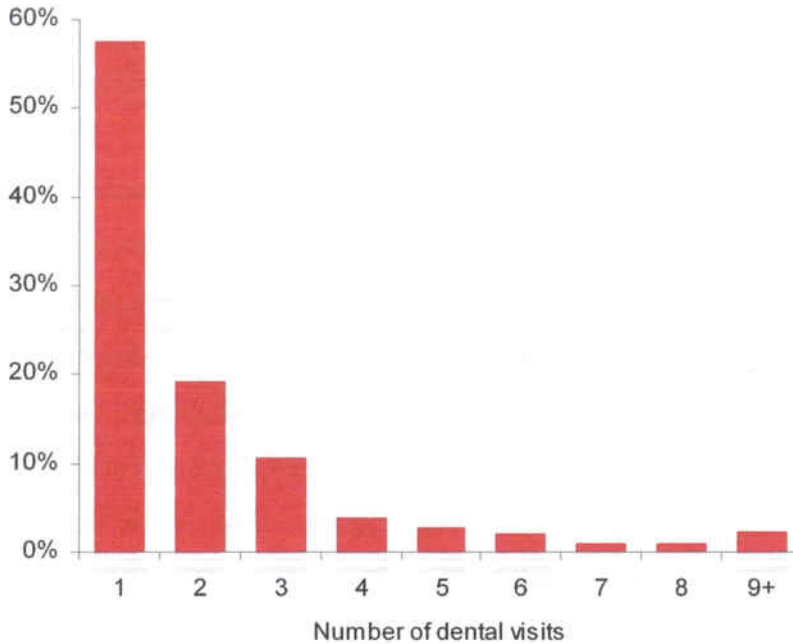
#### 4.3.3. Dental services utilisation

The SHS collects information on the number of visits to the dentist during the last three months previous to the interview. 15.65% of the individuals report they have seen a dentist or dental hygienist during the reference period (the observed frequency of dental visits of those who have visited the dentist is shown in figure 4.2). The rest of the individuals were asked how long ago was their last visit to a dentist or a dental hygienist. About 6% of the interviewed said they had never seen a dentist. Another 7.5% answered they did not remember when their last visit to the dentist took place. Based on the question about last dental visit a variable *dently*, indicating the dental attendance during the past year, was defined. The percentage of Spaniards who have

---

<sup>5</sup> There is increasing evidence (e.g. Johnson *et al.*, 2000; EU Working group on Tobacco and Oral Health, 1998) that tobacco use is an important risk factor for periodontal disease and is detrimental to both initial and long term success of dental implants. Moreover, smoking often results in discoloration of teeth and dental restorations.

**Figure 4.2.** Actual frequency of dental visits among those who have visited the dentist during the last three months.



Source: Spanish Health Survey, 1997.

seen the dentist in the 12 months preceding the interview equals 30.64%. This figure is quite close to the 1997 dental attendance rate for Spain (31.57%<sup>6</sup>), calculated from the European Community Household Panel (ECHP). Table 4.2 contains information about the dental attendance of various European countries, as well as of the USA and of Australia. As it can be seen, Spain has one of the lowest rates of dental attendance, leaving behind only Greece and Portugal.

The SHS also contains detailed information about the type of dental service the individual received in his or her last visit to the dentist. Among those reporting a dental visit within the last year previous to the interview 37.21% went for a check-up; 33.96% had one or more teeth filled (restored); 29.46% had a teeth cleaning; 20.72% had a tooth extracted; 12.14% went because they needed bridges, crowns or

<sup>6</sup> This percentage is calculated applying cross-sectional personal weights.

other kind of denture; 3.30% received gum treatment and 4.71% went for other types of treatment.

**Table 4.2.** Dental attendance rates for some European countries, USA and Australia.

Country	Year of the study	% of population with dental visit in the past year
Austria	1997	62.26
Belgium	1997	55.48
Denmark	1997	77.36
Finland	1997	52.17
Germany	1996	77.83
Greece	1997	24.84
Ireland	1997	35.70
Italy	1997	38.20
Luxembourg	1996	70.18
Netherlands	1997	74.83
Portugal	1997	27.41
Spain	1997	31.57
Sweden	1997	47.16
United Kingdom	1996	61.31
Australia	1996	56.20
USA	1999	64.10

*Sources:*

- a) European countries: ECHP 1996 and 1997. Author's own calculations.
- b) Australia: *Oral Health and Access to Dental Care 1994-1996*, Australian Institute of Health and Welfare (AIHW) Dental Statistics and Research Unit; Research Report, March 2001.
- c) USA: Wall, T.P., and L.J. Brown (2003), "Recent Trends in Dental Visits and Private Dental Insurance, 1989 and 1999", *Journal of the American Dental Association*, 134(5), 621-627.

#### **4.3.4. Determinants of dental services utilisation: Socio-economic and supply-side variables**

The SHS asks about the provider of the last visit – public dentist, dentist on private practice or dentist of private insurance companies. As we pointed out before, in 1997

the mandatory social insurance (which covers around 99% of the Spanish population) only covered a small package of dental services (molar extractions and diagnostic care during pregnancy). For that reason, most people (around 90%) make visits to the private sector dentists (table 4.3). As Álvarez and Delgado (2002) suggest, in such circumstances, an adverse selection problem may arise. Individuals may be induced to demand dental health insurance in anticipation of future dental care needs. However, the percentage of Spaniards who contract dental health insurance is less than 4%<sup>7</sup>. There are at least three possible explanations for this low rate of dental insurance. First, there are very few insurance companies that offer dental insurance coverage. Second, many insurers offer the possibility to contract dental health coverage only to individuals who also subscribe a more general health insurance policy (in fact, this is the case of 56.77% of those holding dental insurance). Last, most dental insurance policies include very high co-payment rates for the majority of the dental care services, which make them less desirable.

**Table 4.3.** Provider of the last dental visit.

	<b>Individuals with dental visit within the last 3 months</b>	<b>Individuals with dental visit within the last year</b>	<b>All individuals with at least one dental visit</b>
Public Dentist	13.42	10.83	16.30
Private Dentist	81.15	83.67	79.80
Dentist of insurance company	5.43	5.49	<b>3.90</b>
	100	100	100

*Source: Spanish Health Survey, 1997.*

Availability of financial resources is very important for the utilisation of health services not included in the public insurance package and subject to high co-payment rates, such as dental care services. Unfortunately, income is not very accurately

<sup>7</sup> The SHS contains information about dental insurance coverage of those who have visited a dentist at least once during their lives (94.04%). It seems plausible to assume that the remaining 372 individuals who say they have never seen a dentist are not covered by dental insurance.

measured in the SHS. The survey contains a six interval categorical variable of household monthly income. Moreover, around one fifth of the interviewed did not answer the income question. Two different strategies to overcome this problem have been developed in previous studies. The first one is to set the income variable equal to the household expenditures, taken from form the Spanish Household Expenditures Survey a year nearby (González, 1995; Álvarez and Delgado, 2002). The second strategy consists of computing income using interval regression. Unfortunately, it was not possible to impute income from the new Continuous Family Expenditure Survey (CFES)<sup>8</sup>, because it does not contain good information on household's income. The income question in the 1997 CFES is answered by only 34% of the interviewed. Thus, the second strategy was adopted in this study<sup>9</sup>.

The effect of education on health and health services utilisation is complex. Already in 1972, Grossman argued that more educated individuals were more efficient in the production of their own health using inputs different from health care and as a consequence they demanded less health care. However, if education is assumed to increase one's ability to evaluate the advantages of good health, then the use of preventive care should rise (Kenkel, 1994). Empirical works on dental care demand find strong positive effect of education on the utilisation of dental services (Olsson, 1999; Álvarez and Delgado, 2002). Moreover, having in mind that income increases with education, we may extrapolate the results of income elasticity to education. If demand for dental care increases with income<sup>10</sup>, and education and income are positively correlated, we expect more educated individuals to be more intensive users of dental care than less educated individuals. We measure education by a set of dummy variables representing the highest level of formal education completed by the individual.

---

<sup>8</sup> The new Spanish Continuous Family Expenditure Survey, a panel survey, started in the third quarter of 1997.

<sup>9</sup> The interval regression methodology was used in the analysis in chapter 2 of this thesis. For more details see Appendix B.

<sup>10</sup> Holtmann and Olsen, 1976; Manning and Phelps, 1979; Álvarez and Delgado, 2002 estimate positive and significant income elasticities ranging from 0.12 to 0.87.

Opportunity cost of time is measured by a set of dummy variables representing individual's current employment status (retired, unemployed, housewife, student, and other). Working individuals are the reference category.

The dentist per population ratio at provincial level measures the availability of dental care services. Manning and Phelps (1979) claim that in the presence of excess demand for dental care, supply of dentists performs as a non-price rationing device.

**Table 4.4.** Dentist per population ratio in some European countries, USA and Australia.

Country	Year	Rate per 10,000 population
Austria	1998	4.72
Belgium	1998	6.82
Denmark*	1996	9.27
Finland	1998	9.37
France	1996	6.78
Germany	1998	7.59
Greece*	1996	10.91
Ireland	1998	4.62
Italy	1997	6.44
Luxembourg	1998	6.58
Netherlands	1996	4.71
Portugal	1998	3.33
Spain	1997	3.84
Sweden	1997	15.20
United Kingdom*	1996	4.24
EU average		6.87
Australia	1998	4.00
USA	1996	5.98

Source:

WHO Statistical Information System (WHOSIS), Health Personnel, WHO estimates of numbers of doctors, dentists and nurses, by Member States, <http://www3.who.int/whosis/menu.cfm> [15 August 2003].

\* For these three countries the dentist per population ratio is based on figures from E. Widström and K.A. Eaton "Systems for the Provision of Oral Health Care, Workforce and Costs in the EU and EEA - A Council of European Chief Dental Officers' Survey", 1999, <http://www.whocollab.od.mah.se/euro/eu/eurofr.html> [15 August 2003].

The lower the dentist per population ratio, the higher the opportunity cost of care (longer waiting period between appointment and visit, longer travel time to the dentist's office). On the other hand, excess supply (high dentist per population ratios) is argued to induce demand for care (Birch, 1988; Grytten, 1991; Olsson, 1999). In the presence of asymmetric information, dentists maintain their workload (and earnings) by "prescribing" a higher number of visits per treatment. The ratio of dentist per population in Spain (less than 4 dentists per 10,000 inhabitants) is the second lowest among the European countries, and is lower than in the USA and Australia (table 4.4). Thus, it is not surprising that Álvarez and Delgado (2002) do not find evidence of supplier-inducement in the number of dental visits.

Finally, we include dummies for the size of the town of residence. These are expected to capture further differences in the access to dental care.

#### **4.4. Measuring inequalities in dental health**

Dental health is likely to be influenced by the same social and environmental determinants as general and mental health. Some of these determinants are age, gender, geographic location, socio-economic status and education. Others include measures of risk behaviour, such as tobacco and alcohol use, which are also of broader health concern. Because of this, in measuring dental health we adopt the socio-economic approach to measuring health inequalities instead of the "pure inequality approach"<sup>11</sup> (Wagstaff and van Doorslaer, 2000b).

---

<sup>11</sup> This approach, which is borrowed from the income inequality literature, aims at evaluating the variation in health across people, irrespective of the socio-economic stratum they belong to. This approach, in contrast to the socio-economic approach, does not pick up whether people in poor health are rich or poor, or hold university degree or just a primary school diploma, or are employed or unemployed. The most commonly used measures of pure health inequality are the Gini coefficients, the variance and Atkinson's (1970) index.



A first idea of the population's oral health status and of the existence of inequality in the distribution of oral health can be obtained by the description of the prevalence of different oral conditions among the adults. Table 4.5 presents the percentage of Spaniards who declare having a particular oral health problem by income quintiles. The ratio of the top and bottom quintile is also shown, although, it is an arbitrary and incomplete measure of inequality (basically, because it measures differences between the two tails of the distribution and does not reflect the experiences of the entire population). The percentage of individuals preserving their natural teeth increases with income (the differences are statistically significant with Pearson  $\chi^2 = 266.16$ ).

**Table 4.5.** Prevalence (per cent) of some dental conditions among the Spanish adults, by income quintile.

Dental conditions	Income Quintile					Q1/Q5	Total
	Bottom 20%	20-40%	40-60%	60-80%	Top 20%		
preserve all natural teeth	13.86	21.97	29.97	33.84	40.50	0.34	28.03
tooth decays (caries)	38.94	42.66	39.26	36.65	30.23	1.29	37.55
extracted teeth because of being badly decayed or unstable	81.49	73.30	66.75	62.39	56.13	1.45	68.01
filled teeth	31.97	44.27	56.89	64.72	75.78	0.42	54.72
gum bleeding (gingivitis)	18.75	22.13	21.88	20.53	20.21	0.93	20.70
unstable teeth	15.38	9.86	6.97	5.29	4.33	3.55	8.37
crowns, bridges, dentures	46.55	35.36	30.05	28.39	31.28	1.49	34.33
missing teeth	47.44	43.54	36.62	35.85	27.91	1.70	38.27

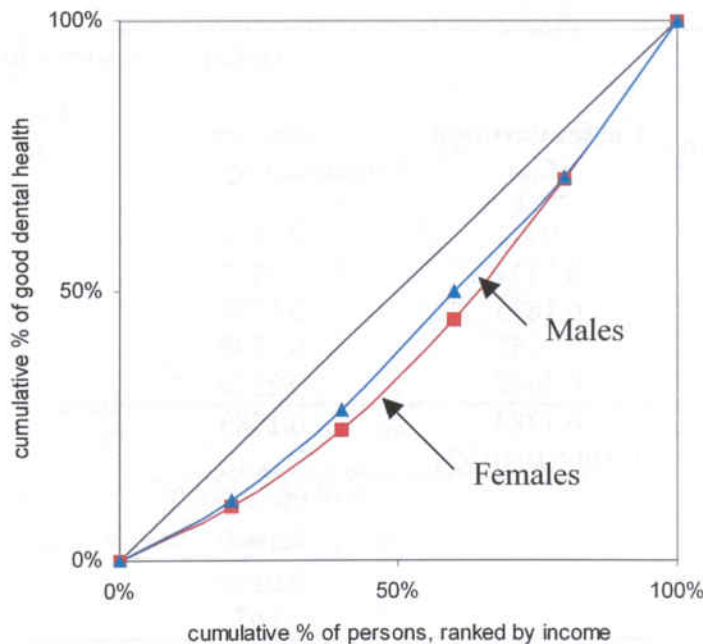
Source: Spanish Health Survey, 1997.

