Is there a 'Secession of the Wealthy'? Private Health Insurance Uptake and National Health System Support

Joan Costa-Font[a,c]
Mireia Jofre-Bonet[b]

[a]London School of Economics, London UK
[b]Department of Economics and City Health Economics Centre, City University, London, UK
[c]Departament de Teoria Econòmica, Universitat de Barcelona, Spain

Contact Address: LSE Health and Social Care. Cowdray House, Houghton Street, London. WC2A 2AE. Tel: +44 207 955 6484 Fax: +44 207 955 6803. E-mail: J.Costa-Font@lse.ac.uk

Abstract

The purchase the private health insurance (PHI) as a mean to partially supplement the National Health System (NHS) coverage is often regarded as a potential signal for a declining support for the NHS. To date, the hypothesis that attitudes towards the NHS might be influenced by the uptake of PHI is still open to empirical scrutiny. Exploiting the fact that PHI is typically purchased by the most affluent, in this paper we test the so called 'secession of the wealthy' hypothesis whereby the likelihood of expressing "lack of support for the NHS" increases with having supplementary PHI. Using empirical data from Catalonia, we draw upon an empirical strategy that circumvents an obvious simultaneity problem by estimating both a recursive bivariate probit as well as an IV probit. After controlling for insurance premium, household income and other socio-demographic determinants, we find that the purchase of PHI reduces the propensity of individuals to support the NHS. We also find evidence that PHI is a luxury good and that, interestingly, it has a large price elasticity, suggesting the sensitivity of PHI purchase to fiscal incentives.

Key words: private health care, health insurance, NHS reform.
JEL Classification: I1; G1

1. Introduction

Although in most European countries health care is predominantly state-financed, in many countries an increasing share of the population gets medical treatment in the private sector. The growth of the private health care sector in Europe is driven by some factors such as: The inability of uniform health services to satisfy heterogeneous preferences for health care (Hall and Preston, 1998; Besley *et al*, 1996; 1999); differences in certain quality dimensions of provision (Jofre-Bonet, 2000a, Costa and Garcia, 2003); and, an increased consumer demand for choice and a direct access to providers (Propper 1993, Costa-Font and Font-Vilalta, 2004, Rodriguez and Stoyanova, 2004).

Buying private health insurance has also been referred as indicative of 'opting-out' whereby individuals express their lack of satisfaction with the system (Calnan *et al.,* 1993) and has also been referred to as the "exit voice" (Hirchman, 1970). Since in very few countries "leaving" the public system completely is an option, obtaining data to test the opting out hypothesis is extremely difficult. More general empirical research on individual perceptions and attitudes towards the NHS and purchase of private health insurance (PHI) indicate that both decisions might not be independent. This has been found to be the case in the United Kingdom (Propper, 1993; Propper, 2000, Burchardt and Propper, 2000). Nevertheless, the specific question of whether taking private health insurance undermines support for publicly funded health care controlling for relevant variables such and individual specific insurance premium has not been fully examined.

The decision to 'partially' opt-out from the NHS – mainly for elective care purposes and without stopping contribution towards the NHS- by purchasing PHI reveals important political economy issues worth testing: On the one hand, individuals partially opting-out do free up resources for those NHS services that they do not use. Indeed, Besley and Coate (1991) show that if individuals can consume at most one unit of a good and given a certain quality of NHS care, consuming private health care implies comunsimubng care that otherwise would be NHS provided. Yet, if those going private are relatively well off individuals who continue to finance the system, their exiting the system could arguably improve the health system's equity (Besley and Coate, 1991). On the other hand, health services are more likely to

suffer government failures (Smith *et al*, 2001)[1]. Those individuals that opt out might not be willing to finance the NHS in those areas that they do not use, and would therefore be less supportive of NHS improvements. Hall and Preston (1998) and Burchardt and Propper (2000) find some empirical support for this hypothesis. However, those studies lacked data on relevant structural variables such as insurance premiums and health status which approximate the economic sacrifice involved in purchasing PHI and the need of health care.

This paper aims at empirically examining whether the uptake of PHI influences the individual's propensity to have a non-supportive attitude towards the NHS. As suggested by Hall and Preston (1998), one might well argue that common unobserved factors might influence both decisions and accordingly we estimate several specifications of the probability of showing lack of support for the NHS to circumvent this problem: We start with a simple probit model but then estimate an instrumented variables probit model and a recursive bivariate probit model to capture and control for the potential correlation between the two underlying processes that's stand behind these two decisions (Fabbri *et al*, 2004).

We employ data from the 1994 Catalan Health Survey (CHS), which contains data on health and socio-economic information as well as on insurance premiums and income at a representative level. Based on both fundamental and empirical grounds, the examination of the issue at hand with these data appears as an especially suitable exercise: The data was collected in Catalonia, a region-state of Spain, which is a paradigmatic example of a European country where health care is mainly tax financed – following the lines of a NHS – though 15% of total population has a PHI subscription and private care accounts for 25% of total health expenditure in 2002. In the last twenty years, the Spanish NHS has adopted as decentralised structure based on region-state policy responsibilities (Lopez-Casasnovas *et al.*, 2005). The particular region-state Catalonia exhibits a historically high share of individually purchased PHI. Indeed, between 22 and 25% of the population during 1990s and up until 2003 purchased PHI. PHI is a supplementary financial arrangement that offers non-elective care coverage at a similar level as that provided by the NHS (e.g., specialist's medical care) but at a higher perceived quality (e.g., lower waiting times etc)[2].

