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Estimating the demand and individual expenditure for pharmaceutical's: evidence from the Catalan health survey

by

Joan Costa[a,b], Joan Rovira[b] and Panos Kanavos[a]
[a]LSE Health and Social Care, London School of Economics, London (UK)
[b]Grup de Recerca en Economia de la Política Social, Universitat de Barcelona, Barcelona (Spain)

Corresponding Author:

Joan Costa i Font
LSE Health and Social Care,
Houghton Street, London WC2A 2AE.
Tel : 020 79556484
Fax: 020 7955 6803.
E-mail:J.Costa-Font@lse.ac.uk

Abstract

This paper estimates the determinants of the demand for pharmaceuticals in Spain accounting for individual differences in co-payments along with the influence of self-medication. The econometric application accounts for the censured nature of the data, arising from infrequency of purchases and the non-observability of out of pocket vs prescription drugs. Results from an econometric model controlling for selectivity and endogeneity issues suggest that income does not influence demand for pharmaceuticals whereas health status and age (age shows a non-linear effect) are strongly influential in determining demand for pharmaceuticals. These results are relevant, especially in the Spanish case where current reform proposals are planning to introduce income related co-payments instead of the age related ones. Further out-of pocket expenditure determinants are identified and analysed. Self-medication is a significant demand determinant for demand however, it does not significantly influence expenditure. Reasons for this are that individuals just consume without a prescription low priced drugs and medicines for non-severe amenities that tend to be inexpensive. Policy implications of the papers show that any variation in the co-payment structure and on in the price of medicines that are typically consumed without prescription would significantly influence demand.

Key words: pharmaceutical expenditure, demand for drugs, Catalonia.

1. INTRODUCTION

From an economic point of view, pharmaceuticals are an input of the health care and health production process . Although some pharmaceuticals are purchased over-the-counter the large part of the pharmaceutical consumption comes from prescribed drugs. When the public sector plays an active role (both as an active agent and as a regulator[1]) as happens with many other health care inputs there is a general trend of rising health care of a rising health care expenditure, and in particularly pharmaceutical expenditure. One of the largely emphasised issues still under study is the role *insurance coverage and reimbursement* in the demand and expenditure for pharmaceuticals. Even though rising costs may justify insurance coverage to reduce the burden of out -of-pocket drug spending (Stuart et al , 2000)[2], at the same time significant moral hazard effects may induce individual drug consumption to rise. The Catalan (& Spanish) National Health Service provides free-off -charge universal health care coverage with the exception of prescribed drugs sold in pharmacies which are subject to a significant cost sharing. From 1980, co-payments charged to consumers were of a 40% , except for pensioners who are exempt from charges, and chronically ill consumers who pay a 10% of price up to a reduced cap of 2.2 euros. The overall effect of cost sharing is however ambiguous since there is some degree of prescription fraud by pensioners. Although it may be extremely difficult to estimate with some precision this magnitude, estimates disclose a value of approximately 8% (López and Mossialos, 2000). Studies estimating the demand for health care tend to exclude the influence of pharmaceuticals demand, mainly because existence of consumer co-payments (López , 1998) constraints the possibility of identifying its influence in household surveys.

Evidence from the pharmaceutical market in the US insurance coverage for pharmaceuticals increases the use and expenditure of prescription drugs, whereas leads to a reduction of out-of pocket expenditures (Lillard et al 1999[3], Coulson, et al, 1995[4]). However there is small evidence of this phenomenon in European countries from studies based on individual data, and therefore accounting for consumer characteristics. The main previous study based on aggregated data on the demand for pharmaceuticals for Spain, was undertaken by Puig (1988). In this study it was estimated a small price elasticity and from this paper it appeared as relevant the small effect of cost sharing policies in the demand for drugs. The reasons for this is its complexity and difficulties for precisely measuring the effects of relevant unobserved determinants. In Spain the effect of co-payments can be indirectly approximated by the influence of *age and disability,* as co-payments (different then the 0%) apply for non-retired workers as well as for chronically ill patients. The aim of this paper is to estimate the determinants of the demand for pharmaceuticals using individual data on pharmaceutical's use, GP visits and out-of pocket expenditure. Unfortunately, available data refers only to one year 1994 where the Catalan Health Survey data was collected, therefore no time effects are captured. Nonetheless, we account for censuring and endogeneity effects that yields as a