Tooth decays, tooth extractions due to caries or because of being unstable, unsound teeth and missing teeth are oral conditions that affect more adults belonging to the lowest income quintiles. The Q1/Q5 ratios for these four oral conditions are 1.29, 1.45, 3.55 and 1.70, respectively. A ratio of 1.49 reveals a higher prevalence of crowns, bridges or other type of oral prosthesis among the poorest, too. The

explanation may be found in the fact that the elderly, most of who belong to the two lowest income quintiles (around 80%), represent one-third of all individuals who wear some kind of oral prosthesis. While all these types of oral conditions show poor income-inequality, filled teeth prevail among the higher income groups. The number of those with tooth restoration in the top income quintile is two and a half times higher than in the bottom quintile.

We use the concentration index approach to analyse more thoroughly dental health inequalities in Spain. This technique has been previously used in the analysis of health inequalities (Propper and Upward, 1992; van Doorslaer *at al.*, 1997), but it has never been employed to measure dental health inequalities.

**Figure 4.3.** Good dental health concentration curves, by sex.



Source: Spanish Health Survey, 1997.

Figure 4.3 illustrates the reported cumulative distribution of good dental health for women and men ranked by income. The shapes of the concentration curves indicate that for both, women and men, good dental health is more concentrated among the rich. The observed inequality is a bit higher for women than for men in the three middle quintiles and is practically equal for both sexes in the top and the bottom quintiles. The corresponding unstandardised concentration indices and their standard errors equal 0.1615 (0.0218) for the sub-sample of women and 0.1480 (0.0206) for the sub-sample of men.

The overall unstandardised concentration index of 0.1966(0.0152) indicates the existence of pro-rich inequality in the distribution of good dental health. Table 4.6 and figure 4.4 show the actual ( $C_M$ ) and the indirectly standardised percentage of

**Table 4.6.** Quintile distributions, inequality and inequity concentration indices for good dental health, SHS, 1997.

Income Quintile	Unstandardised ( $C_M$ )	Indirectly standardised for:	
		Age, Sex, Unhealthy behaviour	Age, Sex, Unhealthy behaviour, Income, and Control variables*
Bottom 20%	0.0913	0.1418	0.1119
20-40%	0.1331	0.1487	0.1405
40-60%	0.1875	0.1780	0.1846
60-80%	0.2157	0.1898	0.2040
Top 20%	0.2638	0.2330	0.2506
Mean	0.1783	0.1783	0.1783
$C_M$ (st.error)	0.1966 (0.0152)		
$C_N$ (st.error)		0.0966 (0.0030)	0.0409 (0.0017)
$HI_{WV}$		0.1000	0.1557
St.Error		0.0150	0.0150
t-value		6.67	10.38

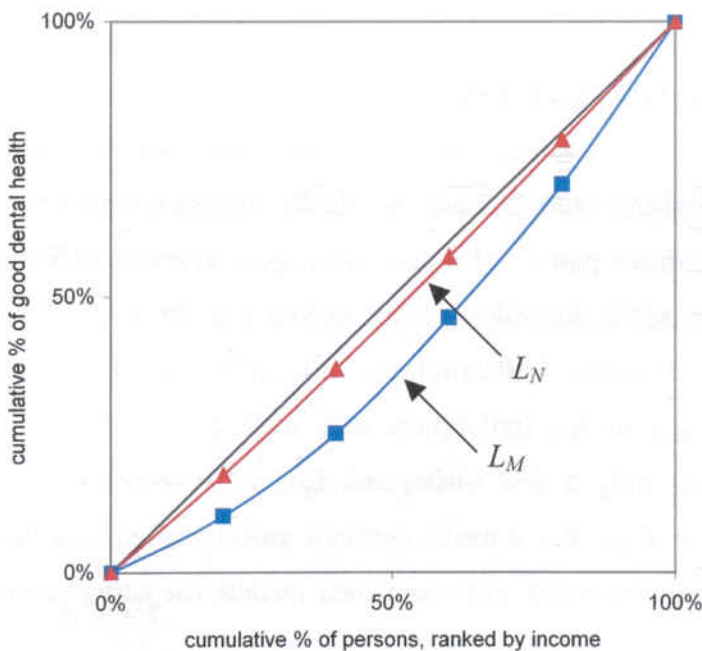
Source: Spanish Health Survey, 1997.

Notes: t-values estimated using Newey-West estimator for the variance of the concentration index.

\* Control variables: dental insurance, dentist-per-population ratio, education, labour status, marital status, size of residence town.

people in each quintile that have good dental health<sup>12</sup>. We standardise for age, sex and a dummy representing unhealthy lifestyles. A probit model was used to generate the expected oral health status. A Newey-West regression (Stata, 2001) was run to obtain the  $HI_{WV}$  indices and their robust standard errors. After standardisation, the inequality favouring the rich is reduced, but remains significantly positive. Age, sex and unhealthy lifestyles, however, are not the only factors that are likely to affect dental health. Education, dental insurance and availability of dentists (represented by the dentists to population ratio), size of residence town, income and employment

**Figure 4.4.** Concentration curves for actual and expected good dental health.



Source: Spanish Health Survey, 1997.

<sup>12</sup> The indirectly standardised quintile rates are calculated as the difference between actual and expected rates, plus the sample mean (see World Bank, Technical Note #13).

status are used as control variables in the standardisation procedure. The resulting quintile distribution and concentration index are presented in the last column of table 4.6. As it can be seen the expected level of good dental health, measured by  $C_N$ , is reduced (from 0.0966 to 0.0409), leading to higher standardised concentration index ( $HI_{WV}$ ). This result suggests that our control variables exhibit positive effect on the degree of horizontal inequity in good dental health. Therefore, if we do not control for differences due to socio-economic characteristics of the individuals (which is to standardise for age, sex and unhealthy lifestyles only), we will get an underestimated measure of the inequity in good dental health.

## **4.5. Measuring inequalities in dental care utilisation**

### **4.5.1. Estimation strategy**

Dental care utilisation patterns, based on Health Interview Surveys data, show many resemblances with the pattern of utilisation of general health services. The variables recording dental visits, just like the one accounting for physician visits, contain a large number of zeros, indicating no utilisation during the reference period. Furthermore, most of the individuals who have seen a dentist (or any type of physician) report only a few visits, and frequent use is rarely observed. Thus, estimating the need-predicted health services utilisation requires the use of discrete choice (like probit or logit) and count data models (negative-binomial or two-part models).

As it was pointed out before, we use two alternative measures of dental care utilisation to assess the degree of inequality. First, we proxy dental care use by a dichotomous variable representing usage of dental services within the last year. Then, we estimate the inequalities employing as a measure of expected or needed dental care use a count variable containing the number of dental visits during the past

three months. The aim is to contrast the findings obtained with these two different measures and to provide results that can be compared with future results from other countries<sup>13</sup>.

In the first case, we estimate a probit model for the probability of dental care utilisation and of utilisation of specific dental services (like check-ups, tooth cleaning, tooth restoration, tooth extraction, gum treatment, orthodontic services, and other types of dental treatment).

In the second case, a two-part (Pohlmeier and Ulrich, 1995) and a generalised negative binomial specifications are used to predict the (indirectly) standardised need for dental care,  $m_i^*$ , for individuals reporting a visit to the dentists in the last three months. In the two-part model, the probability of dental visit is estimated by a probit. The frequency of dental care use (the number of visits), conditional on observing a positive outcome in the first part, is estimated by a negative binomial count data model truncated at zero. This model has been previously used to analyse equity in the utilisation of physician visits (to a GP and to a specialist), visits to the emergency services and hospital inpatient days (e.g. Gerdtham, 1997; Van Doorslaer *et al.*, 2000; Urbanos-Garrido, 2001a and 2001b; Van Doorslaer, Koolman and Puffer, 2002<sup>14</sup>).

The probability of visiting a dentist is given by:

$$\text{Prob}(y_i = 1 | x_i) = \Phi(x_i \hat{\beta}_1), \quad (4.7)$$

where  $\Phi(\cdot)$  is the standard cumulative normal distribution and  $\hat{\beta}_1$  is the estimated parameter vector.

<sup>13</sup> Most Health Interview Surveys, which contain questions about dental care, ask about dental services utilization within the last year.

<sup>14</sup> These authors use a logit specification to estimate the probability of any positive use in the reference period.



The estimated probability of positive number of dental visits, represented by a zero-truncated negative binomial model (Greene, 2000) is the following:

$$\Pr(Y_i = y) \left[ 1 - \hat{\Pr}(Y_i = 0) \right]^{-1} = \left[ \frac{\Gamma(y+1/\alpha)}{\Gamma(y+1)\Gamma(1/\alpha)} \right] \times \left( \frac{1}{1 + \alpha \exp(\hat{\beta}'_2 \bar{x}_i)} \right)^{1/\alpha} \times \left( \frac{\exp(\hat{\beta}'_2 \bar{x}_i)}{1/\alpha + \exp(\hat{\beta}'_2 \bar{x}_i)} \right)^y \times \left[ 1 - \left( \frac{1}{1 + \alpha \exp(\hat{\beta}'_2 \bar{x}_i)} \right)^{1/\alpha} \right]^{-1}, \quad (4.8)$$

where  $\hat{\beta}_2$  the estimated parameters vector. The overall need-predicted utilisation of dental care is calculated by multiplying the predicted probabilities of the two models.

Although the two-part model has been widely used in the estimation of income-related inequalities in health care, it has an important restriction. This is the underlining assumption of no correlation between the two decision processes (the contact decision and the decision on the number of visits). Moreover, it is questionable if the number of visits for the non-users can be correctly predicted from the coefficients estimated on the group of users. An alternative to the two-part model is the generalised negative binomial specification. In the generalised version of the negative binomial model the assumption of a constant overdispersion,  $\alpha$ , can be relaxed by allowing the overdispersion to depend on the covariates (our need and non-need variables,  $x_i$ ). Thus, the estimated probability of a visit can be written as:

$$\Pr(Y_i = y) = \left[ \frac{\Gamma(y+1/\alpha_i)}{\Gamma(y+1)\Gamma(1/\alpha_i)} \right] \times \left( \frac{1}{1 + \alpha_i \exp(\hat{\beta}' \bar{x}_i)} \right)^{1/\alpha_i} \times \left( \frac{\exp(\hat{\beta}' \bar{x}_i)}{1/\alpha_i + \exp(\hat{\beta}' \bar{x}_i)} \right)^y, \quad (4.9)$$

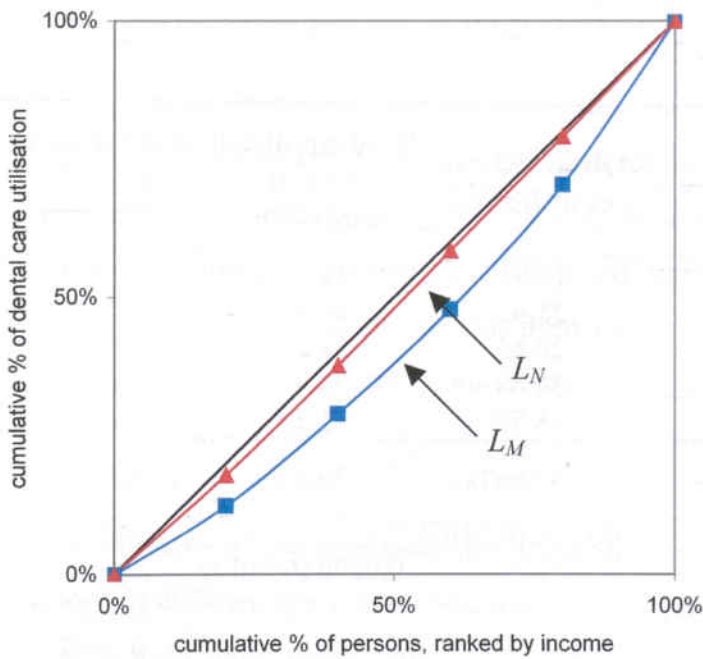
where the overdispersion parameter is modelled as  $\ln \alpha_i = x_i \gamma$ , a linear combination of all covariates  $x_i$ .



#### 4.5.2. Estimation results

Figure 4.5 plots the actual and the need-predicted dental care utilisation within the last year prior to the interview. The actual concentration curve,  $L_M$ , lies below the diagonal (the line of equality), indicating pro-rich income-related inequality in the use of dental care in Spain. However, if people with similar dental health conditions and individual characteristics were treated equally, this inequality would almost disappear. The concentration curve for need-expected dental care coincides with the diagonal.

**Figure 4.5.** Concentration curves for actual and need-predicted dental care utilisation within the last year.



Source: Spanish Health Survey, 1997.

Table 4.7 presents the quintile distribution of actual and need-standardised dental care. The indirectly standardised rates are calculated as the difference between the

observed and need-predicted means per quintile plus the overall sample mean. The overall indirectly standardised concentration index is positive and significant, 0.1421 (0.0107). This number suggests the existence of important inequity in the utilisation of dental services, which favours the wealthier groups of the population. The distribution of the standardised rates of utilisation across income shows the distribution of dental care utilisation that one would expect to observe, irrespective of the differences in the distribution of the need and non-need variables. The last column of table 4.7 contains the difference between the observed and need-predicted rate of utilisation per income quintile<sup>15</sup>. The figures reveal that individuals belonging to the lowest income quintiles “under-consume” dental care, i.e. they receive less care than they need. On the other hand, people in the two highest income groups

**Table 4.7.** Quintile distributions of observed, need-predicted, and need-standardised dental care utilisation within the last year. Inequality and inequity indices.