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[1] This results from short policy timetables, constant change, and demand for instant gratification that are features of politics do not sit comfortably with running a huge and complex service.
[2] However, PHI coverage is restricted to elective care which implies that even those individuals that are entitled to private health care coverage through PHI schemes would use the NHS for non-elective, urgent and high technology care (Lopez-Nicolas *et al*, 2000).

The remainder of the chapter is as follows. Section 2 reports a review of the relevant literature. Section 3, describes the institutional setting, the dataset used and outlines the econometric specification taken to the data. The estimation results are presented in section 4. Section 5 discusses the results and Section 6 concludes.

2. Background

A central aspect of the public policy debate to date is on the interaction between the public and the private sector and its underlying influences. Besley and Coate (1991), Gouveia (1996) and Stiglitz (1974) suggest that individuals that opt-out for the public sector might not be willing support economically and politically the allocation public sector resources to such areas, as it is the case of publicly financed health care. The departing argument for our paper originates in the phenomenon described in Besley and Coate (1991) by which health care aims at ensuring equity and efficiency goals. Given that it provides a relatively uniform health care financing it with a progressively-tax-based public funding. Thus, the public provision of health care may be seen as the result of a majority supporting a "guaranteed" public provision of health care. However, once some general coverage has been provided, those who benefit less by this public system, namely the high contributors may 'opt-out' by buying PHI. In this context, purchase of PHI can also be interpreted as a signal that they would not support a quality of care improving NHS reform because it would lead to a higher contribution. Since usually those in the upper income distribution do not constitute a sufficient majority to show a clear opposition to public spending, they have to content themselves by supporting low public spending and increasingly opting-out whenever the standards of quality of the public financed health care are below their personal needs.

Nevertheless, individuals are heterogeneous in preferences for redistribution, and better-informed - and relatively richer individuals - might prefer privately provided health care (Propper and Burchardt, 1999). Thus, whether enrolling in private health care sector leads to a lesser support for an NHS improvement is individual specific and relies on observable and unobservable factors. Propper (2000) argues that if the extension of the private sector is accompanied by a reduction in the willingness to pay taxes this could drive the NHS into a 'poor services for the poor'. In this sense, Propper (2000) finds empirical evidence that users of private services are richer and more likely to support the political right as well as less supportive of equity goals of the NHS. However, it is pointed out how political attitudes are in themselves

endogenenous and underpin other individual specific effects such as the preference for private sectors in general.

In countries where the NHS provides full coverage, opting out is only partial and refers to buying privately some elective care which the relatively more affluent wish to obtain more promptly (Besley *et al.*, 1996). However, as explained above, the development of a PHI market might reduce the size of the coalition of NHS supporters. Therefore, although in the short run equity in the finance of the NHS might improve, in the long run, what we can term as the "secession of the wealthy" might have inverse equity effects, providing an explanation for the deterioration of public health care: Those opting out of the system might be willing to change the composition of private health care towards those procedures that they consume within the NHS or they might want to reduce the NHS size in order to pay fewer taxes.

Empirical strategies to test the interaction between support for public sector and the development of the private sector are complex and limited by revelation problems. Indeed, first of all, rational individuals do not have incentives to reveal their 'true' willingness to finance public sector activities, which is broadly known as the 'free rider problem'. Second, individual preferences over the re-allocation of funds to existing programs instead of rising taxes cannot easily be inferred either. However, despite of these restrictions some empirical strategies have been implemented that overcome some measurement limitations. Using survey and budgetary experiments Strauss and Hughes (1976) find that education and medical care receive a high priority in comparison to other government programs. More recent studies establish a link between the individual expression of a private demand for a publicly provided good (e.g., health care) and the individual preferences for the structure of public services (Preston and Ridge, 1995; Hall and Preston, 1998). Using evidence of the Social Attitudes Survey, Preston and Ridge (1995) estimate the demand for local public spending taking into account potential 'revelation biases' associated with "survey" responses.

3. The empirical application.

3.1. The institutional setting

Spain structures the provision and funding of health care as a system of regional health services, so called the NHS (Lopez Casanovas *et al.*, 2004). The legal bases of the Spanish health care are the 1986 General Health Care Act and the 2003 Health System Quality and Cohesion Act. The Spanish health system is

regionally decentralized, and Catalonia was the fist region-state in taking over legal responsibility for healthcare from the central government in 1981. The Spanish NHS ensembles an increasing array of regional health authorities, to which health care responsibilities have been transferred progressively from 1981 up to 2002.[3] Health care is the foremost policy making responsibility of autonomous communities along with education and it accounts 30-40 percent of their total public funds in their hands. With the exception of nine percent of funds collected at the regional level, the NHS is centrally financed and the regional resource allocation has turned out into a central block grant transfer based on of an unadjusted capitation formula. The Spanish NHS provides health care free of charge at the point of use except for pharmaceuticals and dental care. In contrast with the situation in other regions, more than half of Catalan health expenditure is private, and the system works on a contractual basis.[4] Furthermore, Catalonia stands jointly with the Balearic Islands as the region state with the lowest share of public health care spending as a share of the GDP (4%).

