

The evolution of inequity in the access to health care in Spain: 1987-2001

by

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Abstract

This paper reports an analysis of the evolution of equity in access to health care in Spain over the period 1987-2001, a time span covering the development of the modern Spanish National Health System. Our measures of access are the probabilities of visiting a doctor, using emergency services and being hospitalised. For these three measures we obtain indices of horizontal inequity from microeconomic models of utilization that exploit the individual information in the Spanish National Health Surveys of 1987 and 2001. We find that by 2001 the system has improved in the sense that differences in income no longer lead to different access given the same level of need. However, the tenure of private health insurance leads to differences in access given the same level of need, and its contribution to inequity has increased over time, both because insurance is more concentrated among the rich and because the elasticity of utilization for the three services has increased too.

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1. Introduction

The Spanish society has undergone a major overhaul in the three decades elapsed since the death of Franco. The transformation from dictatorship to a democracy and the devolution of government to the regions have combined with the sheer effect of the passage of time to transform an obsolete public sector into one comparable to that of developed countries. The health care system is one of the areas where reforms have been far reaching, and in this paper we aim to evaluate the change over time in one of the indicators that serve to assess its performance: the existence and degree of inequities in health care utilization. In particular we will evaluate whether there have been changes in the distribution of utilization for a given level of health care need. Secondly, we shall decompose the sources of inequality in utilization and explain the observed differences between 1987 and 2001. The choice of these two time periods is motivated by the fact that the most comprehensive pack of reforms for the health care system was systematized and put forward by the 1986 General Health Act, among whose main goals there are the wish to eliminate socio-economic health inequalities in access, as expressed in its “Artículo 3” and to correct inequalities in health “Artículo 12”. We shall use data from the 1987 Encuesta Nacional de Salud (CIS, 1987) to assess the degree of income related utilization inequality in the Spanish population shortly after this important law. We choose the 2001 edition of the same survey (CIS, 2001) in order to deal with comparable information. The comparison of two cross sections of the Spanish population has a limited ability to reflect the causal effect of a multi-faceted package of reforms. Nevertheless, our contention is that the implementation of these reforms should change the joint distribution of utilization and socio-economic characteristics

after controlling for health care needs, and in this paper we set out to measure such change.

Our results show that by 2001 the system has improved in the sense that differences in income no longer lead to different access given the same level of need. However, the tenure of private health insurance leads to differences in access given the same level of need, and its contribution to inequity has increased over time, both because insurance is more concentrated among the rich and because the elasticity of utilization for the three services has increased too.

Section 2 briefly summarizes the main characteristics of the health system and the reforms that have taken place in the recent past and provides a brief review of previous relevant studies. Section 3 presents the methodology that we adopt for the measurement of inequities in health care utilization and the explanation of their changes over time. Section 4 presents the empirical results and section 5 discusses the implications of our results.

2. The transition of the Spanish health care system and previous literature on inequities in utilization

At the end of the dictatorship in 1975, the Spanish health system was based on a social security scheme paid by employers and employees and complemented by a network of health care centers owned by different organizations. One of the characterizing features of the pre-democratic system was a strong bias towards hospital care. While the 70's had

witnessed the creation of a public network of modern hospitals, primary and preventive services in the public network were underdeveloped: general practitioners were typically available for two and a half hours per day at isolated outlets which lacked administrative and diagnostic support (EOHCS, 2000). The arrival of democracy unleashed the latent demand for a better health care system and important legislative and managerial changes ensued. The Ministry of Health was created in 1977 and the 1978 Constitution consecrated public coverage for all citizens. Momentum gathered after 1983 when the government started a set of reforms to integrate the different networks. By 1986 the General Health Act transformed the social security system into a National Health System.

Thus, there are two main structural reforms with a potential impact on socio-economic inequalities in access to health care occurred during the period studied in this paper. Firstly, the system finally was consolidated as a tax-funded, universal coverage National Health System within which individuals are entitled to a comprehensive set of benefits including not only primary and specialized inpatient and outpatient care, but also subsidized medicines with zero co-payments for specific groups such as pensioners or disabled persons and reduced co-payments for drugs for chronic diseases including AIDS. Secondly, primary care has been totally reformed by means of substituting the obsolete outlets mentioned above by team based practices staffed by doctors and nurses who have received specific training in family medicine and whose activities not only included curative care, but also preventive care, health promotion, follow up of patients and services targeted to particular population groups such as the mentally ill, drug users etc. The implementation of the primary care reform all over Spain was slow: while it was

planned as far back as 1984 and turned into law in 1986, only 50% of the population was covered by the new system in 1992 and the proportion reached 81% by 2000 (EOHCS, 2000). This is in fact the most important reform taking place during the period under study. For these reasons it seems appropriate to evaluate the change between 1987 and 2001.

