Asymmetric Information in the Portuguese

Health Insurance Market

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1 Introduction

● The negative consequences of asymmetric information in insurance markets are well known.

● Methods to minimise these consequences are used by insurance companies.

● *Are the methods used by the insurance companies enough to eliminate the problems of asymmetric information?*

● The purpose of this paper is to contribute to the answer to this question in the case of the Portuguese health insurance market.

● The demand for health care is modelled conditioning on characteristics of the individuals and on information on the existence of health insurance coverage.

● Some authors have developed this type of study (for example, Holly et al, 1998, Cameron et al, 1988).

2 Some features of the Portuguese NHS

- Theoretically, the NHS covers all health services and all individuals.

- However, some types of care are not available in the NHS, like dental consultations.

- Specialist and dental consultations are more commonly provided by the private sector.

- In those cases, the NHS reimburses expenses up to certain amount for each type of service.

- Those maximum amounts are insignificant when compared to the costs of private health care.

- Rationing within the NHS might result from lack of supply of certain services (specially in some regions).

- Rationing constrains the demand for health care. It can make it unpossible to reach the optimum consumption level.

3 Health insurance and asymmetric information

● Expenditure in health care is unknown. Risk-averse individuals want to avoid a large expenditure.

● Health insurance is the natural solution for this problem. Under reasonable assumptions, the consumer chooses to buy some insurance.

● The heterogeneity of the population together with the inability of insurers to distinguish consumers according to their risk leads to adverse selection (Akerlof, 1970).

● Adverse selection affects the efficiency of the equilibrium in insurance markets and even its existence (Akerlof, 1970).

● Solutions for adverse selection:

   − "self-selection mechanism" (Rothschild and Stiglitz, 1976)
   − "categorisation of risks" (Hoy, 1982)
   − "multi-period contracts" (Dionne, 1983)

● Being insured diminishes the incentives to avoid losses, moral hazard.

● It is a problem of asymmetric information since the insurer does not observe this behavioural change.

● Moral hazard limits the ability of risk spreading.

● Since Arrow (1963) and Pauly (1968), some solutions were proposed:

> – Observation of care by the insurer
> – Partial coverage (coinsurance and deductibles)

● Adverse selection and moral hazard lead to a higher demand for health care for insured individuals.

● Asymmetric information can be detected by comparing the demand of insured and uninsured individuals.

● However, the observed health care consumption is likely to differ from the desired consumption due to rationing.

● It should be taken into account that evidence of a higher consumption of insured individuals might by associated both to:

- Asymmetric information - moral hazard and adverse selection).
- Reduction of rationing allowing the individual to approach the optimum consumption level.

4 The data

- Sample of 4164 individuals taken from the 1997 wave of the Portuguese Household Panel.

- Demand for health care measured by the number of visits to three types of doctors in the 12 months before the survey. This paper focuses on the number of visits to a specialist (except dentist).

- Information on socioeconomic and demographic characteristics of the individuals and on the existence of health insurance coverage.

- Covariates: Age, Sex, Income, Education, Activity, Region, Health status, Smoking habits

- Insured $= 1$, if covered by private health insurance

- If the effect of Insured on the desired health care consumption is significantly positive, there is evidence of asymmetric information.

5 Modelling issues:

● Bivariate Probit Model with partial observability (Poirier, 1980) is used for the probability to visit a especialist.

● Objective: to estimate the effect of being insured on individual behaviour concerning health care.

● A significantly positive effect would show evidence of asymmetric information.

● However, the observed consumption might not correspond to the desired consumption due to rationing of care.

● Thus, the effect on the observed consumption might differ from the effect on the individual behaviour.

● The model used allows to overcome this limitation of the data.

- Demand for health care is often modelled as the number of visits to a doctor.

- The number of visits has been defined as the result from two different decision processes (see Pohlmeier and Ulrich, 1995 Santos Silva and Windmeijer, 2001).

- In the first process, the individual decides whether or not to go to the doctor.

- In the second process, the individual and the health care supplier determine the number of referrals.

- The length of the observation period is 12 months which leads to measurement errors.

- The number of referrals depends on unobservable factors (characteristics of the doctors, the degree of delegation of authority by the individual).

- Attention is focused on the first decision process.

● There is not complete information on this decision. This decision might be affected by rationing.

● A positive number of visits means that the individual decides to visit the doctor and has access to that service.

● An outcome of zero visits might result from two situations:
  – the individual decided not to visit a doctor or
  – the decision to visit a doctor did not result in a visit because of rationing.

● Let

$$S = \text{number of decisions to visit a specialist}$$
$$V = \text{number of visits to a specialist}$$
$$A = 1, \text{if the individual has access to a specialist}$$
$$D = 1, \text{if } S > 0$$

then

$$\Pr\left[V > 0|x\right] = \Pr\left[S > 0, A = 1|x\right] = \Pr\left[D = 1, A = 1|x\right],$$

● There is only information on $D \times A$. Thus, we only know whether or not both D and A equal 1.

● The conditional probability of visiting a specialist is given by (Poirier):

$$\Pr\left[V > 0 | x\right] = \Pr\left[D = 1, A = 1 | x\right] = F(x\beta_1, x\beta_2; \rho),$$

where $F(., .; .)$ is the bivariate standard normal distribution and ρ is the correlation between unobservable factors.

● $\hat{\beta}_1$ gives the estimated effects on the conditional probability of deciding to visit a specialist.

● $\hat{\beta}_2$ gives the estimated effects on the conditional probability that the individual has access to specialised care.