Health care is one of the most politicised areas of public policy debate in Spain. The NHS is envisaged as a 'prioritised' public service, presumably fulfilling personal as well as socio-political goals that affect the legitimacy of the welfare government. According to the Spanish public opinion survey on health care (Barómetro Sanitario, 2000) 47 percent believe that the government should spend more on health care and 90 percent disagree on cost-containment in health care. Therefore, it seems that the public backs public investment in health rather than a reduction in health care expenditure. Simultaneously, 67 percent agree in that people should be able to supplement the NHS care by purchasing PHI. As Figure 1 exhibits, an increasing share of the Spanish population perceives that the NHS worked well but needs substantial remaking. However, those who think that that the NHS needs to be redefined as well as those thinking that the NHS already works well tend to decline or remain stable over time. Therefore, some significant share of the population might react to the lack of the government adjustment of the health system to their expectations by purchasing insurance plans (25 percent in 2003).

[Insert Figure 1 about here]

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[3] After Catalonia in 1981 followed Andalusia (1984), the Basque Country and Valencia (1987), Galicia and Navarre (1990), Canary Islands (1994) and finally completed in 2002 to the remaining ten regions

[4] PHI in Spain provides coverage against the need of having to pay private medical treatment out of pocket. With the exception of civil servants, choosing *substitutive* PHI (which is done by less than 5% of the population in Catalonia), PHI purchasers have *double coverage*.

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The Spanish Insurance Law defines PHI – so called 'Seguro de Asistencia Sanitaria' - as an insurance that "provides to the insured with the medical, hospital and surgery care, with own staff of doctors whereby the insurer takes care of its own enrolees in exchange of a premium". Unlike in other EU countries, insurance policies are mainly individually (rather than corporately) purchased and, typically, benefits are received in kind rather than reimbursed to the patient. Normally, to control ex-ante moral hazard after purchasing PHI there is at least a 6-month period by which no claims can be satisfied with the exception of urgent care.[5] Contracts have an undetermined duration and can be cancelled by both insurer and insured. The majority of insurance policies purchased are for medical care, usually under the form of indemnity.[6] Previous research using data from Catalonia (Costa-Font and García, 2003, Costa-Font and García 2002, and Costa-Font and Font-Vilalta, 2004) indicates that demographic variables are important determinants in the purchase of PHI, and for instance, the share of PHI increases up until the age of 30. The largest share of the Catalan private health insurance market is concentrated in Barcelona (78.6 percent of the insured), which represents around 23 percent of the total population in Barcelona. In Tarragona, Girona and Lleida 17 percent, 22 percent and 22 percent of the population buys PHI, respectively.

3.2. The data

We use data from the Catalan Health Survey (CHS, 1994). This is a cross-sectional health survey of 15,000 individuals living in Catalonia and was collected during the autumn 1993. This survey - usually undertaken every five years – is a representative survey of the eight Catalan health regions. Besides standard detailed social and demographic information, it provides information on health service utilization and on attitudes towards the NHS. Although the data is not the latest survey, the most recent data on 2002, does not contain income information which makes it less suitable for our purposes.

[Insert Table 1 about here]

We include variables reflecting individual's income, age, gender and education as based on previous literature we know they have a significant impact on the decision to purchase PHI and may do also on the propensity to support the NHS support.

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[5] This includes obstetric care wich has a period of 1 year without claims and specific interventions are excluded (e.g., vasectomies, prosthesis etc).

[6] Reimbursement policies do not seem to be in high demand despite having been offered for a long time. Recently dental care policies have been developed and introduced fully in the market, however their coverage is limited to the 9.1% of the population.

As displayed in Table 1, our sample is made of 48 percent men and 52 percent of female respondents. The average age of the respondents in our sample is about 40 years. Twenty-one percent of the sample has some primary education, 55 percent primary studies, 13 percent secondary studies and 11 percent superior education. The average number of family members in our sample is 3.68 and 51 percent of the sample is married, the average income is was €12,591.46 in 1994 and the average health status is about good or at 3 out of 5, where 5 are worst possible health and 1 is best possible health. Seven percent of the respondents feel they have an excellent health, 16.5 percent that they have very good health; 52 percent that they have good health; about 20 percent think they have regular health and about 4.25 percent feel they have bad health. Looking at health status and PHI, we observe that among those who are insured, 18.3 percent perceived their health to be bad, from which 53 percent were elderly.

Those who purchase PHI individually are 19 percent of the sample and only 5 percent perceived that the system should be reformed completely. The two questions of the CHS that we use to measure PHI purchase and lack of support for the NHS are the following:

- *Do you currently hold any voluntary (private) health insurance policy?*

- *Which of the following statements define your personal attitude towards the NHS:
  a) No changes are needed; b) Some small changes are needed;
  c) Significant changes required; d) the NHS should be completely changed.*

Note that the way the question is formulated answering that the NHS needs to be 'changed completely' reflects a general political negative attitude towards the NHS and its role in society, and thus we believe that CHS successfully measures 'lack of support for the NHS'.