In this study we intend to pay special attention to the role of private health insurance (PHI) as a determinant of inequities in health care. PHI in Spain essentially provides “duplicate” or “double” coverage in the sense that it covers services that are concurrently provided by the public network. Nevertheless there are some features, such as the possibility of by-passing the GP before consulting a specialist or the access to better hospital amenities, which confer PHI a degree of supplementarity in the sense of Mossialos and Thompson (2002). The concern about the equity effects of PHI in Spain is justified by the fact that expenditure on PHI has received public subsidies in the form of tax bonuses. Prior to 1999 the subsidy operated via personal income tax: individuals received a 15% rebate on insurance premia (as well as on any other expenditure on health care). Currently, it operates via corporate tax: premia are considered tax free in kind salary and companies can subtract from profits the cost of collective policies (thus obtaining a 35% tax bonus on their cost). These subsidies might potentially induce undesired effects in terms of equity, because PHI alters the patterns of utilization, as shown by Rodríguez and Stoyanova (2004). Moreover, for the particular case of specialist visits, Jones et al. (2006) and Van Doorslaer et al. (2002) have obtained evidence that supports the notion that PHI in Spain actually generates pro-rich inequity in access.

Apart from the studies cited above, there is a growing body of literature on the evaluation of the reforms in the Spanish National Health system since the Health Act of 1986 in terms of inequities in utilization. The pioneering work of Rodriguez et al. (1993) offered evidence, with data from 1987, on the degree of inequity in public health care consumption as measured by the expenditure devoted to doctor visits and hospitalizations in the public network. A similar method was followed by Abásolo (1998) with data for 1993. More recently, Urbanos (1999, 2001a,b) has considered the dynamics of inequity and analyzed data for 1987, 1993, 1995 and 1997 within a unified methodological framework. Urbanos actually considers consumption data (number of visits and inpatient days) as well as an expenditure aggregate and her results suggest a decrease in inequity during the period 1993-1995. Moreover, for 1997 she finds that the inequity indices for visits to GPs and specialist and inpatient days are not statistically significant. In contrast, she finds that there is a significant degree of pro-rich inequity in emergency visits and that individuals without private health insurance are likely to over-utilise public health care outlets, especially GP visits. Abásolo et al. (2001) test the existence of equity in utilization of and access to public-sector GPs in Spain in 1993 by analysing whether different socio-economic characteristics influence on the probability that the individual visited a public-sector GP during a two-week period. They find that individuals with private health insurance were less likely to visit a GP. Van Doorslaer et al. (2002), find a significant degree of pro-rich inequity in specialist visits and pro-poor inequality in GP visits using data from the 1996 Spanish wave of the ECHP. Van Doorslaer et al. (2004,2006) again find that there is a significant degree of pro-poor inequity in both the probability of visiting and the conditional number of visits to a GP

whereas there is pro-rich inequity in both the probability of contacting a specialist and the conditional number of visits. Van Doorslaer, Koolman and Masseria (2004) obtain point estimates that would suggest evidence of pro-rich inequity in hospital admissions using data from the ECPH, but the null of no statistical significance cannot be rejected from these estimates.

This paper contributes in a series of fronts to the existing literature. First, unlike Rodríguez et al. (1993) and Urbanos (1999, 2001a,b) and Abásolo et al. (2001), we do not restrict the analysis to publicly provided health care. As discussed above, the reason is that privately provided health care and PHI have received public subsidies during the period considered. Secondly, most of the existing studies do not address the equity effects of PHI, and this paper offers some methodological advantages with respect to those that do so, such as Van Doorslaer et al. (2002), which will be discussed later on. A third contribution consists in using two comparable health surveys with rich information on health status spanning 14 years since the General Health Act. Despite the obvious limitations of all before-after evaluations, this is a plausible empirical strategy to approximate the effects of the evolution of the system on equity.

3. Methods

3.1 Measuring and decomposing inequalities in health care utilization

The operational concept of inequity used in the recent literature is socio-economic inequality in utilization not justified by socio-economic inequalities in need. Therefore it is necessary to compute measures of socio-economic inequality in utilization, decompose

these measures and subsequently decide which components might be justified by unequal needs. The literature on health inequalities has recently adopted a standard tool for the measurement of socio-economic inequalities in health or health care utilization: the concentration index (CI) (Wagstaff et al., 1989). The concentration index has a similar interpretation to the more familiar Gini index for pure inequality. In fact, the two inequality measures differ in the fact that the ranking variable is a measure of socio-economic status (usually income) (CI) rather than health/utilization (Gini). The CI ranges between -1 and 1 . A value of -1 would mean that all health/health care utilization is concentrated in the poorest person, whereas a value of 1 would result if all health/utilization were concentrated in the richest person. A value of zero would mean that health/utilization is equally distributed over income in the sense that the p th percentage of the population ranked by income has exactly the p th percentage of total health/utilization for any p .