Income Quintile	Observed rate of utilisation	Need-predicted rate of utilisation	Standardised rate of utilisation	Observed minus need-predicted rate of utilisation
Bottom 20%	18.91%	26.86%	22.69%	-7.95%
20-40%	25.42	29.52	26.54	-4.10
40-60%	28.85	31.02	28.46	-2.18
60-80%	34.64	30.92	34.36	3.72
Top 20%	45.39	31.38	44.65	14.01
Mean rate of utilisation	30.64%	30.64%	30.64%	
$C_M$ (st.error)	0.1711 (0.0107)			
$C_N$ (st.error)		0.0290 (0.0017)		
$HI_{WV}$			0.1421	
St.Error			0.0107	
t-value			13.30	
$R_I$ (Linear Redistribution Scheme)	12.83%	2.18%	10.66%	

Source: Spanish Health Survey, 1997.

Note:  $t$ -values estimated using Newey-West estimator for the variance of the concentration index.

<sup>15</sup> This measure of inequality in use of health care is used by Urbanos-Garrido (2001a).

“over-consume” dental care, i.e. their actual use surpasses their needs. This over-consumption is especially pronounced for those in the last income quintile. Their actual use is 14% higher than their needed rate of utilisation of dental care.

Table 4.7 also reports the linear redistribution scheme ( $R_l$ ), proposed by Koolman and van Doorslaer (2002). The  $R_l$  index is a more intuitive measure of inequality than the concentration index. It equals seventy five times<sup>16</sup> the concentration index and it shows the proportion of the health variable (in our case dental care use) that has to be transferred from the richest to the poorest half of the population in order to achieve equity. Thus, according to our estimations almost 11% of all dental visits should be taken from the better off and given to the worse off in order to remove all income-related inequity in the use of dental care in Spain.

We now turn to the assessment of inequality based on the alternative measure of dental services utilisation, the number of dental visits of the individuals who had seen the dentist within the last three months preceding the interview. In table 4.8 we present the results from the two alternative estimation techniques used – the two-part model and the generalised negative binomial model. As it can be seen, the results are practically identical. The figures reveal that the better off use dental services significantly more often than the worse off. People from the two highest income quintiles consult the dentists about two times more than those belonging to the bottom quintile.

The concentration coefficients of the need-predicted frequency of dental visits are negative and significantly different from zero, indicating that people from the lower socio-economic classes need more dental care than those from the higher socio-economic classes. Figure 4.6 confirms the above finding, but reveals that the inequality in need is not very large. Since the need-predicted concentration index

---

<sup>16</sup> The authors point out that the two indices differ by three hundred-fourths only if the variance of the fractional rank is 1/12. In our sample the variance of the fractional rank is exactly equal to 1/12.

**Table 4.8.** Observed, need-predicted, and need-standardised number of dental visits within the last three months. Inequality and inequity indices.

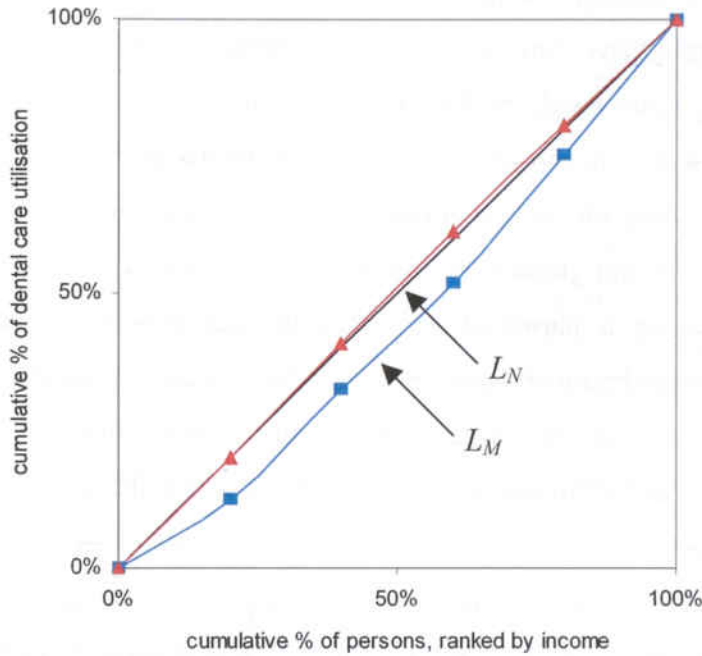
Income Quintile	Observed	Two-part model		Generalised negative binomial model	
		Needed	Need-stand.	Needed	Need-stand.
Bottom 20%	0.21	0.33	0.21	0.32	0.21
20-40%	0.33	0.34	0.32	0.34	0.33
40-60%	0.32	0.33	0.32	0.33	0.32
60-80%	0.39	0.31	0.40	0.31	0.41
Top 20%	0.41	0.31	0.43	0.31	0.43
Mean number of visits	0.33	0.33	0.34	0.32	0.34
Q5/Q1	1.95	0.94	2.05	0.97	2.05
Q5-Q1	0.20	-0.02	0.22	-0.01	0.22
$C_M$ (st.error)	0.1191 (0.0235)				
$C_N$ (st.error)		-0.0158 (0.0028)		-0.0113 (0.0025)	
$HI_{wv}$			0.1349		0.1303
St.Error			0.0234		0.0234
t-value			5.76		5.57
$R_l$ (Lin. Redistribution Scheme)	8.93%	1.19%	10.12%	0.85%	9.77%

Source: Spanish Health Survey, 1997.

Note: t-values estimated using Newey-West estimator for the variance of the concentration index.

calculated using the variable of dental visit within the last year is small (see table 4.7), but positive (0.0290), this means that the two alternative measures of dental care utilisation (a visit in the last year and number of visits within the last three months) lead to contrary predictions for the need for dental care. The question one should ask is which one is to be considered the right measure of dental care utilisation and consequently should be used for policy implication. Based on the figures of the prevalence of dental problems (see table 4.5), one would expect that poor people need more care. Moreover, people tend to forget, so the longer the recall period the less precise the gathered information.

**Figure 4.6.** Concentration curves for actual and need-predicted dental care utilisation within the last three months.



Source: Spanish Health Survey, 1997.

With these in mind, we consider that the variable containing the number of dental visits within the last three months better captures the “true” situation in dental services utilisation.

Observing an unequal pro-rich distribution of actual dental care utilisation and estimating almost equal (or a slightly pro-poor) need-predicted dental care utilisation results in a significantly positive standardised concentration indices. Thus, the hypothesis of the existence of income-related inequity in the use of dental care is again confirmed. Equity can be achieved by redistributing around 10% of all dental visits from the richest to the poorest half of the population.

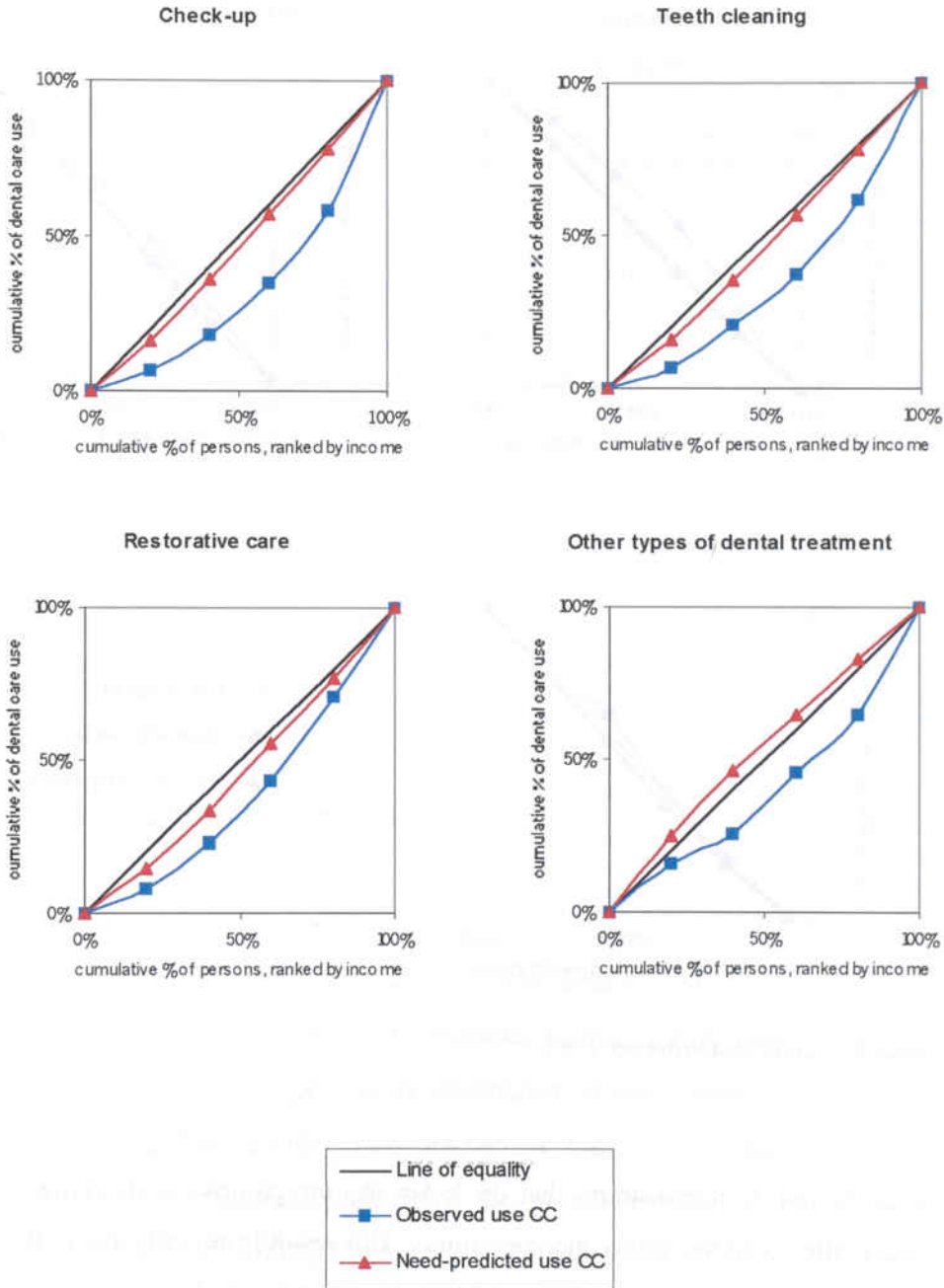
Finally, we apply the concentration index approach in the analysis of income-related inequality in the utilisation of several types of dental care within the last year preceding the interview. The results, which are shown in figures 4.7 and 4.8, are quite revealing. Preventive dental services (like check-ups and teeth cleanings), as well as basic restorative care, are clearly concentrated among the higher income groups<sup>17</sup>. On the other hand, the low income groups are the most intensive users of tooth extractions, the cheapest type of treatment for decayed or damaged teeth. For two types of services the actual utilisation concentration curve crosses the line of equality, and it is not possible to determine if there is or not income-related inequality favouring a particular group of the population. These are the gum treatments and orthodontic services. However, we should be cautious in interpreting the results for gum treatments because of the small number of positive observations. Only one percent of the interviewed say they have received a gum treatment at their last visit to the dentist. On the other hand, orthodontic services include many different types of treatments, some of which may be of an aesthetic nature. Thus, no clear conclusion about the distribution of these types of services can be derived. At last, we measured the income-related inequality in the use of “other” types of dental treatment. Dental services are not as numerous as general health services. Therefore, it is easy to infer that the other services category comprises mainly aesthetic dental services, such as veneers or teeth whitening and bleaching. Thus, it is not surprising that the observed utilisation of this type of services is concentrated among the wealthier, while the need-predicted one is concentrated among the poorer. Table 4.9 shows the difference between observed and need-predicted use of the different types of dental services, as well as the concentration indices with their robust standard errors and the  $R_i$  indices. The significantly positive concentration indices for diagnostic, teeth-cleaning, restorative and other (aesthetic) dental services confirm the existence of pro-rich horizontal inequity for these services. The only negative and significantly different from zero index is the one associated to surgical care (tooth

---

<sup>17</sup> Those who visit the dentist for preventive reasons are mainly young women (aged around 35) and have at least secondary education.



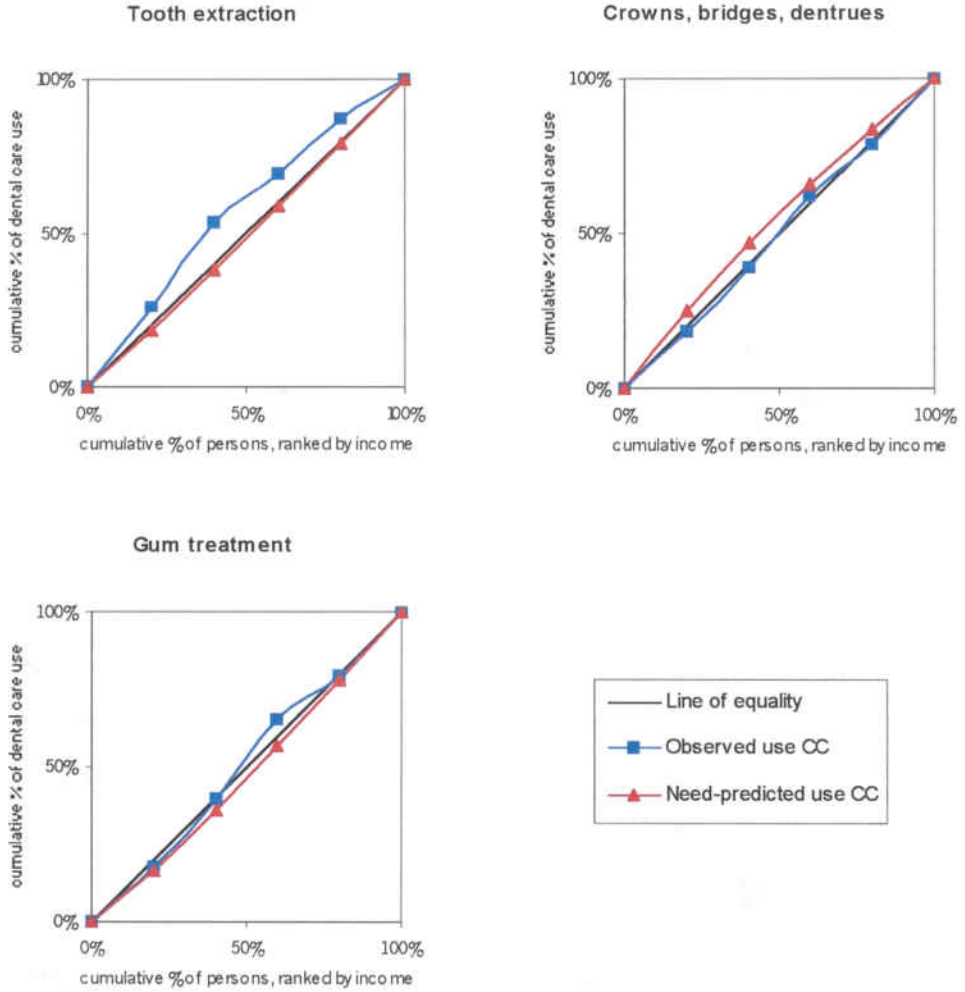
**Figure 4.7.** Concentration curves of actual and need-predicted utilisation of several types of dental care services within the last year.