Table 2 provides evidence of the interactions between support for the NHS and purchase of PHI. Looking at the object of our interest, we find that of those that buy PHI, almost nine percent has a negative attitude towards the NHS and thinks that the NHS needs to be completely changed. And, of those that think that the NHS should be completely changed, almost 29 percent buy PHI.

[Insert Table 2 about here]

As Table 2 shows, PHI subscription and lack of NHS support are more likely for those more affluent and married. Gender and health seem not to place any effect while education is higher for those that purchase PHI and support less the NHS.

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3.3. The Econometric specification

The empirical work developed here is based on the assumption that individuals decide to purchase PHI[7] maximizing their expected utility and that this decision is contingent on their income; the PHI premium; and on other observable individual characteristics given a certain public health care quality. As discussed in Browning and Meghir (1991) and as applied by others in other contexts (see Mellor 1997 and French *et al.* 2004, for instance), this interpretation of the PHI demand a *conditional structural demand model* simplifies the empirical analysis enormously. We take thus this approach and assume that both PHI purchase decision and propensity to support the NHS are conditional on a set public health care quality.

Even though the decision of purchasing PHI and supporting or not the NHS are very likely to be simultaneous processes, we argue here that attitudes towards the NHS may be state dependent. In this sense, partially opting out (buying PHI) might reinforce previously held attitudes against or in favour of the NHS.

In this paper, we interpret that PHI purchase might influence individuals attitude towards the NHS. Thus, we specify the following equation for the decision of buying PHI as:

$$I^{*}_{i} = Z_{i}\beta + \mu_{i}, \qquad (1)$$

where I^{*}_{i} is a latent variable representing the individual's propensity to buy PHI, Z_{i} is a vector of observable individual characteristics and μ_{i} the idiosyncratic error term.

Since I^{*} is not directly observable, we define a dichotomous decision variable I which takes value 1 when we observe PHI purchase and 0 otherwise so that $I=1$. Thus, assuming a normal distribution with 0 mean and variance 1 for the random error μ_{i}, this model can be estimated using a probit model:

$$\Pr ob(I = 1) = \Pr ob(I^{*} > 0) = \Pr ob(Z_{i}\beta + \mu_{i} > 0) = \Phi(z^{'}_{i}\beta), \qquad (2)$$

where Z_{i} is as above and Φ is the standard normal cumulative distribution.

On the other hand, we assume that the individual's latent propensity to have a negative attitude towards the NHS depends on observable and unobservable characteristics and also on the fact of having locked in a PHI contract already. Thus, the latent attitude towards the NHS, A^{*}_{i}, can be modelled as:

$$A^{*}_{i} = X_{i}\alpha + \delta I_{i} + \varepsilon_{i}, \qquad (3)$$

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[7] Although not entirely accurate in Spain, we assume that buying PHI individually or through the employer is equivalent.

where X_i is a vector of observable variables, ε_i is a normally distributed random variable, and I_i the indicator variable for having purchased PHI.

The propensity to have a negative attitude towards the NHS is unobserved but we assume that the individual has a negative attitude towards the NHS and answers that he/she would reform the NHS completely. By defining A_i as an indicator variable that takes value 1 when the individual answers he/she would reform completely the NHS and 0 otherwise, we get the following expression:

$$A_i = \begin{cases} 1 & \text{if} & A^* > 0 \\ 0 & \text{if} & A^* \leq 0 \end{cases} \qquad (4)$$

Again, the probability that the individual has a negative attitude towards the NHS can be modelled as a probit model:

$$\text{Prob}(A_i = 1) = \text{Prob}(A_i^* > 0) = \text{Prob}(X_i\alpha + \delta \cdot I_i + \varepsilon_i > 0) = \Phi(X_i\alpha + \delta \cdot I), \qquad (5)$$

where again Φ is the normal cumulative distribution function; A_i is an indicator variable for the individual's attitude towards the NHS; and ε_i is a random variable normally distributed with mean zero and unit variance.

Note that the coefficient δ in equation (5) will be biased if as expected, there is some simultaneity problem between both decision processes due for instance to common explanatory unobserved heterogeneity. Examples of these non-exogeneous unobserved characteristics are the individual's perception of the NHS quality of care, the political views of the individual, or the individual's family medical record in the NHS, for instance. Because of the correlation of the two processes' unobserved heterogeneity, the estimation of the model above by Maximum Likelihood would produce a biased coefficient estimate for δ. The estimate would confound the structural effects of buying PHI on lack of support for the NHS with the effects of the correlation between the unobserved heterogeneities present in both processes. There are different methods to estimate equations 2 and 5 circumventing this problem.

Our approach is to present a set of solutions where we address the different problems faced:

We first approach is to assume that the error terms of both PHI purchase and attitude formation are uncorrelated so that we can treat PHI as exogenous (column 1 of Table 2). Using these coefficients, we used a simple two step procedure suggested by Wooldridge (2002) and tested for the endogeneity of I^* in equation 5

and the simultaneity of equations 2 and 5. This test is valid for binary variables and does not require normality or homocedasticity of errors terms. Although we could not reject the hypothesis of exogeneity, for comparative reasons we thereafter treat the variable I in equation 5 as both endogeneous and exogenous.