Suppose we are interested in calculating the CI for a measure of health care utilization on income using individual data from the population of interest. Let y_i denote a measure of utilization for the i^{th} individual, $i=1,2,\dots,N$, and R'_i denote the cumulative proportion of the population ranked by income up to the i^{th} individual (their 'relative income rank').

The CI of utilization on income is given by (see e.g. Van Doorslaer and Jones, 2003),

$$CI = \left(\frac{2}{\bar{y}} \right) \text{cov}(y_i, R'_i) \quad (1)$$

where $\bar{y} = E(y_i)$.

We consider three types of health care utilization: visits to doctors, use of emergency services and hospitalisations. For each of these services, our measure of access consists in the probability of utilization at least once within a given time period. In the case of visits to doctors the time period is fifteen days whereas for the other two services, the time period is one year. For 2001, we are able to consider separately the probabilities of having visited a GP or a specialist, since the survey provides information on the speciality of the doctor in the last visit. While the health surveys offer information on the number of events for each of the three services, we abstain from considering measures of equity in the number of events. This is motivated by the fact that the distributions for the numbers of events are concentrated on 0 and 1. For instance, less than 5% (6% for 2001) of individuals report more than one visit to the doctor and less than 2% (1% for 2001) report more than two. The case of hospitalizations is even more extreme in this sense, as only for 2001 we do find individuals reporting more than one event, and these individuals make up for less than 2% of the sample. Furthermore, the studies that have considered both the probability of contact and the conditional number of events have found that, where there are inequities, these operate in the same direction for both dimensions of utilization (Van Doorslaer et al., 2004).

For each of the three types of health care, we specify a Linear Probability Model (LPM) in the following way

$$y_{ji} = \mathbf{a}^j + \sum_k \mathbf{b}_k^j x_{ki} + \mathbf{e}_i^j \quad (2)$$

where $y_i = \mathbf{1}$ (individual i reports at least one episode of health care j). It follows that

$$P(y_{ji} = 1) = \mathbf{a}^j + \sum_k \mathbf{b}_k^j x_{ki} \quad (3)$$

Our choice for the LPM is justified on the grounds that the linearity in parameters is particularly useful for our purposes of decomposing inequalities in the probability of utilization (this property has been exploited by Van Doorslaer et al. (2004) in their study of inequity in the utilization of inpatient services). Moreover, the well known limitation of the LPM model producing predicted probabilities outside the [0,1] interval is irrelevant in our case, since we are only interested in the parameters of the model, which are consistently estimated by OLS. In particular, as shown by Wagstaff et al. (2003), if the probability of utilization is described by equation (3), then an inequality index for the probability of utilization is given by

$$CI^j = \sum_k \left(\mathbf{b}_k^j \frac{\bar{x}_{ki}}{\bar{P}^j} \right) CI_K' = \sum_k \mathbf{h}_k^j CI_K' \quad (4)$$

The term in brackets is the elasticity of P with respect to x_k evaluated at the population means and CI'_k denotes the concentration index of x_k against income. Thus this

inequality measure can be usefully broken down into the contributions of individual explanatory variables. Moreover, if we define the estimated health elasticity with respect to determinant k as

$$h_k^j \equiv \frac{b_k^j \bar{x}_k}{P^j} \quad (5)$$

then we can rewrite the decomposition in a way such that the CI is just a weighted sum of the inequality in each of its determinants, with the weights equal to the elasticities, as expressed in the last part of equation (4). As mentioned by Van Doorslaer and Koolman (2004), the decomposition also clarifies how each correlate of health contributes to total income-related utilization inequality: this contribution is the result of (i) its impact on health, and (ii) how unequally distributed over income it is.

Measures of horizontal inequity are easily obtained from the decomposition of income related inequality in utilization (Van Doorslaer et al. (2004), Gravelle (2003)). All that is required is an agreement on what variables in the model of utilization can be considered as legitimate determinants of unequal access from a normative point of view. Assume that the vector $\mathbf{x}=(x_1, \dots, x_k)$ can be partitioned into non-need and need variables $\mathbf{x}=(\mathbf{x}^n, \mathbf{x}^n)=(x_1, x_2, \dots, x_{k1}, x_{k1+1}, \dots, x_k)$. An index of horizontal inequity is given by the part of socio-economic inequality in utilization not justified by socio-economic inequalities in need. That is

$$HI^j = CI^j - CI_n^j = CI_{nm}^j = \sum_{k=1}^K h_k^j CI_K^j - \sum_{k=k_1+1}^K h_k^j CI_K^j = \sum_{k=1}^{k_1} h_k^j CI_K^j \quad (6)$$