[1] The development of "fourth hurdle " criteria based on economic evaluation techniques rise to the fore the issue that regulating the demand for pharmaceutical's should not only rely on overall costs but in effectiveness as well, that is resources involved in the health production process and its effects on individuals health.

[2] Stuart, B; Brandt, N ; Brieacher, B; Fahlam, D; Palumbo, F; Pizarro, J and Stuart, L (2000). Issues in prescription drug coverage, pricing, utilisation and spending: what we know and what we need to know. Report for the US Department of Heath and Human Services. Office of the Assistant for Policy and Evaluation Office of Health Policy.

[3] Lillard, L; Rogowski, J and Kington (1999). Insurance coverage for prescription drugs. Medical Care, 37: 926-936.

[4] Coulson, E; Rerza, J Neslusan, C and Stuart, B (1995). Estimating the moral hazard effect of supplemental medical insurance in the demand for prescription drugs by the elderly. American Economic Review, 85:122-26.

result of the existence of co-payments employing double equation process that includes the determinants for GP visits . From the variables included in the model we are in a position to investigate the influence of cost sharing policies, self medication and income effects in the demand for pharmaceuticals. Additionally, results may be interpreted in a restrictive way as capturing evidence of supply induced demand in the case of pharmaceuticals. Finally which are the additional determinants of the demand for pharmaceuticals.

2. THE PHARACEUTICAL MARKET REGULATION

Catalonia is legally an autonomous community from Spain. In Spain the share of pharmaceutical expenditure in total health expenditure is as large as the 19,5% in 1997 whereas the mean of the European Union (EU) countries is around 12% (Puig, 1999)[5] . To contain this "expenditure excess" recent demand cost containment measures taken mainly refer to the introduction of a "negative list" for minor drugs no longer being subsidised, and the increase of medicines treating chronic conditions. As López and Mossialos (2000)[6] show pharmaceutical expenditure in Spain has risen due to the price increases of mainly new reimbursed medicines. Other measures implemented refer to establishing fixed budgets for pharmaceutical expenditures and capitation payment to doctors. However as figure 1 displays, prescription sales have been significantly growing from 1988 to 1998.

From a demand perspective the market for pharmaceuticals in Spain comprises three main products: (i) over -the -counter (OTC) medicines for which consumers pay the whole price (which may include vitamins and other supplement's) , (ii) medicines (patented novel medicines, branded and unbranded generics) sold under NHS GP prescription which are subjected to co-payments relying on individual characteristics and (iii) medicines purchased through private prescription, where unless the consumers acquires an NHS prescription, pays the whole price. Prescription drugs account for around the 80% of total pharmaceutical expenditure.

Price regulation of pharmaceuticals in Spain& Catalonia is mainly based on the decision of a Commission that is ascribed to the Spanish Ministry of Health and Consumption that determines the *maximum reimbursable price* for every pharmaceutical speciality. This price includes generics but excludes a set of pharmaceutical specialities that were excluded from public subsidisation form January 1998 . Prices for drugs differ between purchasers. A preliminary distinction should be posed between drugs that are sold in pharmacies from drugs sold to hospitals, the later obtaining discounts that are explicitly contemplated in the maximum price setting that the ministry of health undertakes. Additionally, the later are not paid by patients or if paid (due to hospitalisation in private hospitals) individuals are sensibly les aware of its costs.