Secondly, we estimate two bi-probits models:
- In the presence of a weak correlation between the instruments and the endogenously determined explanatory variable, Greene 1998 and 2000 suggest that the bivariate probit model may be more appropriate and more efficient. The assumption that μ_i and ε_i are distributed as a bivariate normal with $E(\mu_i)=E(\varepsilon_i)=0$, $Var(\mu_i)=Var(\varepsilon_i)=1$, and $cov(\mu_i, \varepsilon_i)=\rho$, allows for the possibility that that the unobservables affecting attitude, A_i, and the purchase of PHI, I_i, are related. Because the both variables are bivariate, the likelihood function is a bivariate probit. The estimation of a bivariate probit model produces both unbiased estimates of β and α and an estimate of ρ, the covariance between the error terms:

$$L(\beta,\alpha,\rho) = \prod_{I_i=1,A_i=1} \Phi(X_i\beta, Z_i\alpha; \rho) \times \prod_{I_i=1,A_i=0} \Phi(X_i\beta, -Z_i\alpha; \rho) \times \prod_{I_i=0,A_i=1} \Phi(-X_i\beta, Z_i\alpha; \rho) \times \prod_{I_i=0,A_i=0} \Phi(-X_i\beta, -Z_i\alpha; \rho)$$

(6)

where β and α are the parameters associated with the reduced forms of equations 2 and 5, respectively; X and Z are the exogeneous regressors; and Φ the cumulative bivariate normal distribution function.

Note that with the bivariate probit approach we can only estimate a reduced form so that we do not obtain an estimate of δ but we can test the sign of correlation between the error terms in equation 2 and 5.

- Given that there might admittedly be some reverse causation, we control for the existence of such effects by means of a recursive bivariate probit model. This model follows the lines of Madala recursive systems number 5 (Fabbri et al, 2004) and allows us to undertake an additional robustness check of the influence of PHI on individuals attitudes towards the NHS.

Finally, we use an instrumental variable method for binary dependent variables. This involves the estimation of equation 5 as a two-stage probit model using instrumental variables to correct for the endogeneity of I_i. The two-stage probit model is estimated using the routine "ivprob" of the Stata software. This routine was programmed by Joseph Harkness which implements the Amemiya Generalized Least Squares (AGLS) estimators for probit and tobit with an endogenous regressor as described in Newey (1987). The endogenous regressors are treated as linear functions of the instruments and the other exogenous variables.

Given that some argue that the effect of PHI might be not be on lack of support but on eroding previous support to the system, we run an ordered probit model assuming exogeneity of the PHI parameters after checking that and extract the marginal effects.

4. Results

Table 2 provides the results of different models: Column or panel 1 reports the results of the simple probit model of the variable "lack of support" for the NHS. The second panel reports the results of the bivariate probit model that does correct for the potential endogeneity of the variable lack of support for the NHS. The third panel reports the results of the recursive bivariate probit model that does correct for the potential endogeneity of the variable lack of support for the NHS and the potential reverse causality. Column four reports the IV probit model for lack of support that does correct for the endogeneity of the variable lack of support for the NHS but not for the fact that PHI is binary – this is included just for comparative reasons as the variable PHI does not appear to be exogenous in the test performed.

Table 3 provides the marginal effects of the independent variables for models in columns 3 and 4 of Table 2, i.e., assuming both endogeneity or exogeneity of PHI.

Below we discuss our results analyzing the effect that each of the variables included has on the probability of lacking support for the NHS:

-Lack of support and PHI: In order to provide a robust response to the question posed by the paper, we first examine the effect of PHI on lack of NHS support in Table 3. First of all, we find that holding PHI unambiguously increases the probability of lack of support towards the NHS regardless of the specification examined. Table 4 we find that assuming exogeneity does not change significantly the marginal effect of PHI on this propensity.

- The effect of other health and socio-demographic variables:

-Education and "lack of support for the NHS": Having lower education than a College degree influences negatively the likelihood of reporting "lack of support for the NHS" (see Table 3). In other words, higher levels of education – which is a well-accepted indicator of higher income levels - make it less likely to have a negative perception of the NHS. Age exhibits a non-linear effect so that years of life make it more likely to be critical of the NHS. Consistently, health status goes the opposite way. Males are less likely to reveal being supportive of the NHS when the confounding effect of the unobservables is corrected.

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-The role of income and PHI: Income is among the variables that determine the decision to purchase PHI. Note that the effect of the logarithm of income on the decision of buying PHI is very strong at about 0.7 for both the two biprobit models (columns 2 and 3 in Table 2). This suggests that PHI is a normal good and is consistent with some previous studies (Costa-Font and Garcia, 2003). The interpretation of this result is that an income expansion leads to an expansion of the market for supplementary health care in Spain. The dummy variable "no income reported" often associated to high income levels[8] is very significant and about 0.11-0.14 for both biprobits.

-The role of income and Lack of Support for the NHS: With respect to the effect of income on the lack of support for the NHS, we see that it is negative but insignificant when we do not correct for the potential endogeneity of PHI but becomes significant and still negative when we do (third specification).

PHI premium and PHI: As expected, the effect of the logarithm of the insurance premium is always negative and about -1.3. Moreover, the implied price elasticity of PHI demand evaluated at the mean premium are about -0.3, indicating that potential subscribers are sensitive to potential changes in insurance premium, and in particular, that a subsidisation of the insurance premium would yield an expansion of the market for supplementary PHI in Spain.