This method differs in an important way from the method of “indirect standardization” by Wagstaff and Van Doorslaer (1996). The method of indirect standardization consists in first computing the concentration index of actual utilization and then subtracting from it the concentration index of predicted utilization, where predicted utilization is obtained from the estimation of an econometric model for utilization as a function of need variables. This procedure has been criticised on the grounds that the omission of variables which, despite not qualifying as need indicators from a normative point of view are nevertheless associated to utilization, can lead to biased estimation (Schokkaert and Van de Voorde, 2004; Gravelle, 2003). This is particularly relevant for the purposes of this study. Since we wish to evaluate the impact of PHI on utilization, and since PHI tenure is strongly associated to income and other socio-economic characteristics, omission of income –a non need variable- from the utilization equation can lead to biased estimates for the impact of PHI. The existing studies for the case of Spain mostly rely on the indirect standardization method. Indeed, only Van Doorslaer et al. (2004, 2006) use the method discussed above, but their analysis does not consider the effect of PHI.

In relation to the point discussed in the previous paragraph, we must note that the literature on utilization generally treats PHI as an endogenous variable (see Vera-Hernández 1999 for the case of Spain). This is motivated by the recognition that

unobserved factors that affect the purchase of PHI are correlated with unobserved factors that affect utilization (adverse selection bias). Our steps to address this issue consist in enriching the specification for utilization with an ample set of health status indicators in an attempt to capture all relevant risk factors. This should purge the estimate for the effect of PHI from biases arising from the omission from the utilization equations of health factors that simultaneously drive the propensity to purchase PHI. We subsequently test this assumption.

3.2 Decomposing inequity over time

The previous section shows how horizontal inequity in utilization can be expressed as the contribution of non-need variables to an index of socio-economic inequality in utilization. It is then straightforward to use the approach proposed by Wagstaff et al. (2003) in order to decompose the difference in inequity between two periods. The method is a derivation of the well known Oaxaca decomposition whereby the difference between the CI's of the population at period t and period t-1 can be written as

$$\Delta HI^j = CI_{nn_t} - CI_{nn_{t-1}} = \sum_{k=1}^{k_1} \mathbf{h}_{kt} (CI_{kt} - CI_{kt-1}) + \sum_{k=1}^{k_1} CI_{kt-1} (\mathbf{h}_{kt} - \mathbf{h}_{kt-1}) \quad (7)$$

Then, the contribution of any variable to the difference in inequity is given by :

$$\Delta CI_{nn_k} = \mathbf{h}_{kt} (CI_{kt} - CI_{kt-1}) + CI_{kt-1} (\mathbf{h}_{kt} - \mathbf{h}_{kt-1}) \quad (8)$$

In practice, we shall compute the differences in inequity (and contributions toward such difference) between 2001 and 1987. Moreover, in order to assess the relative importance of the inequality versus the health elasticity component in the contribution of each variable, we also compute the relative excess elasticity compared to year 1987, i.e. $(\eta_{k2001} - \eta_{k1987}) / |\eta_{k1987}|$, and the relative excess inequality, $(CI_{k2001} - CI_{k1987}) / |CI_{k1987}|$

3.3 Statistical Inference

Many of the statistics that we are going to report are non-linear functions of the data whose sampling distributions are hard to obtain. For this reason we shall use bootstrapping methods in order to derive standard errors. The bootstrap estimates for standard errors are computed following the five-step approach used by Van Doorslaer and Koolman (2004). The number of replications has been set to 500.

3.4. Data and variable definitions

We use the 2001 and the 1987 editions of the Encuesta Nacional de Salud (CIS, 1987, 2001). These are nation wide surveys collecting information on health and socioeconomic characteristics of individuals. The surveys contain separate adults (16+) and children samples. The analysis in this paper is based on the adult samples. The sampling scheme is a multi-stage stratified process whereby primary strata are Autonomous Communities (2001 edition) or Provinces (1987 edition). Within primary strata, sub-strata are defined according to residence area population size. Within

substrata, municipalities (primary sampling units) and sections (secondary sampling units) are selected according to a proportional random sampling scheme. Finally, individuals are randomly selected from the sections. The survey documentation includes weighting factors that correct for the fact that the number of observations within the primary strata is not proportional to actual population. We use these weights whenever a nationwide statistic is computed. The information contained in the data files do not allow the identification of all the primary sampling units (because municipalities with a population below 100000 are not identified). Similarly, information about the secondary sampling units is omitted so it is impossible to control for cluster effects at either the municipality level or the section level.