● The individual makes the decision to seek care based on preferences and needs. This decision is defined as a function of the covariates mentioned before.

● Access to specialised care is limited by rationing. It is assumed to depend on: Region, Age, Income, Hosp and Insured. The elements of β_2 that correspond to the remaining covariates are constrained to equal 0.

● This model allows to distinguish the effect of health insurance on the access to specialised care (constrained by rationing) from the effect on the individual decision to visit a specialist.

● The possible endogeneity of the decision to purchase insurance is not taken into account.
- It would require the use of instruments related to risk aversion of the individuals.

- Risk aversion is not observable and cannot be approximated with the available information.

● The model should be seen has giving the effect of health insurance on the probability of visiting a specialist, conditional on the remaining covariates.

● This probability is a conditional expectation, which is an optimal predictor. For insurance companies, this is possibly more interesting than an economic model for individual behaviour.

Variable	Decision		Access	
	$\hat{\beta}_1$	Std.dev.	$\hat{\beta}_2$	Std.dev.
Constant	−0.056	1.113	−0.719	0.641
Male	−0.679	0.850	—	—
Age	−0.001	0.038	0.039	0.022
Age2/1000	−0.112	0.342	0.336	0.183
MaleAge	−0.023	0.034	—	—
MaleAge2/1000	0.443	0.318	—	—
Health1NChronic	0.615	0.087	—	—
Health1Chronic	1.264	0.177	—	—
Health2NChronic	1.543	0.273	—	—
Health2Chronic	2.329	0.564	—	—
Hosp	2.632	2.062	0.524	0.176
Smoke1	−0.057	0.132	—	—
Smoke2	0.263	0.116	—	—
Smoke3	0.079	0.152	—	—
Smoke4	−0.111	0.090	—	—
Income1	0.017	0.216	0.111	0.117
Income2	−0.016	0.242	0.549	0.179
Income3	0.135	0.247	0.550	0.161
Income4	0.253	0.298	0.970	0.187
Activ1	−0.580	0.145	—	—
Activ2	−0.402	0.144	—	—
Activ3	−0.114	0.138	—	—
Activ4	0.064	0.334	—	—
Educ1	0.201	0.120	—	—
Educ2	0.564	0.152	—	—
Region1	0.285	0.175	−0.317	0.197
Region2	0.089	0.171	−0.083	0.217
Region3	0.254	0.218	−0.530	0.203
Region4	0.470	0.223	−0.374	0.240
Insured	0.580	0.229	−0.170	0.229

$\hat{\rho} = 0.019$ std.dev.= 0.458

$Log - likelihood = -2289.01$

	$\Pr\left[D = 1 \mid \bar{x}_1, \text{Insured}\right]$
Insured $= 1$	0.543
Insured $= 0$	0.319
$\Delta\Pr$	0.224

x_1 is the vector of regressors excluding Insured
$\bar{x}_1$ is obtained by taking the mean of Age and the mode
of the discrete regressors

• It is not possible to evaluate the effect of Insured on the total expenses in health care.

• However, a higher propensity to visit a doctor is related to higher expenditure.

• Thus, the results suggest that the amount spent in health care by a person who is covered by health insurance tends to be higher than if he was not covered.

• That difference arises from the different behaviour of insured and uninsured individuals.

• There is no evidence that the increase on the consumption of insured individuals is associated with alleviating rationing.

6 Conclusions

- There is evidence of asymmetric information.

- Being insured has a significant effect on health demand which cannot be explained only by rationing of care in the public sector.

- Income and region of residence are important determinants of access to specialised care.

- The main conclusion is that *the problems of asymmetric information are not being fully eliminated in the Portuguese health insurance market.*

- The empirical analysis in this paper has limitations related to the available data.

- Availability of a richer database would allow a different, probably better, analysis.

Description of covariates

Age	age in years
Male	1 if male
Health1Chronic	1 if considers general health status to be fair and does not have a chronic illness or disability
Health1NChronic	1 if considers general health status to be fair and has a chronic illness or disability
Health2Chronic	1 if considers general health status to be poor and does not have a chronic illness or disability
Health2NChronic	1 if considers general health status to be poor and has a chronic illness or disability
Hosp	1 if was more than 7 nights hospitalised in the previous year
Smoke0	1 if has never smoked (reference)
Smoke1	1 if does not smoke but has smoked occasionally in the past
Smoke2	1 if does not smoke but has smoked daily in the past
Smoke3	1 if smokes occasionally
Smoke4	1 if smokes daily
Income0	1 if net annual income is less than 2500 Euro (ref.)
Income1	1 if net annual income is between 2500 and 4500 Euro
Income2	1 if net annual income is between 4500 and 6000 Euro
Income3	1 if net annual income is between 6000 and 8500 Euro
Income4	1 if net annual income is above 8500 Euro
Activ0	1 if is inactive or discouraged worker (reference)
Activ1	1 if works in agriculture
Activ2	1 if works in industry
Activ3	1 if works in services
Activ4	1 if is unemployed
Educ0	1 if did not complete basic school (reference)
Educ1	1 completed basic school (9 years) but not secondary school
Educ2	1 completed secondary school (12 years)
Region0	1 if lives in Madeira (reference)
Region1	1 if lives north from Lisboa e Vale do Tejo
Region2	1 if lives in Lisboa e Vale do Tejo
Region3	1 if south from Lisboa e Vale do Tejo
Region4	1 if lives in Açores
Insured	1 if is covered by private health insurance