Source: Spanish Health Survey, 1997.



**Figure 4.8.** Concentration curves of actual and need-predicted utilisation of several types of dental care services within the last year.



Source: Spanish Health Survey, 1997.

extractions). It demonstrates that the lower income groups use this type of services more often than the higher income groups. This result is not only due to the fact that extracting a unhealthy tooth is cheaper than treating it, but also to the fact that extractions are the only treatment covered by the public health insurance system. The concentration index for orthodontic services is positive and significant, but relatively

low in absolute value, while the one for gum treatment is not significantly different from zero.

**Table 4.9.** Inequality and inequity measures for several types of dental services.

Income Quintile	Difference between observed and need-predicted utilisation						
	Check-ups	Teeth cleaning	Restorative care	Tooth extraction	Crowns, bridges, dentures	Gum treatment	Other treatments
Bottom 20%	-3.94%	-3.00%	-2.73%	2.72%	-0.97%	0.19%	-0.30%
20-40%	-2.84	-1.40	-1.00	2.79	0.00	0.31	-0.47
40-60%	-0.58	-0.76	0.04	-1.14	0.98	0.42	0.39
60-80%	3.26	2.74	4.33	-0.62	0.00	-0.19	0.35
Top 20%	13.39	8.84	4.29	-2.12	1.13	0.13	1.60
HI <sub>WV</sub>	0.2983	0.2586	0.1529	-0.1688	0.0905	-0.0611	0.2761
St.Error	0.0210	0.0235	0.0207	0.0276	0.0362	0.0706	0.0657
t-value	14.22	11.00	7.39	-6.11	2.50	-0.87	4.20
R <sub>I</sub>	22.37%	19.40%	11.47%	-12.66%	6.79%	-4.58%	20.71%

Source: Spanish Health Survey, 1997.

Note: t-values estimated using Newey-West estimator for the variance of the concentration index.

#### 4.6. Discussion and conclusion

As Urbanos-Garrido (2001a) points out, there are some econometric issues that may introduce bias in the estimates of inequalities in the use of public health care services. Her arguments also apply to the estimation of inequalities in dental services utilisation. The dental morbidity indicators used to assess the “need” for dental care may not be the most precise instrument. If the covariates used in the estimation of inequality are correlated with the error term (the unmeasured need) the estimation results may be biased. However, we believe that the dental health indicators we use are much better predictors of “dental need” than are the overall health indicators for general “health need” (e.g. having a caries is an objective measure of “need” for dental care, while being hampered in your leisure time activities by a specific health

condition (e.g. suffering from anxiety) does not necessarily mean that health care is needed).

Another possible source of bias may come from the endogeneity of some of the regressors. Income and insurance status are examples of characteristics that affect health care utilisation and at the same time could be influenced by individual's needed utilisation of care, which is predicted by the need variables. We performed the test for exogeneity proposed by Smith and Blundell (1986). We instrumented income and dental insurance status by individual's social status (based on the highest level of education completed and occupation) and dummy variables for the region of residence. The test statistics support the hypothesis of exogeneity of both income and dental insurance status.

Before proceeding with the discussion, we should mention that, although inequalities in health and health care utilisation have been broadly studied, very little research has been done on dental health and dental health inequalities. Probably because one of the major reasons is that till recently dental health has not been considered essential to general health, and the psychological and social consequences of dental maladies have not been realised. This also explains the fact that while, in general, health care systems in most European countries are based on egalitarian principles (e.g. Veatch, 1981; Sugden, 1983; Daniels, 1985), the dental care sector, thus constituting an "outlier", is predominantly ruled by libertarian views (e.g. Engelhardt, 1986; Lomasky, 1981)<sup>18</sup>.

Because of all the above, we thought that a more thorough analysis of the inequalities and inequities in dental health and dental services utilisation in Spain would be of interest not only to health economists, but also to policy makers. Moreover, we

---

<sup>18</sup> Williams (1993) offers a comparison of the egalitarian and libertarian principles. Applied to health care, the egalitarian principle claims for public health care system, where health care is distributed according to "need" and financed according to "ability to pay". On the other hand, the libertarian view suggest that health sector should be mainly privately financed, and individual's willingness (and ability) to pay should serve as a rationing device.

observe that individuals from the lower socio-economic groups tend to have higher levels of oral disease. Our findings confirm the hypothesis of the existence of significant income-related inequity in the distribution of good dental health favouring the better off.

There are two questions, arising from the results we obtained from the analysis, that need further discussion. First, is dental health inequality greater than general health inequality? And second, to what extent the observed income-related inequity in dental health in Spain differs from that of other countries with similar structure and organisation of the dental care sector? We compare our measure of inequality in dental health with the measure of general health inequality for Spain estimated by Van Doorslaer and Koolman (2002)<sup>19</sup>. These authors find that self-reported health is unequally distributed in favour of the higher income groups in all EU countries. Thus, the wealthier individuals not only enjoy better general health status, but also better dental health status. The main difference is in the magnitude of income-related inequality. The degree of inequality in dental health (CI = 0.1557) is much higher than in general health (CI = 0.0066). Thus, if the society is worried about the degree of general health inequality, it should be even more concerned with the inequality in dental health, not only because of the inequality itself, but also because dental health problems may cause general health problems.

Answering the second question is not that easy because there is almost no evidence on the existence of inequities in dental health in other countries. The best we can do is to report the figures for the only dental health indicator that is measured in most countries. Table 4.10 contains information about the number of decayed, missing and filled teeth (DMFT) at the age of 12 in some European countries, USA and Australia. If we look at the latest available figures, Spain and Portugal score highest meaning that these countries' population has worse dental health compared to the rest of the countries. However, the figures in column two do not provide a very good base for

---

<sup>19</sup> The data in their paper is taken from the third wave (held in 1996) of the European Community Household Panel.

comparison (the DMFT score for Spain is for 1994, all the others are much more recent). To overcome this inconvenience, we looked for the DMFT figures for the years 1993 or 1994. These are presented in the last column of table 4.10. The differences among countries in 1993-94 were not very important. Unfortunately, Spain remained in the queue, its DMFT score in 1994 was the third highest. All the above suggests that there is place for worrying about the dental health and dental health inequalities.

**Table 3.10.** Average number of decayed, missing, and filled teeth (DMFT) at the age of 12.

<b>Country</b>	<b>DMFT at the age of 12 (year of study in brackets)*</b>	<b>DMFT at the age of 12 in 1993-94**</b>
Austria	1.7 (1997)	3.0
Belgium	1.6 (1998)	n.a.
Denmark	0.9 (2001)	1.3
Finland	1.1 (1997)	1.2
France	1.9 (1998)	2.1
Germany	1.2 (2000)	2.4
Greece	2.0 (2000)	1.6
Ireland	1.2 (2002)	1.4
Italy	2.1 (1996)	n.a.
Luxembourg	0.7 (1999)	1.2
Netherlands	0.6 (1998)	0.9
Portugal	3.0 (2000)	n.a.
Spain	2.3 (1994)	2.3
Sweden	1.1 (2002)	1.5
United Kingdom	0.9 (2000-01)	1.4
	1.6	
Australia	0.8 (1998)	1.1
USA	1.3 (1992-93)	1.3
<b>World average</b>	<b>1.7 (2001)</b>	

*Source:*

\* WHO Oral Health Country/Area Profile Programme. Caries for 12-Year-Olds by Country/Area. <http://www.whocollab.od.mah.se/countriesalphab.html> [24 October 2003].

\*\* OECD Health Data 2002.

Our aim was not only to study dental health, but also to offer a broad view about inequalities and inequities in the utilisation of dental services in Spain. We find significant inequalities in the observed use of general dental services favouring the wealthier groups of the adult population, independently of the variable used as a measure of utilisation (a dummy or a count variable). Moreover, having predicted an almost equally distributed dental care need, we conclude that there is a significant pro-rich inequity in the utilisation of that type of care in Spain. To get an idea of whether estimated inequity is important we may compare it to other types of health services that share similar characteristics. Among all health services, specialists services most resemble dental services, in the sense that both treat specific kinds of health problems. The observed inequality in actual specialists services utilisation in Spain is positive and significant ( $C_M = 0.0267^{20}$ ), but is more than four times lower than the inequality in actual dental services utilisation we have calculated ( $C_M = 0.1191$ ). The estimated degree of horizontal inequity in specialists visits is also lower than the estimated degree of inequity in dental visits,  $HI_{WV} = 0.0808$  and  $HI_{WV} = 0.1303$ , respectively. This means that in order to achieve equity in specialist services 6% of all specialists visits have to be redistributed from the richest to the poorest, while in the case of dental services, 10% of all dental visits need redistribution. Thus, if the society considers the existing inequity in specialists visits (some of which are privately paid for) undesirable, then it should also be concerned with the even higher degree of inequity in dental services utilisation.

Our findings about the inequities in the utilisation of specific types of dental care are especially revealing. Preventive dental care (like diagnostics and teeth cleanings) and basic restorative care show clear pro-rich inequality. Aesthetic dental services also favour the better off. Oral surgery (tooth extractions), which is the cheapest way of treating a damaged tooth besides being the only one provided by the public health system, is the only type of dental care that turns out to be concentrated among the poor segments of the population. At last, no definite conclusions can be derived for

---

<sup>20</sup> Van Doorslaer, Koolman and Jones (2002).

the existence of income-related inequality neither for treatments related to wearing crowns, bridges or dentures, nor for gum treatment.

The existence of inequities in dental health and dental care utilisation is not surprising in a system where high treatment prices, that should be paid out-of-pocket, are an important barrier to access care. In fact, the share of dental expenditures in Spanish private health expenditures has been increasing at a stable rate of around 1 percentage point per year during the years 1998, 1999, and 2000. Private dental expenditures accounted for 20.31% of total private health expenditures in 2000<sup>21</sup>.

The solution to most of the problems confronting dental care could be overcome by including dental care services, or at least preventive dental care services, in the public health system either for children and adolescents only<sup>22</sup> or for all covered by the public health insurance (around 99% of the Spaniards). Cost-benefit analyses are needed to demonstrate the viability of such policies. There is no doubt, however, that whilst oral treatment services alone cannot improve dental health, ensuring access to appropriate, regular dental care is the key for identifying needs and improving dental health of the population.

---

<sup>21</sup> This figure is calculated using data from the Continuous Household Expenditures Survey. The denominator equals total private health expenditures (including private health insurance policies) at a household level.

<sup>22</sup> Preventive and basic restorative care of permanent denture of children and adolescents is covered by the public health insurance in Navarra and País Vasco (see Cortés and Llorda, 2002).



**REFERENCES**

Álvarez, B., and M.A. Delgado (2002), “Goodness-of-fit Techniques for Count Data Models: An Application to the Demand for Dental Care in Spain”, *Empirical Economics*, **27**, 543-567.

Atkinson, A.B. (1970), “On the measurement of inequality”, *Journal of Economic Theory*, **2**, 244-263.

Birch, S. (1988), “The Identification of Supplier-Inducement in a Fixed-Price System of Health Care Provision. The Case of Dentistry in the United Kingdom”, *Journal of health economics*, **7**, 129-150.

Blaxter, M. (1992), “A Comparison of Measures of Inequality in Morbidity”, in J. Fox (Ed.), *Health Inequalities in European countries*, Gower, Aldershot.

Cameron, A.C., P.K. Trivedi, F. Milne, and J. Piggott (1988), “A Microeconomic Model of Demand for Health Care and Health Insurance in Australia”, *Review of Economic Studies*, **55**, 85-106.

Cortés, J., and J.C. Llorda (2002), “Salud pública bucodental”, in J.M. Cabasés, J.R. Villalbí, and C. Aibar (Eds.), *Invertir para la salud. Prioridades en salud pública. Informe Sespas 2002*.

Daniels, N. (1985), *Just Health Care*, Oxford University Press, New York.

Engelhardt, H. T. (1986), *The Foundations of Bioethics*, Oxford University Press, New York.

EU Working Group on Tobacco and Oral Health (1998), Meeting Report, *Oral Diseases*, **4**, 48-67.

Gerdtham, U.-G. (1997), "Equity in Health Care Utilization: Further Tests Based on Hurdle Models and Swedish Microdata", *Health Economics*, **6**, 303-319.

González, Y. (1995), "La demanda de seguros sanitarios", *Revista de Economía Aplicada*, **8**, 111-142.

Greene, W.H.(2000), *Econometric Analysis*, 4th Edition, Prentice-Hall.

Grossman, M. (1972), "The Demand for Health: A Theoretical and Empirical Investigation", NBER, Columbia University Press.

Grytten, J. (1991), "The Effect of Supplier Inducement on Norwegian Dental Services: Some Empirical Findings Based on a Theoretical Model", *Community Dental Health*, **8**, 221-231.

Holtmann, A.G., and E.O. Olsen (1976), "The demand for Dental Care: A Study of Consumption and Household Production", *The Journal of Human Resources*, **XI**, 546-560.

Jiménez-Martín, S., Labeaga, J.M., and M. Martínez-Granado (2002), "Latent Class Versus Two-part Models in the Demand for Physician Services across the European Union", *Health Economics*, **11**, 301-321.