The ranking variable is equivalised total monthly income earned by the household (income hereafter). In the ENS this is measured as a categorical variable with 12 response categories in 1987 and 6 response categories in 2001. In order to obtain a continuous measure for income and also overcome the fact that for both editions there is a substantial proportion of item non-response, we specify an interval regression model using a wide range of explanatory variables referring both to the respondent and the head of household. These variables are relationship between interviewee and head of household, education of head of household, occupation of head of household, employment status of head of household, tenure of private health insurance, age and sex of the head of household and regional dummies. Except for the upper quantiles, the distributions for the predictions of income compare well with data from the continuous household expenditure survey (ECPF) of 1987 and data from the Spanish sample of the

2001 wave of the European Community Household Panel. The evolution of income inequality as measured by the Gini index also compares well with external sources.

The initial 1987 ENS sample included 29647 individuals. From the initial sample, 5 observations were dropped as income could not be predicted, and after deleting those not responding to one of the relevant questions the final sample contains 29185 observations in the visits to doctors estimation, 28849 in hospitalisation and 29122 in use of emergency services. On the other hand, the initial 2001 ENS sample included 21067 individuals from all the Autonomous Communities, although the observations from Ceuta and Melilla were dropped as there were not individuals from these two regions in the 1987 sample. From the remaining 20748, after deleting those not responding to one of the relevant questions the final sample contains 20644 in the visits to doctor estimation, 20635 in hospitalization, 20636 in emergency visits, 20644 in GP visits, 20644 in specialist visits.

4. Empirical results

As discussed in section 3.1, we specify and estimate LPM for the probability of visiting a doctor during the last fortnight, hospitalization over the last 12 months and emergency services utilization over the last 12 months.. The explanatory variables in the models are: i) the logarithm of equivalent household income; ii) 14 age-sex categories corresponding to age groups 16-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80+ for men and women (the omitted category corresponds to a woman

aged between 16 and 19). iii) 4 marital status categories: single, married, divorced, widowed (single or divorced are the omitted categories); iv) 5 categories of self assessed health: very good (omitted category), good, fair, bad, very bad; v) 5 chronic illness: cholesterol, high blood pressure, diabetes, bronchitis or asthma, heart diseases and allergy; vi) whether daily activities or leisure had been limited by any of the chronic diseases in the last 12 months; vii) whether daily activities or leisure had been limited because of pain in the last two weeks; viii) whether the individual had to stay in bed for more than half day in the last two weeks; ix) whether the individual had an accident in the last year; x) tenure of private health insurance.

Table A1 contains the parameter estimates for the equations corresponding to each of the services by OLS. Table A2 reports the results for the tests, based on Hausman (1978) and outlined in Wooldridge (2003), of the assumption of exogeneity of private health insurance in the specified utilisation equations. These tests require the use of excluded instruments for PHI and, in line with previous studies (Vera-Hernández 1999, Jones et al. 2006) we use occupational characteristics of the head of the household as variables that affect the purchase of PHI but do not affect directly individual utilisation. The first line in each of the 1987 and 2001 panels in table A2 report the test for the null of no significance of these instruments in the reduced form equation for PHI. The rest of statistics are the t-values for the tests of significance of the reduced form equation for PHI residual in each of the utilisation equations (i.e. tests for the null of exogeneity of PHI in these equations). All these statistics are robust to the in-built heteroscedasticity of the linear probability model. As the figures in the table reveal, the p-values for the null

hypothesis are above the 5% level except in the case of emergency visits in 2001. This suggests that the inferences for emergency visits should be treated with caution.

The estimates for the models permit the calculation of the inequality measures presented in table 1. Note that in both 1987 and 2001, the utilization of the three types of services (visits to doctors, emergencies and hospitalizations) is unequally pro-poor distributed. The concentration indices are statistically significant and the point estimates are greater for 2001, revealing that the degree of pro-poor inequality is exacerbated over time. Figure 1 presents the contribution of each group of variables to the overall CI. These figures reveal that a very large portion of the CI is explained by need, which is concentrated among the poor.

Insert figure 1 around here

The second row of table 1 presents the inequity measure for each of the services as defined in section 3.1. For each of the services, HI (inequity index) is the part of the CI (inequality index) explained by income and tenure of private health insurance (i.e. the non-need and non-demographic variables in our specifications for the probability of utilization).