Reimbursement policies are determined by a special Commission of rational use of drugs where the 17 autonomous regions are represented, such as the industry, consumers , trade unions, professional associations and experts designated by the Ministry of Health. is based on the inclusion of a set of drugs in a negative list that typically excludes those drugs groups indicated for minor symptoms. The general criteria for the inclusion of a drug in the list are: a) the characteristics of the disease, b) the inclusion in a patient groups, c) the drug

[5] Puig, J (1999). *Reptes de la gestió de la prestació farmaceutica*, Fulls econòmics del sistema sanitari., 33, novembre

[6] López Bastida, J and Mossilaos, E (2000). Pharmaceutical expenditure in Spain: cost and control. *International Journal of Health Services*, 30:597-615.

therapeutic utility, d) public expenditure limitations or finally, e) the existence of therapeutic alternatives. OTC are excluded of reimbursement , however we may distinguish those drug categories that are publicised that are explicitly excluded from reimbursement from those that are not. Patients that are hospitalised under the NHS system, obtain free-of –charge drugs , totally financed by the public sector. 68% of prescribed drugs are subject to co-payments as follows:

- 40% of selling price for drugs in general
- 10% for some collectives and drugs for chronically ill patients up to a price cap of 439 PTA, equivalent to 2.63 Euro.
- Disabled and retired population is exempt from paying any co-payment.

Prescription policies are based on the practice guidelines developed at the regional level . Physicians –both in primary care and in hospitals - obtain a salary partly determined by incentives linked to prescription quality . Generics are being extensively promoted and publicised in the media and encouraged through a new system of reference pricing.

The market for medicines in Spain is one of the largest in the European Union (EU) in consumption terms. As in most other countries, the study of both demand and expenditure for pharmaceuticals is quite limited, pharmaceutical products are extremely differentiated, i.e the total pharmaceutical presentations in the market in 1998 were of about 8000. Therefore, it's extremely difficult to account for all the products to estimate demand . Even in such a case or in the assumption that products would be grouped in specialities, additional problems would be to account for unobserved heterogeneity.

One of the main worries regarding the Spanish pharmaceutical policy is the rise of prices. Pharmaceutical prices have risen significantly more than the general price index. However, due to the small innovative activity of Spanish firms pharmaceutical and the smaller purchasing power, prices in Spain are comparatively lower than prices in other parts of Europe (se table 1). However, looking at consumption per capita in absolute and relative terms it becomes evident that is as large as the UK whereas in relative terns (%GDP) its one of the EU countries that has a higher pharmaceutical expenditure from which a 78% of the bill is paid by the public sector. The Spanish health system is structures in regions health services. As table 2 shows, Catalonia and Valencia display the highest value of pharmaceutical specialities sales per capita and high share of total pharmaceutical expenditure according to the population share it has. Therefore, the application to Catalonia appears as particularly relevant.

3. INDIVIDUAL DETERMINANTS OF THE DEMAND FOR DRUGS

The demand for pharmaceutical's we specify is directly derived from the demand for health care following the Grossman's tradition. Agents employ time and health care -both intangible (medical care) and tangible (pharmaceutical's) - to fulfil their demand for health . Let us follow the traditional demand analysis and assume that each household maximises a utility function subject to a budget constraint and as a result is obtained an indirect utility function :

$$v_h = v(x_h, p, z_h)$$

where x_h is the total expenditure per household that is assumed to be equal to disposable income, p refers to prices and z_h is a vector of household characteristics. Additionally we would obtain that demand for drugs will be associated with the demand for health care following the Grossman model such that the demand for pharmaceuticals will depend on the individuals stock of health care (H), income (Y), prices for pharmaceuticals (here we will refer to their determinants: age and disability), education (E) and environmental conditions :

$$P_h = F(P, E, Y, X, Age, disability)$$

form this theoretical determinants, the literature on the demand for drugs identifies several determinants mostly associated with individual characteristics (Stuart, 2000; Poisal et al, 2000[7]). A first distinction may be between individual and economic determinants. This is important as far as individual mainly determinate demand whereas economic determinants are especially associated to expenditure increases.