-Goodness of fit measures: Note that the likelihood ratio specification tests reported at the bottom of all models are satisfactory. The significance of the Rho-error term of the correlation estimate at the bottom of column 3 indicates that there exists correlation between the error terms of equations 2 and 5.

Finally, in Table 5 we provide the results of an ordered probit model as well as the marginal effects of the different levels of attitude towards the NHS. Interestingly, age still displays a non-linear effect but income is significant: those relatively more affluent, those with PHI and with worse health status are more likely to exhibit lack of support for the NHS. The three columns on the right hand side of the table confirm these effects: income and PHI especially affect negatively the probability of believing

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[8] Income imputation methods to assign income to those not reporting it indicated that not reporting income is associated with very high levels of income.

the NHS does not need big changes, but positively the likelihood of considering that the NHS needs significant or extensive changes.

[Insert Table 5 about here]

5. Conclusion

This paper provides an examination of the relationship between individual propensity to (not to) support the NHS and the expansion of the market for supplementary PHI in the context of Spain. After confirming that PHI is a luxury good, we find individuals buying PHI exhibit a lesser support for the NHS. This is a robust result that under different specifications corresponding to different assumption on the simultaneous nature of the association between PHI uptake and attitudes towards the NHS.

We have dealt with the contemporaneous association between the support for the NHS and decision of buying PHI. To control for the existence of potential endogeneity problems when estimating PHI purchase and propensity to have a negative attitude towards the NHS, we choose to estimate both processes as a two-stage probit model as well as a bivariate probit model. Our results suggest that PHI makes reporting "lack of support for the NHS" more likely. In the same direction, the positive sign o the error term correlation between these two decision variables when estimated using a bivariate probit model corroborates this implication. We find that the demand for PHI affects negatively the propensity to show support towards the NHS, even when we control for social-demographic factors, income and premium paid. Interestingly, ordered probit models suggest that this effect remains when several attitudes are examined at the same time. The rough data already suggests that big changes needed at the NHS halves when individuals have PHI. Empirical specifications that attempt to control for some for of reverse causality suggest a milder though still significant effect. This suggests that even when a revolt of the rich is not expectable at current levels, it might well be that if private health care reached a certain level this could be a plausible reaction.

The results obtained provide some empirical support to the interpretation of "purchasing PHI" as an expression of at least "partial or ideological" "opting-out" the NHS provision. These results also provide some diffuse support to the hypothesis of the 'revolt of the rich' in the sense that we show that education has a positive effect on the likelihood of showing "lack of support for the NHS" and education is typically

associated with higher levels of wealth. Along the same line, we find that, when estimating the decision to buy PHI without accounting for the fact that "lack of support for the NHS" is potentially endogeneous, income seems to be picking up part of the effect of "lack of support for the NHS" on the decision to buy PHI. This mildly corroborates the association of "lack of support for the NHS" and higher levels of income.

From this, it is not far fetched to conclude that some of the effect of income, age and health on the decision of buying PHI reported in previous literature (Costa-Font and Garcia, 2003) may have been picking up the effect of the omitted variable "lack of support for the NHS". The fact that the reduced form reflected by the biprobit model which corrects for the unobserved heterogeneity influencing both PHI and "lack of support for the NHS", does produce similar coefficients than the simple probits of PHI and NHS only reinforces this belief.

Given that individuals are usually assumed to support increases in NHS spending if their willingness to pay for expanded/better coverage exceeds the tax costs that they would face (Brook, Preston and Hall, 1998), household income is likely to determine the ability to pay for PHI as well as the preferences for certain sources of public spending, i.e. influencing both PHI purchase and "lack of support for the NHS". But, interestingly in this paper, we show that even when controlling for income, household characteristics, and premium paid, a "negative attitude towards the NHS" still influences very strongly the likelihood of purchasing PHI and takes away some of the effect of the other socio-demographic variables.

One policy related interpretation of our findings is that increases in the size of the market for supplementary health insurance might have effects that are not obvious. Since that those that opt-out completely or partially are usually unsatisfied with the NHS, and wealthier individuals have low incentives to support costly NHS reforms, a potential long run effect might be shrinking the size of the welfare state in those areas where the NHS competes with the private sector

It is worth mentioning some caveats as well. Mainly, that we have used data from a specific region-state of Spain to test the above hypothesis. Thus, our database is representative of Catalonia rather than Spain as a whole, and Catalonia has the particular characteristic of having a long tradition of private health care. Our database is from 1994 and does not contain data for other years. Therefore, we cannot control for dynamic effects whereas one might argue that there is some 'habit formation' in the decision to purchase PHI and also some persistence of a negative attitude towards the NHS. Furthermore, we concentrate in individual rather than

corporate finance PHI given that the market share of the latter was negligible in 1994. Also, although the implication of this is uncertain, there is some indication that those purchasing PHI keep using the public system (Vera-Hernández, 1999; and López *et al* 2000). Finally, our results indicate some evidence of the contemporaneous effects of support for the NHS and PHI; whilst one might well argue that there is some delay in individuals' partial opting out decision. However, data availability does not allow us to examine these effects as far as no panel data evidence is available.