Johnson, N.W., Bain, C.A., *et al.* (2000), "Tobacco and Oral Disease", *British Dental Journal*, **189(4)**, 200-206.

Kakwani, N., Wagstaff, A., and E. van Doorslaer (1997), "Socio-economic Inequalities in Health: Measurement, Computation, and Statistical Inference", *Journal of Econometrics*, **77**, 87-103.

Kernel, D.S. (1994), "The Demand for Preventive Medical Care", *Applied economics*, **26(4)**, 313-325.

Koolman, X., and E. Van Doorslaer (2002), "On the Interpretation of a Concentration Index of Inequality". ECuity II Project, Working paper #4.

Lien Nguyen, T.T., Häkkinen, U., and G. Rosenqvist (2002), "Dentist Service Utilization of Adults Finns: Results from The National Health-Care Survey", 4<sup>th</sup> ECHE Paris, 8 July 2002.

Lomasky, L. (1981), "Medical Progress and National Health Care", in M. Cohen, T. Nagel and T.M. Scanlon (Eds.) *Medicine and Moral Philosophy*, Princeton University Press, Princeton, New Jersey.

Manning, W.G., and C.E. Phelps (1979), "The Demand for Dental Care", *The Bell Journal of Economics*, **10(2)**:,503-525.

O'Donnell, O., and C. Propper (1991), "Equity and the Distribution of UK National Health Service Resources", *Journal of health economics*, **10**, 1-19.

Olsson, C. (1999), "Supplier Induced Demand: An Analysis of the Swedish Dental Care Market", Umeå Economic Studies No 494 *Essays in the economics of dental insurance and dental health*, PhD thesis, Umeå University.

Propper, C., and R. Upward (1992), "Need, Equity and the NHS: The Distribution of Health Care Expenditure 1974-87", *Fiscal Studies*, **13(2)**, 1-21.

Regidor, E., Gutierrez-Fisac, J.L., Domínguez, V., Calle, M.E., and P. Navarro (2002), "Comparing social inequalities in health in Spain: 1987 and 1995/1997", *Social Science and Medicine*, **54**, 1323-1332.

Rodríguez, M., Calonge, S., and S. Reñé (1993), "Spain", in E. Van Doorslaer, A. Wagstaff, and F. Rutten (Eds.) *Equity in the Finance and Delivery of Health Care*, Oxford University Press, Oxford, pp. 201-218.

Rothman, K. (1986), *Modern Epidemiology*, Little, Brown & Co., Boston, Massachusetts.

Smith, R., and R. Blundell (1986), "An Exogeneity Test for a Simultaneous Equation Tobit Model with an Application to Labour Supply", *Econometrica*, **54(3)**: 679-685.

Stata Corporation (2001), STATA 7, Stata Statistical Software.

Sugden, R. (1983), "Who Cares?", IEA Occasional Paper No. 67 (Institute for Economic Affairs, London).

Urbanos-Garrido, R.M. (2001a), "Explaining Inequality in the Use of Public Health Care Services: Evidence from Spain", *Health Care Management Science*, **4**, 143-157.

Urbanos-Garrido, R.M.(2001b), "Measurement of Inequality in the Delivery of Public Health Care: Evidence from Spain", FEDEA Working Paper 2001-15 (Fundación de Estudios de Economía Aplicada), <http://www.fedea.es/hojas/publicaciones.html> [12 January 2003].

Van Doorslaer, E., and X. Koolman (2002), "Explaining the Differences in Income-related Health Inequalities across European Countries", ECuity II Project, Working paper #6.

Van Doorslaer, E., Koolman, X., and A. Jones (2002), "Explaining Income-related Inequalities in Doctor Utilisation in Europe: A Decomposition Approach", ECUity II Project, Working paper #5.

Van Doorslaer, E., Koolman, X., and F. Puffer (2002), "Equity in the Use of Physician Visits in OECD Countries: Has Equal Treatment for Equal Need Been Achieved?", in *Measuring Up: Improving Health Systems Performance in OECD Countries*, OECD, Paris, France, pp. 225-248.

Van Doorslaer, E., Wagstaff, A., Calonge, S., Christiansen, T., Gerfin, M., Gottschalk, P., Janssen, R., Lachaud, C., Leu, R.E., Nolan, B., O'Donnell, O., Paci, P., Pereira, J., Pinto, C.G., Propper, C., Reñe, J., Rochaix, L., Rodríguez, M., Rutten, F., Upward, R., and B. Wolfe (1992), "Equity in the Delivery of Health Care: Some Cross-country Comparisons", *Journal of Health Economics*, **11(4)**, 389-411.

Van Doorslaer, E., Wagstaff, A., Bleichrodt, H., Calonge, S., Gerdtham, U.-G., Gerfin, M., Geurts, J., Gross, L., Häkkinen, U., Leu, R.E., O'Donnell, O., Propper, C., Puffer, F., Rodríguez, M., Sundberg, G., and O. Winkelhake (1997), "Income-related Inequalities in Health: Some International Comparisons", *Journal of Health Economics*, **16(1)**, 93-112.

Van Doorslaer, E., Wagstaff, A., Van der Burg, H., Christiansen, T., De Grave, D., Duchesne, I., Gerdtham, U.-G., Gerfin, M., Geurts, J., Gross, L., Häkkinen, U., John, J., Klavus, J., Leu, R.E., Nolan, B., O'Donnell, O., Propper, C., Puffer, F., Schellhorn, M., Sundberg, G., and O. Winkelhake (2000), "Equity in the Delivery of Health Care in Europe and the US", *Journal of Health Economics*, **19(5)**, 553-583.

Veatch, R. (1981), *A Theory of Medical Ethics*, Oxford University Press, New York.

Wagstaff, A., Paci, P., and E. Van Doorslaer (1991), "On the Measurement of Inequalities in Health", *Social Science and Medicine*, **33(5)**, 545-557.

Wagstaff, A., Paci, P., and E. Van Doorslaer (1994), “Measuring Inequalities in Health in the Presence of Multiple-category Morbidity Indicators”, *Health Economics*, **3**, 281-291.

Wagstaff, A., and E. Van Doorslaer (2000a), “Measuring and Testing for Inequality in the Delivery of Health Care”, *Journal of Human Resources*, **35(4)**, 716-733.

Wagstaff, A., and E. Van Doorslaer (2000b), “Equity in Health Care Financing and Delivery”, in A.J. Culyer and J.P. Newhouse (Eds.) *Handbook of Health Economics*, North-Holland, pp.1803-1862.

WHO (2003), “The World Oral Health Report 2003: Continuous Improvement of Oral Health in the 21<sup>st</sup> Century – The Approach of the WHO Global Health Programme”, [http://www.who.int/oral\\_health/media/en/orh\\_report03\\_en.pdf](http://www.who.int/oral_health/media/en/orh_report03_en.pdf), [25 January 2004].

Williams, A.H. (1993), “Equity in Health Care: The Role of Ideology”, in E. Van Doorslaer, A. Wagstaff, and F. Rutten (Eds.) *Equity in the Finance and Delivery of Health Care*, Oxford University Press.

World Bank, *Outcomes#6: Concentration Curves*. Quantitative techniques for Health Equity Analysis, Technical Note #6, [http://www.worldbank.org/poverty/health/wbact/health\\_eq\\_tn06.pdf](http://www.worldbank.org/poverty/health/wbact/health_eq_tn06.pdf), [5 August 2003].

World Bank, *Outcomes#7: The Concentration Index*. Quantitative techniques for Health Equity Analysis, Technical Note #7, [http://www.worldbank.org/poverty/health/wbact/health\\_eq\\_tn07.pdf](http://www.worldbank.org/poverty/health/wbact/health_eq_tn07.pdf), [5 August 2003].

World Bank, *Outcomes#13: Measuring inequity in health service delivery*,  
Quantitative techniques for Health Equity Analysis, Technical Note #13,  
[http://www.worldbank.org/poverty/health/wbact/health\\_eq\\_tn13.pdf](http://www.worldbank.org/poverty/health/wbact/health_eq_tn13.pdf),  
[5 August 2003].



# **EQUITY AND UTILISATION OF PRIMARY, SPECIALIST AND DENTAL HEALTH SERVICES IN SPAIN**

**(Equidad y utilización de los servicios de médicos  
generales, especialistas y dentistas en España)**

**Alexandrina Petrova Stoyanova**

Department de Teoria Econòmica  
Universitat de Barcelona

**Febrero 2004**

## **RESUMEN**

**DE LA MEMORIA PARA OPTAR AL GRADO DE  
DOCTOR EN ECONOMÍA**

Directora de la tesis: Dra. Marisol Rodríguez Martínez  
Profesora Titular  
Departament de Política Econ. i Estructura Econ. Mundial  
Tutor: Dr. Joan Costa i Font  
Profesor Titular  
Departament de Teoria Econòmica

## **Capítulo 1 – El interfaz público-privado en sanidad**

El primer capítulo constituye una introducción al tema genérico de la tesis: el interfaz público-privado en la atención sanitaria. Los tres capítulos posteriores, que constituyen el núcleo de la tesis, desarrollan aspectos concretos de esta interrelación. La razón fundamental de la existencia de una interrelación entre el sector público y el sector privado está en la especial naturaleza de los servicios sanitarios. En su mayoría son bienes privados que comparten algunas de las características de los bienes públicos. Ello hace difícil la tarea de determinar el nivel “óptimo” de la intervención pública en la financiación y en la provisión de los servicios sanitarios.

La intervención pública en los mercados de bienes privados, entre ellos los bienes sociales como la sanidad, se justifica por el criterio de maximización del bienestar social, que resulta del logro de los objetivos de eficiencia y equidad. La existencia de diferentes fallos en el mercado impide lograr los objetivos de eficiencia. Las ineficiencias de mercado en los mercados de servicios sanitarios son múltiples, por enumerar algunas de naturaleza diversa: i) la falta de mercados completamente competitivos, los mercados incompletos, la información imperfecta y asimétrica entre los pacientes, los médicos y las autoridades sanitarias; ii) la dificultad a la hora de justificar la eficiencia de ciertos servicios sanitarios; iii) la existencia de bienes públicos y sus externalidades; y iv) el riesgo moral y la selección adversa en los mercados de seguros sanitarios, etc.

Pero no sólo hay problemas de eficiencia. El principio fundamental que rige los mercados a la hora de distribuir los servicios sanitarios entre la población es el de la disposición a pagar de los individuos, la cual, está determinada en gran parte por su capacidad de pago. Sabiendo que en la sociedad la renta está distribuida de forma desigual, el acceso a la atención sanitaria también sería desigual. Lograr equidad en el acceso a la atención sanitaria que no dependa del poder adquisitivo está sólo al alcance del estado.

Además de discutir en detalle las razones para la intervención pública en la sanidad, el capítulo 1 hace una descripción de la estructura y la organización del sistema sanitario español. Las características principales del sistema sanitario español son: i) la financiación pública, basada principalmente en los impuestos generales; ii) la cobertura casi universal; y iii) el acceso gratuito a un paquete bastante completo de prestaciones sanitarias. Entre las prestaciones sanitarias excluidas del sistema público destaca la atención dental, que representa una parte importante (un 20%) del gasto sanitario privado.

El seguro público obligatorio cubre también a los funcionarios y a los miembros de las fuerzas armadas. Sin embargo, estos dos grupos tienen un régimen especial de seguridad social, ya que pueden elegir su proveedor de servicios sanitarios entre el sector público (el Sistema Nacional de Salud) y el sector privado (las compañías de seguros que entran en el esquema).

La provisión de servicios en el sector sanitario público está claramente marcada y canalizada y las posibilidades de elección son muy reducidas. Cada ciudadano tiene asignado un médico de cabecera, que a su vez, está ligado a un grupo de especialistas para las derivaciones, y a un hospital para las hospitalizaciones. Así, los médicos de cabecera sirven principalmente como filtro para el acceso a otros servicios. A su vez, el acceso a los hospitales se puede obtener a través de los especialistas.

A pesar de que en España el sistema sanitario público funciona relativamente bien, hay un 11% de la población que contrata un seguro sanitario privado. La cobertura privada en su mayoría está orientada a proveer una modalidad asistencial suplementaria a la ofrecida por el seguro público que incorpora características deseables desde el punto de vista de los individuos: acceso directo a los especialistas, menores listas de espera para las intervenciones quirúrgicas, mayor flexibilidad y comodidades, etc. La mayoría de estos individuos que compran seguro privado poseen, así, una doble cobertura sanitaria. Para los individuos que no están cubiertos por el seguro público (un 0,5% de la población en 1997), el seguro sanitario privado

es substitutivo del público. Por último, hay un porcentaje pequeño de individuos que contratan pólizas complementarias para asegurarse contra riesgos relacionados con las prestaciones sanitarias que no están incluidas en el paquete público (como la atención dental).

El capítulo 1 también analiza la evolución y la composición del gasto sanitario. La importancia del gasto privado ha aumentando ligeramente en las últimas décadas, lo que podría tener unas consecuencias adversas para la equidad en el acceso y la utilización de los servicios sanitarios. El aumento del gasto privado en los servicios excluidos de la cobertura pública puede derivar en que los individuos de renta baja reduzcan más (o incluso dejen de utilizar por completo) la utilización de este tipo de servicios que los individuos de renta alta, lo que viola el principio de equidad horizontal. La preocupación respecto a los gastos en primas de seguro privado u otros servicios substitutivos de los que ofrece el Sistema Nacional de Salud tiene que ver con que estos gastos pueden asegurar el acceso a servicios sanitarios de distinta "calidad".

Los temas que se abordan en los capítulos siguientes de esta tesis (2, 3 y 4) tratan de profundizar en lo que, de una manera general, ya se sabe sobre equidad en sanidad. El objetivo es estudiar en más profundidad la forma en la que la financiación privada en la sanidad afecta a la equidad en el contexto de un Sistema Nacional de Salud como el español. Más concretamente, se analizan los siguientes tres problemas:

- **Las inequidades potenciales en el patrón de utilización de los servicios sanitarios debidas a factores socio-económicos y no a diferencias en el estado de salud.**

Esta cuestión se analiza en el capítulo 2 mediante el estudio de los determinantes en la elección de médico general versus especialista y en la elección de médico público versus médico privado condicionada por la posesión de un seguro privado o no. La importancia de este estudio se basa no sólo en cuestiones relacionadas con la

equidad, sino también en la adecuación del engarce de este subsistema privado con sistema sanitario español, predominantemente público.