a) Individual determinants

Ill health appears as the most important determinant , as pharmaceuticals are an input in the health production process, the lower health status is, the higher the demand for pharmaceuticals. Start et al (2000)[8] finds that a large share of prescriptions for Medicare beneficiaries reporting having a several chronic conditions than for others. Gender and race are also relevant determinants, females have shown to spend more than males. This is can be partially explained by the appearance of diseases that affect women at middle ages and not men. Moreover, race may not be a relevant determinant in Spain as the very vast majority of the population is white. Further, as Stuart (2000) argues, even when race is relevant it may be a proxy variable for income rather than an individual determinants per se. Disability at young age is also identified as a relevant determinant. Poisal et al (2000) finds that disabled beneficiaries under the age of 65 spend almost the double the amount of aged beneficiaries. Age determinants are not entirely clear. First, age is positively associated with health status depreciation we may find a positive influence there. However, prices for chronic ill patients and aged-related medicines sometimes appear to be higher than for other age groups. At this point there is some controversial

[7] Poisal JA, Murray LA, Chulis GS, Cooper BS. (1999). Prescription drug coverage and spending for Medicare beneficiaries. Health Care Financ Rev.20(3):15-27.

[8] Stuart ,B; Shea, D and Briesacher, B (2000). Prescription drug coverage for Medicare beneficiaries: coverage and health status matter. The Commonwealth Fund. New York.

evidence. Evidence from the US (Stuart, 2000) shows that prices for medicines typically prescribed to elders are higher than other. Brendt et al (1998)[9] shows that weather there is no systematic age-related difference in price increases for three classes of drugs (antibiotics, antidepressants and calcium channel blockers) at the manufacturer level, a positive age pattern appears at the wholesaler level for antibiotics and a negative age pattern was found at the pharmacy. Therefore, there is no clear evidence of the age related effect and really depends on the sort of drug analysed , and especially if it treats age related diseases or not.

b) Economic determinants

As far as beneficiaries of insurance coverage do not pay the full price, the role of physicians on determining the demand for drugs is very important. Drug prescription decisions are typically guided by the physicians decision making however, pharmacists play a role in the posterior generic substitution mechanism. Therefore, drug prices may determine consumption and drug expenditure by inducing to pharmacists to substitute drugs. As most of supplemental PHI schemes do not cover drug expenditure and some share of the population (the 22% in Catalonia) have some sort of PHI, they visit a private doctor and if they wish to have a subsidized prescription they have to visit an NHS GP.. Accordingly, high income individuals will consume

Economic determinants are various and very significant, especially when examining consumption of out-of pocket medicines or drugs which are subject to large consumer co-payments. However, the opposite holds with prescribed medicines when co-payments are large (Poisal et al, 2000). Low income may be a significant positive predictor of pharmaceutical expenditure, especially when drugs are reimbursed by the NHS. This is the case of coverage of chronically ill patients. Medicines to treat this sort of patients may be rising prices at higher rates than other drugs. Another important economic determinant is insurance coverage. Poisal finds that individuals with insurance coverage spend a 67% more than those without coverage in the US. Urban status was found as a positive predictor of drug spending in the US (Lillard et al, 1999) whereas age and education were negatively associated when other factors are equal.

[9] Brendt, E.R; Cockburn, I.M; Cooks D.L et al (1998). Prescription drug process for the elderly. Monthly Labour Review, September, 23-34.

4. EMPIRICAL METHODOLOGY AND THE DATA

The methodology implemented in this papers has two main aims :

a) Obtaining the impact of cost sharing in the demand and individual pharmaceutical expenditure.
b) Obtaining the determinants of the demand for pharmaceuticals and specifically the effect of self medication, income and health status, chronic conditions, in the individual pharmaceutical expenditure

Estimating the demand for pharmaceuticals with survey data is a complex issue due to many reasons. Available surveys just show the amount of pharmaceutical expenditure that the individual(family) has undertaken. However, pharmaceutical expenditures includes both out of pocket (with and without prescription) , co-payments and consumption of minor substances (i.e vitamins, etc)

The demand for pharmaceuticals may have very many motivations. A first distinction may be set between prescribed an non prescribed medicines (OTC). Typically non prescribed medicines may be demanded due to self medication and very minor illness . IN this study we estimate using the Catalan Health Survey that a 13% of the population has consumed a drug without any prescription, from where a half of them were drugs for severe illness. However table 4 shows that looking at specific drugs we find that self-medication is typically undertaken under minor diseases whereas is sensibly small for severe diseases.