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Figure 1. NHS Support in Spain 1993-2002 (% of responses)
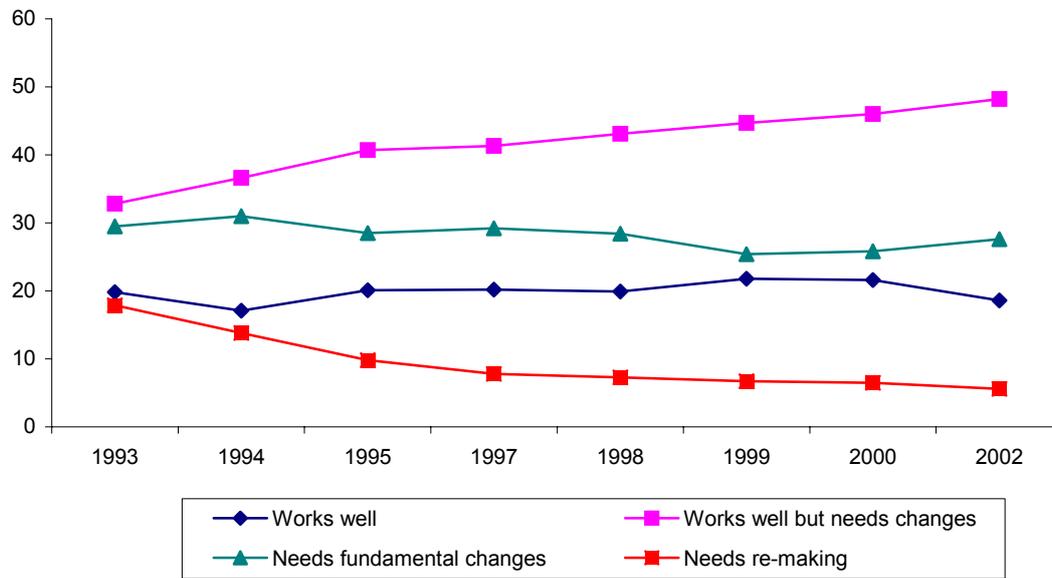
Source: Ministerio de Sanidad y Consumo, 2003

Table 1: Descriptive statistics

Variable	Number of observations	Average	Standard Deviation	Interpretation
Dependent Variable(s)				
Lack of NHS Support	1500	5%	23%	% of individuals who have a negative perception of the NHS (they think that it should be reformed completely)
No Change	15000	40.49%		% of individuals who have a negative perception of the NHS (they think that no changes are needed)
Some Change	15000	47.36%		% of individuals who have a negative perception of the NHS (they think that some changes are needed)
Significant Changes	15000	6.62%		% of individuals who have a negative perception of the NHS (they think that significant changes are needed)
Treatment Variable				
PHI	15000	19%	39%	Percentage of privately insured
Independent Variables				
Age	15000	39.61	22.93	Age in years
Male	15000	48%	50%	Percentage of males
Nmemfam	15000	3.68	1.43	Average number of family members
Educ1	15000	21%	41%	Less than primary education
Educ2	15000	55%	50%	Primary education
Educ3	15000	13%	34%	Secondary education
Educ4	15000	11%	31%	Superior Education
Income*	15000	2,095	746.72	Income (thousands pesetas-1994)
Excellent health	15000	7.5%		Percentage of those in excellent health
Very good health	15000	16.45%		Percentage of those in very good health
Good Health	15000	51.80%		Percentage of those in good health
Fair Health	15000	19.91%		Percentage of those in fair health
Bad Health	15000	4.25%		Percentage of those in bad health
Health	15000	2.97	0.92	Average Health Status (1 to 5)
Single	15000	40.06%		The individual is single
Married	15000	51.21%		The individual is married
Separated	15000	1.07%		The individual is separated
Divorced	15000	0.41%		The individual is divorced
Widow	15000	7.17%		The individual is a widow
Self-employed	15000	14.57%		The individual works independently
Employed	15000	31.49%		The individual is employed
Unemployed with subsidy	15000	3.49%		Lost his/her job but has subsidy
Unemployed no subsidy	15000	1.43%		lost his/her job and has no subsidy
Disabled	15000	2.48%		The individual has some disability
Retired	15000	11.03%		Retired
Homemaker	15000	1.41%		Housewife or other
Student	15000	0.01%		Actively studying
Other	15000	0.09%		Other labour situations
Premium**	15000	63,968.96	14,144.91	Health insurance premium (pesetas-1994) annual

No Change	15000	40.49%		% of individuals who have a negative perception of the NHS (they think that no changes are needed)
Some Change	15000	47.36%		% of individuals who have a negative perception of the NHS (they think that some changes are needed)
Significant Changes	15000	6.62%		% of individuals who have a negative perception of the NHS (they think that significant changes are needed)
Lack of NHS Support	1500	5%	23%	% of individuals who have a negative perception of the NHS (they think that it should be reformed completely)
PHI	15000	19%	39%	Percentage of privately insured

Source: Catalan Health Survey, 1994, and our own.

*About a third of the sample did not report their income but reported everything else. To those individuals, we imputed the predicted income based on age, sex, marital status, education, health, number of members in the family

**We impute health insurance premium to those that have a missing value by predicting premium as a function of age and gender as explanatory variable.