Table 1. Concentration indices, inequity indices and changes over time

	1987			2001				
	Visits	Hosp.	Em. visits	Visits	Hosp.	Em. visits	GP visits	Spec. visit
CI	-0.0626	-0.0342	-0.0219	-0.0959	-0.0847	-0.0465	-0.1478	0.0121
HI	0.0146	0.0246	-0.001	-0.0002	0.0281	-0.0065	-0.0479	0.0991
Income	0.0115*	0.0125	0.0011	-0.0102	0.0078	-0.0182	-0.0439	0.0602
PHI	0.0031	0.0121	-0.0021	0.0099	0.0203	0.0117	-0.0039	0.0388
Change over time (2001-1987)								
	Total visits		Hospital		Emergency visits			
CI ₂₀₀₁ -CI ₁₉₈₇	-0.0333		-0.0504*		-0.0246			
HI ₂₀₀₁ -HI ₁₉₈₇	-0.0149		0.0035		-0.0055			
Relative excess elasticity income	-2.0125		-0.2870		-20.1116			
Relative excess elasticity PHI	1.8760		0.4902		6.1485			
Relative excess inequality Income			-0.1293					
Relative excess inequality PHI			0.1141					

Note: Values significantly different from zero (at P<0.05) in bold typeface. * (at P<0.10)

Note that in 1987 the HI indices for total visits and hospitalizations reveal a significant degree of pro-rich inequity. In these cases, both income and tenure of PHI contribute positively to the HI index. This means, in 1987, that while overall utilization is concentrated among the poor, rich individuals and/or individuals who enjoyed private health insurance (who tend to be richer than average) had more chances of using these health services than poor individuals and/or individuals without PHI **at the same level of need**. In contrast, the HI indices for the three services are statistically not different from zero in 2001, implying that for a given level of need, there are neither pro-rich nor

pro-poor differences in the chances of utilization explained by income or insurance status.

In order to analyze with more detail the changes over time for these indices it is useful to isolate the sources of their changes. As discussed in section 3.2, the contribution of each covariate to the index is given by the product of the elasticity of the probability of utilization and the concentration index of the covariate. So, it might be the case that the impact of income, say, on the chances of using a particular service do not change but income becomes better distributed. This would lead, *ceteris paribus*, to a reduction in the contribution of income to the degree of pro rich inequality in the chances of utilization. The bottom panel of table 1 presents the relevant decompositions for the two non-need covariates that we have used in the specification. The table offers a clear indication of the direction in which the relevant magnitudes have evolved over time. First note that the distribution of equivalised household income has become more equal. Relative to 1987, the concentration index of log equivalised household income is 13% smaller in 2001. The tenure of PHI, however, has evolved in the opposite direction. Relative to 1987, the distribution of PHI is 11% more pro-rich.

Doctor visits: As seen in table 1, the HI for the probability of visiting a doctor is positive and significant in 1987, with both income and PHI contributing positively. In 2001 the HI index is not statistically significant, but this is the result of two antagonistic effects. While in 2001 the contribution of income is negative (and not significant), the contribution of PHI is still positive and significant. In the bottom panel of the table we can see that the change in the contribution of income is driven by a 200% reduction in

the size of the elasticity of the probability of utilization (as well as the decrease in income inequality). In contrast, as well as becoming more concentrated among the rich, the tenure of PHI exerts a greater impact on the probability of utilization. The relative change in elasticity is 180%.

Hospitalizations: The case of hospitalizations is similar to doctor visits. There is a reduction in the contribution of income driven by a 28% reduction in elasticity (plus the reduction in income inequality) but the PHI elasticity of the probability of utilization actually increases by 50%. In 2001 the contribution of PHI is statistically significant, but the lack of significance of the income contribution renders the HI insignificant.

Emergencies: The HI index is not statistically significant either in 1987 or 2001. But while in 1987 the contributions of income and PHI are both insignificant, in 2001 the contribution of PHI is positive and significant. However, as noted before, the exogeneity assumption of PHI in the equation for emergencies in 2001 is rejected, so these inferences are to be taken with caution.

In addition to these three services, we have obtained evidence for the GP visits and specialist visits separately for the year 2001 (unfortunately the data for 1987 does not distinguish between GP visits and specialist visits). The results are consistent with the evidence obtained by Van Doorslaer et al. (2004), Rodriguez and Stoyanova (2004) and Jones et al. (2006). That is, GP visits are concentrated among the poor. This is not only due to need being concentrated among the poor, since the HI index is negative and significant. That is, the poor and those without PHI have more chances of visiting the

GP than the rich and/or PHI holders with the same level of need. Of course, this imbalance is compensated by the existence of a good degree of pro-rich inequity in the probability of visiting a specialist. Indeed, the inequity index for the probability of visiting a specialist in 2001 is greater than any of the other HI indices presented in table 1. Note that roughly two fifths of this index is accounted by the contribution of PHI.