- **Los determinantes de la demanda de seguro sanitario privado.**

Dada la importancia del tipo de seguro en el patrón de utilización de los servicios sanitarios, en el capítulo 3 se estudian los determinantes de la compra de seguro sanitario privado. La decisión de compra se modeliza mediante una función que depende de muchos factores entre los cuales destacan el precio de la prima, las características individuales y regionales y las características del sector público y privado. A este respecto, determinar los factores que influyen en la decisión de compra del seguro privado cuando la mayor parte de la población está cubierta por un seguro público obligatorio es fundamental a la hora de diseñar las políticas sanitarias.

- **Las inequidades en la salud dental y en la utilización de los servicios dentales.**

Mientras que en el capítulo 2 se estudian las desigualdades en el patrón de utilización de servicios sanitarios incluidos en el paquete de prestaciones públicas, en el capítulo 4 se analiza la inequidad en la utilización de uno de los servicios que no están cubiertos por el seguro público, pero que constituye uno de los principales componentes del gasto sanitario privado: los servicios dentales. La investigación formal de la existencia de inequidades en la salud dental y en la utilización de los servicios dentales busca respuesta a una pregunta de política sanitaria básica ¿se debería incluir la atención dental en el paquete de prestaciones sanitarias públicas?

## **Capítulo 2 – El papel del seguro sanitario privado en la elección del tipo del médico para las visitas médicas**

El equipo internacional coordinado por Van Doorslaer, Wagstaff *et al.* (2000) ha demostrado que en muchos países europeos los ricos tienen un patrón de utilización de visitas médicas bastante diferente del patrón que tienen los más pobres. Aunque existen diferencias entre los sistemas sanitarios (generalmente públicos) de los países estudiados, en general se observa que las visitas al médico general muestran una cierta inequidad a favor de los más pobres, mientras que las visitas al especialista están sesgadas hacia los más ricos, incluso después de estandarizar por la necesidad de utilización. La cuestión específica del grado de equidad en la provisión de visitas médicas ha sido abordado de nuevo en un trabajo muy reciente realizado por Van Doorslaer, Koolman y Puffer (2002). Utilizando datos de la Comunidad Europea (PHOGUE, o ECHP por sus siglas en inglés), estos autores han investigado el efecto de los factores no directamente relacionados con la necesidad, como son el seguro sanitario privado o las diferencias regionales sobre la equidad en la utilización en los servicios médicos. Los resultados confirman los indicios anteriores según los cuales, en todos los países, incluyendo España, los ricos hacen más visitas a los médicos especialistas de lo esperado dada su necesidad, mientras que la utilización de visitas al médico general muestra la existencia de inequidad, la cual favorece a los más pobres o, en todo caso, la distribución es casi paralela a la de la necesidad. Polhmeier y Ulrich (1995) observaron que la renta y el seguro privado tienen un efecto positivo sobre la utilización de los servicios de especialistas en Alemania, mientras que el efecto es negativo en el caso de los médicos de cabecera. Sin embargo, Jiménez, Labeaga y Martínez (2002) no observan ninguna relación significativa entre la renta y las visitas al médico general en doce países europeos, solamente un efecto cóncavo sobre la decisión de consultar un especialista.

El objetivo del capítulo 2 de esta tesis es profundizar en los resultados obtenidos por Van Doorslaer, Koolman y Puffer (2002) y explicar el papel que desempeña el

seguro sanitario privado sobre el uso diferencial de los servicios de médicos generales y especialistas en España. El análisis del impacto de la cobertura sanitaria privada en el patrón de utilización de los servicios médicos es de sumo interés para los economistas de la salud y los políticos no sólo por cuestiones de equidad, sino también por su importancia en los sistemas sanitarios públicos, cuyo dominio caracteriza el sector sanitario en la mayoría de los países europeos. La base de datos utilizada en este estudio permite definir de forma precisa el tipo de cobertura que poseen los individuos y contiene información detallada sobre las características de la última visita al médico. De esta manera podemos estudiar qué factores influyen sobre la decisión de elección de médico: si se elige un médico general o especialista y si la visita se produce en el sector público o privado.

Existen varios estudios españoles que analizan el tema de la demanda de las visitas médicas. Rodríguez, Calonge y Reñé (1993) demuestran que la distribución del gasto sanitario por grupos de renta tiene forma de U. Esta forma en la curva de demanda sanitaria se debe al cambio de sentido que ésta muestra en el cuarto quintil. De hecho, las visitas al especialista en 1987 representaron el 40% de las visitas del quintil de renta más alto, mientras que la proporción fue la mitad en el quintil de renta más bajo. Urbanos-Garrido (2000a, 2000b) estimó el grado de inequidad en la utilización de los servicios sanitarios públicos entre individuos con igual necesidad en los años 1987, 1993, 1995 y 1997. Sus resultados revelan la existencia de inequidad en la utilización de atención primaria, la cual favorece a los pobres. Por el contrario, las visitas a los especialistas para el 1987 muestran un cierto grado de inequidad que favorece a los ricos, pero este patrón que se invirtió en 1997. Vera-Hernández (1999) analizó el impacto de la doble cobertura en la demanda de atención especializada pública en Cataluña. Este autor concluye que la posesión de un seguro sanitario privado, además de la cobertura pública, aumenta el número medio de visitas al especialista en un 27%. En este sentido, la renta también ejerce un efecto positivo. Álvarez (2001) observó una relación positiva entre la cobertura privada y el número total de visitas médicas en 1993. Puig-Junoy, Sáez y Martínez-García (1998) estudiaron la elección individual entre visitar al médico general



(público y privado), al especialista (privado), o a los servicios de emergencia en función del tipo de cobertura: seguro público, seguro privado y pago directo. Los costes indirectos (tiempo de llegar a la consulta del médico y tiempo de espera) tienen un efecto negativo sobre la elección del proveedor de servicios sanitarios cuando los costes monetarios son nulos. Los autores concluyen que los servicios de urgencias son un buen sustituto de los servicios de médicos generales y especialistas. La presencia de equidad horizontal y vertical en la utilización y el acceso a los médicos generales públicos en 1993 fue analizada por Abásolo, Manning y Jones (2001). Estos autores concluyen que la atención primaria en el sector público cumple el principio de equidad vertical, pero que existe inequidad horizontal que favorece a las clases sociales más bajas.

El estudio presentado en el capítulo 2 se diferencia de los trabajos anteriores en cuanto que no estudiamos la cantidad demandada de servicios sanitarios, sino la elección del tipo de médico a visitar utilizando información sobre las características de la última visita. En este sentido, nuestro análisis es similar al de Puig-Junoy, Sáez y Martínez-García (1998), pero con la diferencia que no se restringe a tan sólo las visitas iniciadas por el paciente y además establece una jerarquización distinta de las elecciones. Respecto a otros estudios, estudiamos tanto las visitas al médico general y especialista, como las visitas al médico público y privado. La contribución más importante en este capítulo es la definición del tipo de acceso al sector sanitario. Dada la estructura y la organización del sector sanitario en España, se pueden definir tres grupos de acceso. El primer grupo incluye todos los ciudadanos que tienen acceso a los servicios sanitarios exclusivamente a través del Sistema Nacional de Salud. Los individuos que pertenecen al segundo grupo están cubiertos solo por seguro privado, y los incluidos en el tercer grupo disponen de doble cobertura sanitaria. La mayoría de nuestra muestra pertenece al primer grupo, 86,7% incluyendo los funcionarios que han optado por el sistema público como su proveedor de atención sanitaria. El segundo grupo representa el 3,56% de la población y está compuesto por un pequeño porcentaje de individuos sin cobertura pública y los funcionarios que han elegido una compañía de seguros privada como

proveedor de servicios sanitarios. El 9,97% de los españoles que están en el tercer grupo han contratado un seguro sanitario privado que complementa la cobertura pública. Por último, no medimos directamente la equidad, sino que desde un punto de vista epidemiológico relacionamos las implicaciones de los resultados obtenidos con los temas de equidad.

El marco teórico en el que se fundamenta nuestro análisis es un modelo de elección discreta donde los individuos toman la decisión de visitar el tipo de médico que les proporciona mayor utilidad en función del estado de salud, la renta, el tipo de acceso al sector sanitario y otras variables observables y no observables. En la estimación econométrica se ha utilizado un modelo probit de dos partes corregido por la heteroscedasticidad. El supuesto que hay detrás de esta especificación es que la decisión es secuencial, de modo que el individuo primero, elige entre visitar un médico general o especialista y luego, decide entre acudir a un médico público o privado condicionado por las alternativas anteriores. No obstante, la secuencia de la decisión podría ser también invertida tomando en primer lugar la decisión sobre el sector (público o privado) y luego sobre el tipo de médico (general o especialista). Consideramos que a pesar de ser una alternativa interesante, esta última respondería a diferentes preguntas y pondría más énfasis sobre las elecciones dentro del mismo sector. Por último, también se podría argumentar que la decisión no es secuencial, sino simultánea. En este caso existirían cuatro alternativas (médico general público, especialista público, médico general privado, especialista privado) y la especificación econométrica apropiada sería un modelo de elección múltiple (por ejemplo, un probit/logit multinomial). Sin embargo, esta última metodología es la menos atractiva de todas, ya que la opción “médico general privado” tiene muy pocas observaciones para proporcionar resultados fiables, y además los modelos de elección múltiple no permiten la especificación de distintas variables explicativas en cada ecuación.

En la literatura de la demanda de servicios sanitarios el seguro normalmente se trata como una variable endógena, por tanto cabe preguntarse si el tratamiento exógeno

que damos al seguro sanitario en las ecuaciones de la demanda de servicios sanitarios supone un problema econométrico importante. Dado que estamos evaluando el impacto del acceso al sector sanitario definido por el tipo de cobertura en la elección de médico en un momento concreto, consideramos que en nuestro caso podemos tratar esta variable como exógena. Un argumento adicional a favor de la exogeneidad del seguro es la gran persistencia de las características personales y geográficas de los individuos que compran seguro sanitario privado en España. El estadístico de contraste de exogeneidad de Smith y Blundell (1986) no rechaza la hipótesis de exogeneidad de todas las variables explicativas.

La elección de médico especialista versus médico general parece estar significativamente influenciada por las once variables explicativas. Comparados con los de buena salud, los individuos con niveles de salud percibida como mala o regular tienden a visitar más a los especialistas que a los médicos generales. En concreto, haber tenido que limitar sus actividades habituales por más de 10 días en el último año afecta positivamente la probabilidad de visitar un especialista. Sin embargo, la variable que indica haber sufrido un episodio de enfermedad puntual no muestra un efecto significativo. Los individuos de más de 65 años y las mujeres visitan más frecuentemente a los médicos de cabecera. Sin embargo, las mujeres en edad fértil hacen un uso más intensivo de los servicios de los especialistas (probablemente, obstétricos y ginecólogos).

Como era de esperar, el impacto de las variables que definen el tipo de seguro es muy importante. Los individuos que poseen sólo seguro privado o doble seguro tienen probabilidades más altas de visitar a un especialista que los que están cubiertos únicamente por el seguro público.

Entre los factores socio-económicos, solamente el tamaño de municipio de residencia tiene un efecto significativo y negativo sobre la probabilidad de visitar a un especialista. Los residentes de municipio pequeños acuden con más frecuencia a los médicos de cabecera, posiblemente debido a que los médicos privados se concentran

sobre todo en las áreas urbanas grandes. La renta no parece influir la elección del médico de manera significativa, pero es posible que su efecto ya este recogido en el efecto de las variables del seguro. Los individuos que residen en regiones con alto porcentaje de población cubierta por el modelo reformado de atención primaria, eligen visitar un médico especialista mucho menos. Esto indica que la reforma ha sido exitosa.

La elección de un médico general privado frente a la de un médico general público se determina sobre todo por la posesión de un seguro sanitario privado. Tener más de 65 años aumenta la probabilidad de acudir a la consulta de un médico general privado, mientras que residir en una Comunidad Autónoma donde la mayoría de la población está cubierta por el modelo reformado de atención primaria disminuye dicha probabilidad. La probabilidad de visitar un especialista privado frente a uno público está positivamente relacionada con la tenencia de seguro y con el nivel educativo. Las mujeres acuden más a los especialistas privados que a los públicos.

Los resultados obtenidos en este capítulo revelan una diferencia importante en el patrón de utilización de los servicios médicos entre los tres grupos de aseguramiento. Los ciudadanos cubiertos sólo por el seguro obligatorio público visitan en el 94% de los casos a los médicos del sector público y consultan principalmente a los médicos de cabecera. Los individuos con sólo seguro privado recurren al sector privado en el 86% de los casos, y más de la mitad de las veces acuden a un especialista. Por último, los que disponen de doble cobertura sanitaria visitan en el 50% de los casos a los médicos del sector privado, y en el 50% de los casos a los del sector público. Sin embargo, cuando acuden al sector público visitan a médicos generales, mientras que cuando necesitan visitar un especialista, acuden al sector privado.

Nuestro estudio confirma el impacto significativo del seguro sanitario privado en el patrón de utilización de los servicios médicos en España. Este impacto resulta ser más importante para la elección de especialistas privados frente a los del sector público. Aquellos individuos que poseen doble cobertura eligen a los especialistas

privados cinco veces más que a los públicos, y los individuos con sólo seguro privado quince veces más. Este resultado, junto con el hecho de que el 21% de los individuos que sólo disponen de seguro público dicen haber acudido a un especialista privado (probablemente pagando la visita), apunta a una deficiencia importante del Sistema Sanitario Público español, es decir, no sólo existe un acceso difícil a los especialistas públicos, sino que éste no está bien organizado.