Table 2: The decision to purchase PHI and the "Lack of support for the NHS"

Model†	Probit	Biprobit		Recursive Biprobit		IV Probit
Dependent variable	Lack of support NHS	Lack of support NHS	PHI	Lack of support NHS	PHI	Lack of support NHS
Age	0.0670*** (0.006)	0.0630 ** (0.005)	-0.011*** (0.003)	0.026*** (0.007)	0.0105** (0.005)	-0.006 *** (-0.019)
Age^2	-0.0010*** (0.000)	-0.0010*** (0.000)	0.000001*** (0.000)	0.00001*** (0.000)	-9.2E-05 *** (0.000)	0.00003 (0.0002)
Married	-0.0100 (0.048)	-0.0740*** (0.047)	0.032*** (0.034)	-0.015*** (0.051)	-0.0472*** (0.038)	-0.0861 (0.047)
Male	0.0240 (0.035)	0.0320*** (0.035)	-0.012*** (0.025)	0.050 *** (0.036)	-0.0224*** (0.029)	0.0260** (0.036)
Log of Income	-0.059 -(0.032)		0.693*** (0.026)	-0.010 *** (0.053)	0.7127*** (0.030)	0.007 (0.032)
No income reported-dummy	0.122 (0.0038)		0.113*** (0.027)	-0.212 *** (0.089)	0.140*** (0.032)	0.069 (0.079)
Very good health	-0.1740** (0.083)	-0.1740** (0.083)	-0.121*** (0.052)	-0.087 (0.078)	-0.068*** (0.070)	0.1481 (0.075)
Good Health	-0.0450*** (0.072)	-0.0440*** (0.072)	-0.141*** (0.047)	0.039*** (0.088)	-0.111* (0.063)	0.116 (0.075)
Fair health	0.0510*** (0.081)	0.0490*** (0.081)	-0.282*** (0.056)	0.045*** (0.122)	-0.264*** (0.070)	0.221 (0.139)
Bad health	-0.0040*** (0.115)	-0.0090*** (0.115)	-0.388*** (0.084)		-0.420*** (0.100)	
Education 1	-0.1980*** (0.075)	-0.1530*** (0.075)				
Education 2	-0.1280*** (0.053)	-0.1040*** (0.053)				
Education 3	0.0450*** (0.062)	0.0520*** (0.062)				
Log of Premium PHI			-1.374*** (0.105)		-1.3219*** (0.117)	
Constant	-2.5360*** (0.122)	-2.5550*** (0.122)	4.618*** (1.157)	-1.696** (0.783)	3.2435*** (1.305)	0.221*** (0.139)
PHI				0.578** (0.268)		2.7739*** -(0.005)
Rho-error term correlation	0.25 (0.041)	0.1400*** (0.025)				
LogLikelihood		-7920.1131		-8039.789		-2160.64
Wald Test chi2(k-1)	-7920.1131	1040.61		855.18		3691.94
Prob> Chi (k-1)	1040.61	0.0000		0.0000		
Log-Likelihood test (rho=0)	0.0000	43.0818		1.0378		
Prob>Chi^2(k-1)	43.0818	0.3083		0.3083		

† The number of observations used to estimate all models is 11,567 due to missing data
*, **, *** indicate significance at the 99%, 95% and 90% level, respectively
Standard Errors in brackets.

Table 3 Probit Model Marginal Effects for Lack of Support

	Assuming Exogeneity	Assuming Endogeneity
Age	**0.006****	**0.005 ****
Age^2	**-0.0001****	**-0.0001****
Married	**-0.008****	**0.006 ****
Male	0.004	0.001
Log of Income	0.003	0.002
No reported income	**0.011****	**0.001**
Very good health	**-0.013****	**-0.0111****
Good Health	-0.003	- 0.015
Fair health	0.007	0.001
Bad health	0.002	0.008
PHI	**0.061****	**0.056****

** Indicates significance at a 5% level and *** at the 1%.

Table 4: Ordered Probit for Lack of Support

	Ordered Probit		Level of changes needed in the NHS		
			None-Some	Some-Significant	Significant-Totally
	Coeff	st error			
Age	0.0147**	(0.0035)	-0.0057**	0.0028**	0.0013**
Age^2	-0.0002**	(0.000001)	0.0001**	0.00004	0.0001
Married	-0.0367	(0.0283)	0.0142	-0.0071	-0.0033
Male	-0.0076	(0.0209)	0.0030	-0.0015	-0.0007
Log of Income	0.1081**	(0.0205)	-0.0418**	0.0210**	0.0095**
No income reported-dummy	0.1821	(0.0230)	-0.0698**	0.0332**	0.0164**
Very good health	0.0220	(0.0529)	-0.0085**	0.0042**	0.0020**
Good Health	0.0908	(0.0477)	-0.0352	0.0177	0.0080
Fair health	0.1449**	(0.0522)	-0.0555**	0.0262**	0.0131**
Bad health	0.1541**	(0.0696)	-0.0585**	0.0262**	0.0142**
PHI	0.2543**	(0.0263)	-0.0961**	0.0423**	0.0235**
μ_1	1.5610	(0.3074)			
μ_2	3.0114	(0.3080)			
μ_3	3.4419	(0.3081)			
μ_4	4.4345	(0.3110)			
Log-Likelihood	-12,878.46				

** Indicates significance at a 5% level.