5. Discussion and conclusion

The results presented in the previous section suggest that the Spanish health system seems to have achieved the goal of ensuring equal access to doctors, hospitals and emergency services for equal need. In fact, the reason why the HI indices for the three services are not statistically significant in 2001 is because the contribution of income is negative (total visits and emergencies) and or insignificant (all three services). With the necessary caveats derived from the fact that this is a pure before-after evaluation exercise, and at least as far as the point estimates suggest, it seems that the reforms during the period 1987-2001 have reduced the income elasticity for the probabilities of utilization of the three services. Coupled with a reduction in pure income inequality, this means that income, by 2001, does not lead to differences in utilization for the same level of need. This is clearly an improvement with respect to 1987, a year for which our estimates show a positive and significant contribution of income to inequity in the access to doctors.

On a closer look, however, we note that the contribution of PHI to inequality in utilization is positive and significant for the three services. The data reveal that tenure of

PHI has become more concentrated among the rich and, simultaneously, our estimates suggest an increase in the PHI elasticity of the probability of utilization for the three services. This leads to a positive and significant contribution of PHI to our measure of inequity in 2001 for the three services. Moreover, if we consider the chances of visiting a specialist in 2001, the data reveal a substantial degree of inequity with positive contributions of both income and PHI.

The implications of these findings for the policy goals stated in the Health Act of 1986 depend on a judgement value about whether public policy should be concerned with the inequity effect of PHI. After all, the services afforded by PHI are privately provided. A crucial point here is that these services are partially publicly financed through the tax bonuses to PHI. Must the public purse subsidize better access to some citizens? If so, does it matter that these citizens tend to be richer than the average? Obviously, equity is not the only relevant issue when assessing the adequacy of PHI subsidies. Other considerations include the wish to support a private sector that might introduce competition in the health care market, or the wish to deviate demand to private outlets in order to decongest the public network. Concerning the latter, the evidence for the Spanish case (López-Nicolás and Vera-Hernández 2004) suggests that the subsidies are far from self-financing: their study shows that for each euro given away as a subsidy to the purchase of PHI, the public health care network experiences a reduction in utilisation worth 0,12 €. Similar evidence is available for the UK (Emmerson et al., 2001), where tax bonuses were eliminated recently.

While the overall picture obtained in this paper is that the Spanish National Health Service has advanced in the line of making access equitable, further research must find evidence to justify the subsidies to PHI, an element of the system that this research reveals to generate a significant degree of inequity.

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Table A1: Linear Probability Model results for the probability of doctor utilisation in 1987 and 2001

	1987			2001				
	Total visits	Hospital	Emergency visits	Total visits	Hospital	Emergency visits	GP visits	Specialist visit
Log income	0.0078*	0.0034	0.0005	-0.0098	0.0027	-0.0143	-0.0288	0.0189
F20_24	0.0239	0.0288	-0.0041	0.0093	0.0106	0.0194	-0.0059	0.0152
F25_29	0.0283	0.0467	0.0033	-0.0030	0.0523	0.0060	-0.0188	0.0158
F30_34	-0.0167	0.0030	-0.0098	-0.0079	0.0561	-0.0059	-0.0265*	0.0186
F35_39	-0.0005	-0.0026	-0.0236*	-0.0229	0.0152	-0.0736	-0.0220	-0.0009
F40_44	-0.0204	-0.0443	-0.0607	-0.0091	-0.0255	-0.0798	-0.0359	0.0268
F45_49	-0.0195	-0.0626	-0.0681	0.0260	-0.0352	-0.1108	-0.0050	0.0310
F50_54	0.0003	-0.0623	-0.0657	0.0284	-0.0209	-0.0703	0.0030	0.0254*
F55_59	-0.0171	-0.0711	-0.0636	-0.0037	-0.0490	-0.1162	-0.0116	0.0078
F60_64	-0.0059	-0.0688	-0.0713	0.0482	-0.0239	-0.1423	0.0252	0.0231
F65_69	0.0278*	-0.0739	-0.1048	0.0370*	-0.0343	-0.1013	0.0231	0.0139
F70_74	0.0630	-0.0824	-0.1117	0.0718	-0.0278*	-0.1415	0.0402*	0.0316
F75_79	-0.0005	-0.0800	-0.0981	0.0338	-0.0272	-0.1630	0.0421*	-0.0084
F80	-0.0190	-0.0793	-0.1264	0.0261	-0.0514	-0.1660	0.0505*	-0.0244
M16_19	-0.0109	-0.0066	0.0026	-0.0335*	0.0059	-0.0246	-0.0388	0.0053
M20_24	-0.0209*	-0.0077	0.0052	-0.0654	-0.0077	-0.0303	-0.0590	-0.0064
M25_29	-0.0215*	-0.0197	-0.0146	-0.0625	-0.0113	-0.0325*	-0.0493	-0.0132
M30_34	-0.0372	-0.0476	-0.0388	-0.0428	-0.0179*	-0.0564	-0.0414	-0.0014
M35_39	-0.0365	-0.0522	-0.0491	-0.0340*	-0.0056	-0.0690	-0.0325	-0.0015
M40_44	-0.0326	-0.0422	-0.0558	-0.0505	-0.0229*	-0.0886	-0.0474	-0.0031
M45_49	-0.0340	-0.0555	-0.0698	-0.0403	0.0020	-0.0798	-0.0427	0.0024
M50_54	-0.0413	-0.0388	-0.0624	-0.0413	-0.0173	-0.0933	-0.0337*	-0.0076
M55_59	-0.0188	-0.0365	-0.0800	-0.0354	-0.0191	-0.1329	-0.0507	0.0154
M60_64	-0.0027	-0.0635	-0.0833	-0.0201	-0.0132	-0.1339	-0.0212	0.0011
M65_69	-0.0154	-0.0456	-0.0943	0.0446*	0.0111	-0.1267	0.0312	0.0135
M70_74	0.0124	-0.0426	-0.0820	0.0221	-0.0034	-0.1246	-0.0086	0.0307*