La baja utilización de los servicios de los médicos generales por parte de los individuos que disponen del seguro que les proporciona acceso directo al sector sanitario privado indica la falta de este tipo de médicos en el sector privado y que las compañías aseguradoras no les otorgan un papel de filtro (“gatekeeping”).

Las variables de salud tienen un efecto interesante. Se observa que el estado de salud es importante para la elección o para la derivación a los especialistas en el sector público, mientras que la utilización de especialistas del sector privado está mucho menos relacionada con el estado de salud. Los individuos cuya salud percibida no es buena acuden a los especialistas del sector público, independientemente del tipo de cobertura sanitaria.

Las mujeres, en general, tienen probabilidades más bajas de consultar un especialista que los hombres. Existe una hipótesis según la cual detrás de las diferencias por género hay un cierto grado de discriminación en el acceso de las mujeres a los especialistas del sector público. Entre los individuos con sólo cobertura pública, el doble de mujeres que hombres acuden a la consulta de los especialistas privados (efectuando pagos directos).

La relación negativa entre la edad y la probabilidad de visitar médicos especialistas se observa para los tres grupos de seguro. El hecho de que los individuos de más de 65 años y doble cobertura (y sin problema de derivación) tienen un ratio médico general/médico especialista dos veces mayor que los jóvenes del mismo grupo de

seguro, se puede deber a que los médicos de cabecera son más eficientes en los casos de co-morbilidad, algo habitual, por otro lado, en los mayores de edad.

Debemos remarcar que no podemos elaborar conclusiones acerca de la “equidad” ya que los datos no nos permiten medirla. Mossialos y Thomson (2002) ven el acceso no equitativo al seguro sanitario privado debido a la exclusión basada en factores como la edad, el estado de salud, disponer de una renta baja y la selección al riesgo, como un problema importante. Sin embargo, si el sector sanitario público garantizase un acceso equitativo a la atención sanitaria de alta calidad para todos los que tienen una necesidad similar, independientemente del nivel de la renta u otras variables no relacionadas a la necesidad, quizá no sería necesario preocuparse por el acceso no equitativo al seguro sanitario privado. El problema aparece cuando consideramos que el sistema público no funciona del todo bien y el seguro privado se compra para compensar estas deficiencias en el funcionamiento del sistema público, o en el caso en que creemos que el seguro sanitario privado facilita el acceso a servicios sanitarios mejores.

El hecho de que los ricos visiten más a los especialistas preocuparía, desde la perspectiva de la equidad si: la atención especializada fuera de mayor calidad – mayor impacto positivo sobre la salud – que la atención primaria, y si hacer más visitas a los especialistas fuese necesariamente mejor que hacer menos visitas.

Con respecto de estas dos cuestiones, existe una amplia literatura médica que compara la atención especializada con la primaria. Los argumentos principales de los autores que consideran que los servicios prestados por los médicos generales son inferiores a los de los especialistas son los siguientes: i) la atención primaria forma parte del paquete básico; ii) los médicos generales actúan como filtro, lo que conlleva restricciones de los servicios y; iii) que los médicos generales tienen menos formación específica y disponen de menos tecnología moderna. Por otro lado, los defensores de la atención primaria destacan las múltiples funciones y ventajas de los médicos generales, ya que proporcionan servicios que garantizan continuidad y



longitudinalidad del tratamiento, ofrecen mejor coordinación, cuestan menos y en general, contribuyen a mejorar la salud.

Esta controversia no facilita dar una respuesta inequívoca a la pregunta crucial que surge de nuestro trabajo, a saber, si el tipo de aseguramiento determina unos patrones de utilización de los servicios sanitarios tan distintos, ¿quién lo está haciendo correctamente desde el punto de vista médico?. Puede ser que los individuos que disponen sólo de cobertura pública estén mejor protegidos contra los tratamientos especializados innecesarios y potencialmente dañinos que los individuos con seguro privado, que utiliza la atención especializada en exceso. Pero también es posible que estén más expuestos a altos riesgos por el retraso en los tratamientos. La respuesta podría ser que los individuos que disponen de doble cobertura son, en principio, los que toman las decisiones más correctas; dado que poseen una capacidad de elección más amplia.

### **Capítulo 3 – La demanda de seguro sanitario suplementario en un sistema sanitario público**

Todos los resultados citados en el capítulo anterior nos muestran la necesidad de profundizar en el estudio de la demanda de seguro sanitario privado, tarea que abordamos en el capítulo tres. En los sistemas sanitarios con cobertura pública universal y obligatoria, el seguro privado no protege contra posibles pérdidas de riqueza en caso de enfermedad, sino que juega un papel diferente. En la terminología de Mossialos y Thomson (2002) el seguro privado puede ser complementario al seguro público (asegura contra riesgos no cubiertos por el seguro público, o puede ser suplementario con el seguro público (lo que significa que ofrece cobertura contra los mismos riesgos que el seguro público). Se supone que el seguro suplementario garantiza acceso a servicios con características diferentes a las de los servicios públicos como la libre elección de médico, el acceso directo a especialistas, un



tratamiento rápido, sin necesidad de estar en largas listas de espera, habitaciones privadas en hospitales, mejores instalaciones, etc.

En España el porcentaje de la población que posee un seguro sanitario privado es de un 11%. Además, la tasa de cobertura privada se ha mantenido relativamente estable en las últimas dos décadas. La mayoría de las pólizas de seguro privado son de naturaleza suplementaria, lo que significa que muchos de los individuos que compran un seguro privado disponen en realidad de doble cobertura sanitaria. La principal excepción son el 0,5% de la población que no está cubierta por el sistema público y para la cual el seguro privado actúa como substitutivo al seguro público. Las pólizas dentales que contratan algunos individuos son de índole complementaria.

Entre los estudios previos sobre la demanda de seguro sanitario privado debemos destacar el de González (1995). La autora estima la probabilidad de compra de seguro (un modelo probit) utilizando datos de la Encuesta de Presupuestos Familiares de 1990-91. Sus resultados revelan que los principales determinantes de la decisión de compra de seguro son la edad, el nivel de la renta, la educación, la ocupación (profesional o autónomo), el tamaño de municipio y las CC.AA. de residencia.

Vera-Hernández (1999) analiza el impacto de la doble cobertura sanitaria en el número de visitas al médico especialista y en el proceso de selección, en el mercado de los seguros sanitarios privados en Cataluña. El autor comenta brevemente los resultados de un modelo de elección discreta de la compra de seguro privado. Su conclusión principal es que la compra de seguro depende de las características socio-económicas y no de las relacionadas con la salud.

En dos estudios recientes se incorporan como variables explicativas medidas de las diferencias de los atributos del sector público y del sector privado. El primero, el de Jofre-Bonet (2000), analiza el impacto de las listas de espera para intervenciones quirúrgicas en hospitales públicos en la demanda de seguro sanitario privado. Y como es de esperar, la existencia de largas listas de espera en el sector público

incentiva la contratación de seguro privado. Las demás variables explicativas incluidas en la estimación (regresión logística) son las características individuales de la Encuesta Nacional de Salud 1993, que tienen el signo esperado. El segundo trabajo, el de Costa y García (2003), estudia cómo afecta la demanda de seguro sanitario privado la disparidad en la “calidad” de los servicios sanitarios entre el sector público y el privado. La “calidad” se define como calidad percibida y se mide como la respuesta (en escala de 1 a 10) a una pregunta sobre la evaluación general del sistema público y el sector privado realizada sobre unos 400 ciudadanos con residencia en Cataluña. La principal conclusión del estudio es que cuanto mayor es la disparidad en la “calidad” entre los dos sectores, tanto mayor es la demanda de seguro sanitario privado.

Existen numerosos estudios internacionales que analizan la demanda de seguro privado. Cameron et al. (1988) fueron los primeros en analizar conjuntamente la demanda de servicios sanitarios y seguro sanitario utilizando datos de Australia. Los autores afirman que la renta es más importante para la compra de seguro privado que las variables de salud, mientras que el contrario es cierto para la utilización de servicios sanitarios.

Institucionalmente, los casos más similares al caso español son los del Reino Unido y los países nórdicos. Propper (1989 y 1993), Propper, Rees y Green (2001) y Besley, Hall y Preston (1998 y 1999) analizan la demanda de seguro sanitario privado en el Reino Unido. Harmon y Nolan (2001) estudian el aumento de la cobertura sanitaria privada en Irlanda. Johannesson *et al.* (1998) miden el efecto de las listas de espera sobre la demanda de seguro sanitario privado. Todos los estudios mencionados coinciden en que la renta es el principal determinante de la decisión de contratar un seguro privado. La demanda de seguro sanitario privado aumenta con la educación en todos los países excepto en Suecia. Las características personales (edad, ocupación, estatus laboral, etc.) no tienen un efecto claro sobre la demanda de seguro. Las conclusiones sobre el impacto de la calidad del sector público no son

inequívocas. Las aptitudes políticas y las variables de salud resultan significativas para la compra de seguro sanitario privado en algunos estudios en el Reino Unido.

El objetivo de nuestro trabajo es profundizar más en el análisis de la demanda de seguro sanitario privado en España contribuyendo a la literatura existente mediante: 1) el uso de datos de panel, que permiten estudiar unos rasgos dinámicos de la tenencia de seguro; 2) la consideración de los cambios en la oferta del sector público y privado; 3) el análisis de la elasticidad precio de la demanda, aprovechando el cambio exógeno en el tratamiento fiscal de los gastos sanitarios privado que tuvo lugar con ocasión de la reforma del IRPF en 1999 y 4) el énfasis en el efecto de las regiones incluyendo variables regionales específicas para las CC.AA. en lugar de utilizar simplemente dummies regionales.

Para explicar la demanda de seguro utilizamos como proxies de salud la edad, la edad al cuadrado y el sexo (ya que la Encuesta Continua de Presupuestos Familiares 1999-2000 no incluye indicadores de salud). Además incluimos como explicativas, variables que indican el nivel de estudios (también relacionado con el estado de salud), el tamaño de municipio de residencia (para captar la oferta de servicios sanitarios), el número de horas trabajadas (como medida del coste de oportunidad del tiempo), la renta (dada su obvia influencia) y el número de visitas al especialista en el periodo anterior.

La reforma del IRPF del 1999 es un buen instrumento para el análisis del impacto de variaciones exógenas en el precio de la prima en la demanda de seguro sanitario. Es importante aclarar dos cuestiones relacionadas con la reforma. Primero, ¿cuándo visualizan los ciudadanos la reforma? y en consecuencia ¿cuándo cambian su comportamiento?:

- ¿Inmediatamente después de la aprobación de la ley, o sea en el principio del 1999?

- ¿En junio del 2000 cuando hacen la declaración de la renta sobre los ingresos del 1999?
- ¿En algún momento intermedio?

Consideramos que los ciudadanos se dan cuenta en algún momento en el 1999 (el primer año de la reforma), pero que muchos toman la decisión de seguir asegurados o no en el principio del año siguiente, por tanto fijamos como punto de referencia el primer trimestre del 2000.

La segunda cuestión relacionada con la reforma es que los incentivos fiscales no fueron completamente suprimidos, sino que fueron trasladados a las pasaron a las empresas. La misma ley que substrajo las deducciones individuales, introdujo incentivos fiscales para los seguros sanitarios contratados por las empresas.

El impacto de las deducciones se puede considerar un “efecto de precio” (aumento de la prima neta del seguro) o un “efecto renta” (la renta anual disponible se reduce si el individuo renueva su seguro después de la abolición de las deducciones). En los dos casos se espera que el impacto sea una reducción de la demanda de seguros sanitarios contratados individualmente. Sin embargo, el impacto total es ambiguo porque el descenso esperado en la demanda de seguros contratados individualmente puede ser compensada o dominada por el incremento en la demanda de seguro contratado por el empleador.

Finalmente, hemos incluido como variables explicativas tres variables regionales que captan características específicas del sector sanitario y la “tradición” en la compra de seguro. Esperamos un efecto negativo de la variable que contiene el gasto sanitario público, ya que el gasto público elevado se relaciona con una mayor calidad de los servicios prestados. Tener hospitales privados con equipamiento de alta tecnología en la comunidad autónoma de residencia seguramente contribuye a hacer la compra de seguro más atractiva, además de ser un buen indicador de la calidad del sector

privado. Finalmente, hemos incluido una variable que recoge la “tradición” en la posesión de seguro privado.

El marco teórico de nuestro análisis es el de los individuos adversos al riesgo que maximizan su utilidad esperada. Se supone que compran seguro sanitario privado si la utilidad esperada cuando están asegurados es mayor que la utilidad esperada cuando están cubiertos sólo por el seguro público obligatorio. La especificación econométrica es la del modelo logit de efectos aleatorios que permite obtener estimación consistente de los coeficientes sin tener que especificar la relación entre las variables explicativas y la heterogeneidad individual. Utilizamos datos de la Encuesta Continua de Presupuestos Familiares 1999-2000 (los cuatro trimestres del 1999 y los primeros tres del 2000).

Los resultados de la estimación de la probabilidad de compra de seguro sanitario privado muestran que la decisión se determina por un amplio grupo de factores, entre ellos el precio, las características individuales y los atributos regionales.

El efecto de la renta confirma resultados previos obtenidos tanto para España como para otros países con seguro sanitario público universal. Los ricos tienen más probabilidad de contratar un seguro sanitario privado que los pobres. La compra de seguro esta positivamente relacionada, pero a una tasa decreciente, con la edad del individuo. Siendo la edad una proxy de la salud, este resultado puede indicar la existencia de un cierto grado de selección de riesgos. Lo mismo se puede aplicar al signo positivo de la variable sexo (dummy que toma valor 1 para las mujeres), ya que se sabe que las mujeres utilizan los servicios sanitarios más que los hombres. Una explicación alternativa del efecto de la variable sexo es el hecho que las mujeres dan un alto valor al acceso rápido a ginecólogos y obstetras de su elección y a poder disponer de habitación privada cuando dan a luz, dos aspectos que las compañías de seguro airean en su publicidad activamente.