A second major distinction may be set between subsidized and not subsidized medicines. When drugs are not rationed or co-payments are small we may expect pharmaceutical expenditure to rise. This may be the logical result under the presence of supplier-induced demand (SID) . However, when estimating the effect of co-payments in demand, we should take into account that co-payments are set according to some individual characteristics that result from higher need of pharmaceutical consumption due to a fragile health status. Hence, statistical test exclusively based on individual characteristics may fail to consistently estimate the presence of SID.

Moreover, under prescribed drugs, the demand decision is typically taken by the doctor rather than by the patient (consumer). In Spain GP´s act as gatekeepers and is with them that most prescriptions originate (López and Mossialos, 2000). Therefore, the decision to consume prescribed pharmaceuticals cannot be separated from the decision of consuming health care since it's the result of visiting a doctor. Further, even when accounting for the possible endogenenity arising due to the influence of health care consumption, subsidized pharmaceutical consumption is obtained from visiting an NHS doctor rather than private sector doctors. Individuals may consume NHS health care obtain subsidized prescriptions. Evidence form Catalunya (Vera-Hernandez, 1999[10] ; Costa and García, 2000[11]) shows that whereas people that purchase PHI tend to visit more the specialist doctor , this is not the case of GP visits, typically prescribing subsidized drugs. The existence of differential co-payments introduces an important issue to take into account when estimating the relationship of age in the demand for pharmaceuticals.

[10] Vera, M.A (1999). Duplicate coverage and the demand for health care in Catalonia. Health Economics.
[11] Costa, J and García, J (2000). Is there a quality gap? The demand for health insurance in Catalonia, WP Universitat Pompeu Fabra.

Empirical problems emerge when using health surveys that contain information on health expenditure. Unobserved heterogeneity may be large due to the heterogeneity of pharmaceuticals. Information on prices for all medicines is not always disposable, however its generally known the co-payment rate on prescribed pharmaceuticals. Therefore, its possible to intrumentalize the price effect using age and disability information. Elderly and disabled pay nothing for prescribed medicines. Therefore a censuring problem appears when estimating the demand for pharmaceuticals . When looking to individual data pharmaceutical expenditure we may encounter zero observations that may arise form different reasons. First, there is an infrequency problem when using data from one year. Second, healthy individuals may not consume pharmaceuticals as its unnecessary for them. Third, as noted before elderly individuals pay nothing for pharmaceutical consumption therefore a zero expenditure arises . Forth, even though some people should consume pharmaceuticals, we may find that some may not afford high prices for some drugs, however this is less likely (corner solution) to happen due to the possibility of consuming a substitute drug.

The data used in this paper is taken form the Catalan Health Survey (up to now the only survey is from 1994). This is a general health survey that contains detailed data on pharmaceutical expenditure and use. Additionally, contains information on medical utilisation and expenditure partially used in this study. Alternative databases are the Household survey and the Ministry of health database. However, the later one is still unavailable and the quality of the information is slightly better than the available information form the Spanish household survey since in this last survey the lengths of time the household is asked to report pharmaceutical expenditures is just one week.

The survey does not contain as an explicit item the co-payment rate for pharmaceuticals . This information has been approximated by two main variables : age (if the individuals is above 65 co-payment is zero) and disability.