	1987			2001				
	Total visits	Hospital	Emergency visits	Total visits	Hospital	Emergency visits	GP visits	Specialist visit
M75_79	0.0275	-0.0348	-0.0751	0.0303	0.0003	-0.1145	0.0319	-0.0016
M80	0.0027	-0.0039	-0.0657	-0.0147	0.0277	-0.1056	0.0116	-0.0263
Married	0.0263	0.0520	0.0295	0.0117	0.0198	0.0169	0.0055	0.0062
Widow	0.0359	0.0362	0.0228	0.0013	-0.0019	0.0077	-0.0015	0.0028
Cholesterol	0.0347	-0.0123*	-0.0103	0.0167	-0.0127*	0.0100	0.0339	-0.0172
high blood pressure	0.0647	-0.0106*	0.0006	0.0465	-0.0067	0.0074	0.0584	-0.0119*
Diabetes	0.0508	0.0126	0.0159	0.0298	0.0185*	0.0007	0.0482	-0.0184*
bronchitis o asma	0.0383	0.0034	0.0265	0.0260*	0.0165	0.0653	0.0318	-0.0059
Heart	0.0458	0.0582	0.0681	0.0267*	0.1011	0.1038	-0.0154	0.0422
Allergy	0.0166	-0.0044	0.0263	0.0297	-0.0293	0.0116	0.0223	0.0074
limited by cronic	0.0219	0.0687	0.0649	0.0293	0.0558	0.0901	0.0260	0.0033
Limited by pain	0.1849	0.0082	0.0316	0.2564	0.0024	0.1102	0.1877	0.0687
Sah good	0.0242	0.0134	0.0215	0.0505	0.0170	0.0333	0.0295	0.0210
Sah fair	0.1304	0.0440	0.0510	0.1530	0.0926	0.1364	0.0783	0.0747
Sah poor	0.2114	0.1461	0.1273	0.2073	0.2029	0.2102	0.0948	0.1125
Sah very poor	0.1717	0.1786	0.1866	0.0231	0.1032	0.0544*	-0.0189	0.0419
Bed	0.2016	0.0385	0.0700	0.1780	0.0603	0.0420	0.1216	0.0564
Accident	0.0663	0.0830	0.2985	0.0580	0.0651	0.4220	0.0082	0.0498
private insurance	0.0101	0.0160	-0.0041	0.0441	0.0328	0.0423	-0.0119*	0.0560

Note: Values significantly different from zero (at $P < 0.05$) in bold typeface. * (at $P < 0.10$)

Table A2. Tests for the assumption of exogeneity of private health insurance in the utilisation equations

	1987				
Het.- robust F stat. For null of joint no significance of instruments in reduced form P-value	F(6.28004)=112.11 0				
Het. Robust t-value for null of no significance of residual from reduced form in utilisation equation P-value	Total visits	Hospital	Emergency Visits		
	1.17 0.24	0.1 0.92	0.71 0.47		
	2001				
Het.- robust F stat. For null of joint no significance of instruments in reduced form P-value	F(6.20584)=9.71 0				
Het. Robust t-value for null of no significance of residual from reduced form in utilisation equation P-value	Total visits	Hospital	Emergency Visits	GP visits	Specialists
	1.05 0.29	1.71 0.08	2.44 0.015	0.24 0.81	1.91 0.056

Note: All test statistics are robust to heteroscedasticity. The set of excluded instruments used for testing are a set of 6 occupational dummy variables for the head of the household.

Figure 1. Contributions to Concentration Indices