La relación entre el tamaño del municipio de residencia y la probabilidad de compra de seguro no es lineal. La probabilidad de contratar una póliza de seguro privado es más alta para los individuos que viven en pequeños municipios y en capitales de provincias que para los que residen en municipios de tamaño medio. Esto se explica por el hecho que la mayoría de los hospitales y clínicas privados están concentrados en las grandes ciudades. Los individuos que residen en los municipios pequeños pueden tener cierta sensación de no recibir suficiente atención del sector público y en vez de viajar a las ciudades grandes optan por los servicios del sector privado. En este caso, el seguro privado representa un pequeño porcentaje del precio total que deben pagar para ser atendidos (incluyendo los costes directos de transporte y los costes indirectos del tiempo).

El signo de la reforma fiscal es positivo, a pesar de que la teoría económica predice un signo negativo (el seguro privado es un bien normal y si su precio neto sube, la demanda debería bajar). La explicación se debe buscar en las características de la reforma fiscal y las de los datos utilizados en la estimación, ya que no permiten distinguir entre pólizas contratadas individualmente y las pólizas contratadas por el empleador. El signo positivo que observamos puede indicar que la reducción en las pólizas contratadas individualmente está más que compensado por el incremento en el número de pólizas contratadas por el empleador. Si es así, entonces la reforma habrá cumplido su objetivo de incentivar la contratación de este tipo de pólizas.

El uso frecuente de los servicios de especialistas en el periodo anterior aumenta la probabilidad de contratar un seguro privado en el momento actual. La “tradicición” también juega un papel importante. Individuos que viven en Comunidades Autónomas con alto porcentaje de cobertura sanitaria privada a principios de los 1990 tienen una probabilidad de seguir asegurados 10 años después un 2% más elevada que aquellos que viven en CC.AA. con menor extensión del seguro privado en el 1990.

Las características regionales, medidas de una manera novedosa en este capítulo, son importantes determinantes de la decisión de compra de seguro sanitario privado. En regiones donde el gasto sanitario público es alto, la gente prefiere ser atendida en el sector público. Por otro lado, en las CC.AA. donde hay hospitales y clínicas privadas que disponen de alta tecnología, la demanda de seguro sanitario es más alta que en el resto de CC.AA.

En resumen, la decisión de compra de seguro sanitario privado cuando el acceso a los servicios médicos ya está garantizado por el sector público, se determina por un gran número de factores que incluyen el precio de la prima, las características individuales y del sector sanitario público y privado.

Por último, los datos muestran un importante grado de persistencia en la tenencia de seguro sanitario privado. Los individuos o disponen de seguro sanitario privado durante todos los periodos observados, o no tienen seguro privado en ningún momento. Estudiar ésta tendencia precisaría de modelos dinámicos. Tomando como punto de partida los resultados obtenidos en esta tesis, nos marcamos como objetivo de investigación futura el uso de dichos modelos.

#### **Capítulo 4 – Medición de las inequidades en la salud dental y en la utilización de servicios dentales**

En el capítulo 2 nos referimos a las implicaciones de equidad de la utilización de servicios sanitarios cubiertos por el seguro público obligatorio para aquellos individuos que también poseen seguro suplementario. En el capítulo 4 investigamos como se ve afectada la equidad en la utilización cuando los servicios están excluidos del paquete de prestaciones sanitarias públicas como es el caso de la atención dental. Para este análisis, utilizamos la misma fuente de datos que en el análisis del capítulo 2, la Encuesta Nacional de Salud del 1997.



La salud dental forma parte de la salud general. Las enfermedades buco-dentales son condiciones crónicas que tienen impacto en el bienestar de los individuos ya que pueden ocasionar costes financieros (según la Organización Mundial de la Salud las enfermedades buco-dentales ocupan el cuarto lugar entre las enfermedades con mayor coste en los países industrializados) y sociales (pueden afectar a actividades habituales como comer, hablar, relacionarse con otra gente, etc.) importantes.

A pesar de la relevancia que la sanidad buco-dental conlleva, los economistas de la salud no han prestado atención a la equidad de la salud dental y de la utilización de los servicios dentales. La razón que subyace bajo este desinterés es el hecho de que la importancia que tiene la salud dental para la salud en general y para el bienestar de los individuos ha sido infravalorada no solo por las autoridades sanitarias, sino también por los propios ciudadanos. Desafortunadamente, no se puede cuantificar la proporción del gasto en salud que es consecuencia de enfermedades dentales y de las encías, ya que es difícil determinar qué episodios de enfermedad han sido causados por problemas dentales. Además, la financiación de los servicios dentales en muchos países desarrollados es casi completamente privada, lo que convierte el poder adquisitivo en el principal determinante de la utilización de este tipo de servicios. Así, los individuos con similar necesidad pero con distinto nivel de renta, no recibirán un tratamiento igual, vulnerando el principio de equidad horizontal.

Este escenario justifica la necesidad de un análisis más riguroso de la equidad en la salud dental y en la utilización de servicios dentales como un paso previo a una pregunta básica de política sanitaria: ¿se deberían incluir los servicios dentales en el paquete de prestaciones sanitarias públicas?

La metodología que utilizamos en este capítulo destinado al análisis de la equidad en la salud dental es la de los índices de concentración propuesta por Wagstaff, Paci y Van Doorslaer (1991), posteriormente modificada por Wagstaff y Van Doorslaer (1994), Kakwani, Wagstaff y Van Doorslaer (1997) y Wagstaff y Van Doorslaer (2000). Esta metodología ha sido ampliamente usada en el análisis de equidad en la

distribución de la salud y en la utilización de los servicios sanitarios. La equidad se define como la diferencia entre la distribución observada de la salud por grupos de la renta y la distribución esperada de la salud. En el caso de la utilización, se define como la diferencia entre la distribución observada y la distribución estandarizada por la necesidad de la utilización de los servicios sanitarios. La distribución estandarizada por la necesidad de uso se obtiene calculando cuál hubiera sido la cantidad de servicios de salud recibida por un individuo si hubiese recibido el mismo trato que el resto de individuos con sus mismas características de necesidad (morbilidad, salud percibida, edad, sexo, etc.).

Para la estimación del grado de inequidad de la salud dental hemos definido una medida de “buena salud dental” basada en los indicadores objetivos del estado de los dientes y encías que contiene la Encuesta Nacional de Salud. Este indicador se obtiene a través de preguntas directas realizadas a los individuos. Se considera que una persona tiene buena salud dental si no sufre enfermedades ni en los dientes ni en las encías, es decir, si no tiene caries, no le sangran las encías, no le faltan dientes y no tiene limitaciones en las actividades diarias habituales por causa de problemas con los dientes o las encías. Según esta definición, menos de una quinta parte (17,83%) de los españoles tenía buena salud dental en 1997.

En los análisis descriptivos previos al cálculo del índice de equidad, se observa que la mayoría de las enfermedades dentales se concentra en los grupos de población de renta baja. El porcentaje de individuos que conservan todos sus dientes naturales es 3 veces mayor en el quintil de renta más alto que en el quintil inferior, mientras que el porcentaje de individuos en el estrato de renta baja a los cuales les faltan dientes, es el doble que en el estrato de renta más alta.

Nuestros análisis proporcionan un signo positivo en el índice de concentración de la buena salud dental. La estandarización por edad, sexo y hábitos nocivos reduce el grado de inequidad, pero éste sigue siendo marcadamente significativo.

Para determinar la existencia de inequidad en la utilización de los servicios dentales hemos definido dos medidas de utilización para calcular la utilización esperada, a partir de las cuales aplicamos dos estrategias econométricas alternativas. La primera medida es una variable dicotómica que toma valor uno si el individuo ha acudido a la consulta del dentista durante los doce meses previos a la entrevista. La segunda medida es una variable discreta que contiene el número de veces que el individuo ha visitado el dentista durante los tres meses previos de la entrevista. El objetivo es comparar los resultados obtenidos con estas dos medidas de la utilización estandarizada por necesidad y ofrecer resultados comparables con futuros estudios en otros países (las encuestas de salud normalmente recopilan información sobre el número de visitas durante el último año). En el análisis de la utilización de algunos servicios dentales específicos (chequeos, limpieza de boca, empastes, tratamientos de encías, etc.) empleamos también variables dicotómicas.

En el primer caso, estimamos un modelo probit para la probabilidad de utilización de servicios dentales en general y la de servicios dentales específicos. En el segundo caso, estimamos un modelo de dos partes y un modelo binomial-negativo generalizado para predecir la necesidad estandarizada de atención dental para los individuos que han consultado un dentista durante los últimos tres meses. En el modelo de dos partes empleamos un modelo probit para estimar la probabilidad de visita y un modelo binomial-negativo truncado en el cero para la frecuencia de visita condicionada a que haya existido visita previa.

Los resultados de la estimación de la probabilidad de visita en el último año indican que existe un importante grado de inequidad en la utilización de los servicios de dentistas que favorece a los individuos que pertenecen a los estratos altos de renta de la población (el índice de concentración es positivo y significativo). La diferencia entre la utilización observada y la utilización estandarizada por la necesidad de uso indica que los individuos de los estratos de renta baja y media infrautilizan los servicios dentales, es decir, reciben menos de lo que necesitan. Por otro lado, los individuos de rentas altas y medias-altas sobreutilizan los servicios de dentistas, es

decir, su consumo sobrepasa su necesidad. La sobreutilización es especialmente significativa en el último quintil de renta, donde los individuos utilizan 14% más de lo que necesitan. Una estimación posterior del índice de redistribución lineal propuesto por Koolman y Van Doorslaer (2002) indica que para eliminar toda la inequidad en la utilización de los servicios dentales sería necesario transferir el 11% de todas las visitas al dentista de los más ricos a los más pobres. Estos resultados también se confirman cuando en vez de medidas anuales, usamos como medida de utilización de los servicios dentales el número de visitas al dentista en los últimos tres meses.

Por último, también hemos aplicado esta metodología del índice de concentración al análisis de la inequidad en la utilización de varios servicios dentales específicos. En este caso, los resultados son especialmente reveladores. Los servicios preventivos (chequeos y limpiezas de boca) y los servicios de obturaciones están claramente concentrados en los segmentos de la población con renta alta. Por otro lado, los individuos de clases sociales bajas son usuarios más intensivos de las extracciones dentales, que es el tratamiento más barato para dientes con caries o dañados, además de ser el único tipo de servicio dental que el sistema público cubre en casos de urgencia. Por otro lado, los resultados sobre los servicios de endodoncia o ortodoncia (fundas, puentes, prótesis dentales) y los tratamientos de enfermedades de las encías no son concluyentes. Dado que los tratamientos dentales no son tan numerosos como los tratamientos de salud en general, se puede considerar que en la categoría “otros tipos de tratamientos dentales” están incluidos sobre todo los servicios de odontología estética (blanqueamiento, revestimiento de porcelana, etc.). En este caso, no es sorprendente el que los resultados muestren una mayor concentración de este tipo de tratamientos entre los individuos con renta alta, mientras que la utilización estandarizada, o la necesidad, está concentrada entre los individuos de renta baja. Los índices de concentración también indican la existencia de inequidad horizontal a favor de los individuos de clase más alta en la utilización de servicios preventivos, en los tratamientos de limpieza de boca, las obstrucciones y la odontología estética. Por

el contrario, sólo en el caso de las extracciones, el sentido de la inequidad en la utilización se invierte a favor de los individuos de las clases sociales bajas.

La conclusión básica de este análisis de la inequidad es que a pesar de tener peor estado de salud dental (y por tanto tener más necesidad de tratamiento dental), los individuos con menos ingresos utilizan menos los servicios de dentistas que los individuos con ingresos altos.

A partir del importante grado de inequidad en la distribución de la buena salud dental observado en nuestros análisis, cabe hacerse dos preguntas. En primer lugar, ¿es la inequidad en la salud dental superior a la inequidad en la salud general? Y en segundo lugar, ¿hasta qué punto la inequidad observada en España es diferente de la inequidad en otros países con estructura y organización de la atención dental similares? Para responder a la primera pregunta hemos comparado los resultados con los resultados sobre la inequidad en la salud en España calculados por Van Doorslaer y Koolman (2002). Utilizando como medida de salud el indicador de salud percibida, los autores encuentran una distribución no equitativa de la salud a favor de los individuos de renta alta en todos los países europeos. Por tanto, los individuos que pertenecen a las clases sociales altas no solo tienen mejor salud en general, sino que también disfrutan de mejor salud dental que los individuos de las clases sociales bajas. La gran diferencia está en la magnitud de la inequidad. La inequidad en la distribución de la salud dental es mucho más importante que la de la distribución de la salud percibida. Si la sociedad está preocupada por el grado de inequidad en salud, debería estar incluso más preocupada por la inequidad en la salud dental ya que como es bien conocido, los problemas dentales pueden causar graves problemas de salud.

La respuesta a la segunda pregunta es más difícil, ya que prácticamente no existe evidencia empírica sobre la inequidad en salud dental en otros países. La mejor aproximación que puede hacerse es comparar el único indicador de salud dental medido en la mayoría de los países. Este indicador es el número de dientes

obstruidos, extraídos y empastados a los 12 años de edad. En este sentido, España posee uno de los mayores índices de inequidad, lo que significa que la salud dental de los españoles es peor que en el resto de los países desarrollados.

La existencia de inequidades en la salud dental y en la utilización de los servicios dentales no sorprende en un sistema donde los altos precios de los tratamientos, que los individuos han de pagar de su propio bolsillo, son una barrera importante de acceso. De hecho, el porcentaje de gasto dental privado se ha incrementando a una tasa estable de un 1% anual en los últimos años. En el año 2000, estos gastos suponían una quinta parte del gasto sanitario privado.

La solución para la mayoría de los problemas en la atención dental podría ser la inclusión de los servicios dentales, o al menos, de los tratamientos preventivos en el paquete de servicios sanitarios provistos por el sistema público. No obstante, sería necesario hacer un análisis de coste-beneficio para evaluar la viabilidad de una decisión política de este tipo. Sin duda, la inclusión de estos tratamientos dentales en la cartera de prestaciones sanitarias públicas no mejoran la salud dental por sí mismos, pero garantizar un acceso apropiado y regular a este tipo de servicios es la clave para identificar la necesidad y mejorar la salud dental de toda la población.

B.U.B. Secció d'Econòmiques  
Diagonal, 690, 08034 Barcelona  
T. 102 19 66