As noted before, the demand for pharmaceuticals is determined by the previous demand for health care. Therefore a two-stage models may be the appropriate empirical specification to account for endogenenity and unobserved heterogeneity issues. First we model the demand for pharmaceuticals with and without accounting for the two -stage effect decision process resulting from a previous demand for health care. Second, we estimate using a censured regression model the determinants of out -of pocket pharmaceutical expenditure.

a) The demand model

Our reduce form of the demand for drugs is estimated using a standard probit model that accounts for GP visits. The propensity of a person j to incur in positive prescription of pharmaceuticals is given by:

$$d^* = \beta_0 + \beta_1 SM + \beta_3 age + \beta_4 disanility + \beta_5 X_{ij} + \varepsilon_1 + \mu_{1j}$$

where as far as we do not observe demand we assume that the binary outcome resulting from the question on pharmaceutical consumption takes the value of (D=1) if $d^* > 0$. and 0 otherwise. Other covariates are self medication (SM), determinants of co-payments (age and disability) and other individual characteristics (X). The error structure includes a household component (ε) and an individual component (μ).As consuming prescription drugs is the result of a previous visit to the GP, the demand for pharmaceutical will be estimated as well conditioned on having visited to the NHS GP that is dependent on perceptions of the NHS, age, gender, household size, income and health status (for reference on this determinants in Catalonia, see Vera-Hernández, 1999), we do not present results on this first stage but may be obtained in request.

b) Pharmaceutical expenditure

We are interested additionally in estimating the effect of the same variable as the demand for health plus household determinants in the out-of pocket expenditures (lnE) as follows :

$$\ln E^* = \beta_{20} + \beta_{21} SM + \beta_{23} age + \beta_{24} disanility + \beta_{25} X_{ij} + \varepsilon_{21} + \mu_{2j}$$

$$E = 0 \; if \; E^* \leq 0$$

$$E = E^* \; if \; E^* > 0$$

this specification allow to account for a number of zero responses appearing due to the existence of the cost sharing policies.

5.RESULTS

Table 3 shows some previous evidence on the data analysed in the econometric application. We have divided the sample in household types. From characterisation it becomes evident that elderly /typically living alone or in couple or with others but with no children) show a smaller out-of pocket expenditure on pharmaceuticals whereas consumption is higher. This may be interpreted as a previous evidence on the role of co-payments in the demand and expenditure on pharmaceuticals. Table 4 analyses the relevance of self medication in Catalonia by each sort of drug contained in the survey. Its showed that whereas for minor illnesses requiring i.e aspirin or similar products, medicines to reduce weight and to combat cough, the share of individuals self medicated is larger than others

Table 5 shows the determinants of the individual demand for drugs. We present two different equations, a first equation that accounts for the demand equation estimated using a single process and a second equation where a two stage sample selection process has been estimated. The idea of the former process lies on the feature that the process of pharmaceutical consumption may be the consequence of a prior decision to visits a doctor from which a prescription is obtained. Results in the first column show that use of pharmaceuticals significantly rise with age and age square after accounting for health status determinants. Thus, having a 0% co-payment rate for the retired elderly increases significantly the demand for pharmaceuticals as expected. Moreover, the coefficient of having any disability is significant as well at a 1% level. One of the most important predictors of any use of prescription drugs is health status in accordance with the Grossman tradition. Finally, high education and sex have a strong influence as well. However income is not significant what may suggest that pharmaceuticals as an input in the health production process are not demanded unless the individual is ill, and thus income plays a small role here. In the second equation, the significant coefficient of the variable Lambda indicated that the two stage process has been properly identified. Finally, an interesting finding shows that no evidence is determined of supplier induced demand as the coefficient of doctors and pharmaceutical density are not significant when a two stage process is determined, whereas pharmaceutical density is significant when we do not account for the existence of a visit to an NHS GP. This would suggest that, there is an access motive in the demand for pharmaceuticals although it does not affect prescription pharmaceuticals but other drugs that individuals purchase out -of -pocket without the need a previous visit to the GP.

Table 6 shows the results of the censured model for out-of- pocket pharmaceutical expenditure. Here the effect of age is as before, rising health expenditure but less sensibly due to the fact that part of the age variation is captured by the household characteristics. Self medication did not appear to be significant, what may indicate that even though influences demand as showed before it does not influence expenditure because it mainly refers to low price drugs as aspirin's or similar, etc. This may be better understood if the negative influence of chronic illness is included, as individuals with chronic illness are more likely to prescribed drugs. Further, people with chronic conditions are subject to lower co-payments . Income is not significant when expenditure accounts for zero observations.

6. CONLUSIONS

This study shows that co-payments are playing a significant role in shaping demand and expenditure in the pharmaceutical market, however, as expected its influence is more significant in demand rather than in terms of expenditure. This may evidence the feature that co-payments schemes may disincentive the use of more expensive drugs. Self medication does not pay a role in increasing pharmaceutical out-of -pocket expenditure . This is may be indicating that self -medication is more prominent for "low price drugs" where the patient perceives less need to visit the general practitioner. Both findings shows that when demand for pharmaceuticals is viewed as an for an input of the health production function. In this study we did not include information on prices since we account for aggregate family expenditure and no time effects included. A question for a further study is how pharmaceutical prices influence demand of both prescription non-prescription drugs to determine the role that plays in setting the trade-off between income and health.

Whereas higher income and education were associated at the individual level with a higher demand for pharmaceuticals, neither or not the other determine out of pocket expenses at the family level . As utility of drugs is irrelevant if the individual is not ill, the sort of drug consumed by individuals when ill is independent of income and education , even though more educated and wealthy individuals are more likely to demand drugs. However, education may be additionally proxying individual capacity to prevent illness rather than individual demand for a health related input.

Finally, this paper shows the difficulties that appear when using general health surveys based on individual data in estimating the demand for pharmaceuticals. More work and progress should be done in improving available databases to tests hypothesis on individual demand for pharmaceuticals. Moreover, this paper is a first attempts to account for a reduced from of an individual demand where the role of co-payments indirectly determined.

Table 1. Consumption of pharmaceuticals in some EU countries in 1997

	Prices indices of pharmaceuticals	Pharmaceutical consumption per capita		Per capita public pharmaceutical costs (euros)	Share public total costs
	Spain =100	Euros	% GDP	Euros	%
Germany	178	341.34	1.51	231.92	0.68
UK	182	202.97	0.69	133.33	0.66
France	103	349.02	1.52	318.46	0.91
Italy	113	234.42	0.67	117.84	0.50
Netherlands	217	202.30	0.96	195.91	0.97
Belgium	159	331.65	1.01	211.05	0.64
Spain	100	201.26	1.33	156.96	0.78

Source: FARMAINDUSTRIA, 2000.

Table 2. Value of pharmaceutical specialities sales per capita paid by social security by regional health services (euros)

	Population (%)	Sales 1996	Sales 1997	Sales 1998	% total pharmaceutical expenditure
Andalucía	0.18	126652.1	131438.1	143054.7	0.189
Catalonia	0.15	133411.7	142814.2	157688.1	0.172
Valencia	0.10	143659.3	149966.2	163941.7	0.119
Basc Country	0.05	104591.9	111054.7	123949	0.046
Navarra	0.01	119530.7	126677.5	139879.5	0.013
Galicia	0.07	119008	128710.9	144077.1	0.070
Canarias	0.04	109668.3	116253.2	128698	0.037
INSALUD	0.39	110575.8	115521.4	126945.4	0.353
Total	1.00	969093.8	1024433	1130232	

Source: INSALUD, Subdirección de Atención Primaria.

Table 3. Individual private pharmaceutical expenditure (euros) by Catalan household type in the last 30 days before the survey

Household type	N	Share of the sample	Mean Age	Pharmaceuticals consumption [b]	Individual [a] expenditure* (Euros)	
		%	years	%	Total	Household head
Alone	687	4.58	66.85	0.74 (0.02)	8.67 (1.98)	8.64 (1.98)
Couple (no children)	1964	13.09	61.05	0.67 (0.01)	8.09 (0.79)	9.07 (1.21)
Couple & children	8847	58.98	31.31	0.37 (0.01)	13.20 (0.38)	12.76 (0.74)
Alone &children	813	5.42	41.06	0.50 (0.02)	16.75 (1.90)	13.14 (2.49)
Alone & other	291	1.94	65.9	0.64 (0.03)	8.19 (1.76)	6.74 (2.60)
Couple& Children & other	1543	10.29	39.64	0.49 (0.01)	13.85 (0.85)	12.47 (1.82)
Other alternatives	855	5.70	43.05	0.52 (0.02)	11.16 (1.10)	11.17 (2.18)
Total	15000	-	39.61	0.45 (0.04)	12.37 (0.30)	11.26 (0.55)

*Standard error into parenthesis

[c] Computed as total expenditure per member.

[b] Consumption of drugs (pills, …) the last two days .

Source : Catalan Health Survey, 1994.

Table 4. Self medication in Catalonia

	% individuals	Self medication(%)
Anti-allergic	1.5	6
Anti-depressive	2.5	2
Aspirin or similar	15.5	48
Menopause related drugs	0.3	4
Insulin	2.6	2
Laxative	2.7	39
Tension drugs	9.4	0.1
Cough	6.6	40
Vitamins	6.4	26
Asthma	1.5	0
Tranquillisers	4.4	7
Penicillin	3.7	13
Sleeping pills	3.2	7
Reduce weight drugs	0.4	25
Stomach ache drugs	8.7	10

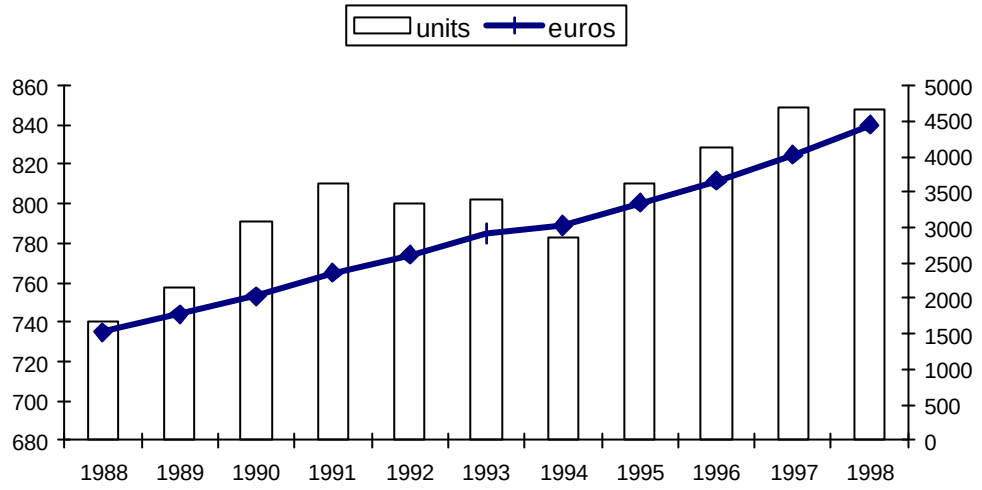
Table 5. Demand for drugs Maximum Likelihood probit model.

	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Age	0.001	0.003	0.401	0.0003	0.0056	0.05
Age^2	0.0003	0.0000	7.708	0.0002	0.0001	3.384
Household members	-0.031	0.012	-2.584	-0.0283	0.0223	-1.268
Gender	-0.338	0.033	-10.166	-0.1644	0.0677	-2.429
Log (income)	-0.026	0.032	-0.803	-0.0339	0.0643	-0.527
Chronic illness	-0.073	0.044	-1.665	0.0001	0.0791	0.001
Perceived health	0.002	0.001	1.573	0.0016	0.0018	0.853
University studies	-0.047	0.075	-0.635	-0.1904	0.1680	-1.133
A levels	0.132	0.080	1.650	0.0142	0.1502	0.095
Secondary studies	0.074	0.046	1.622	-0.0171	0.0821	-0.208
Unemployed	0.030	0.040	0.757	-0.0145	0.0686	-0.212
Disabled	0.086	0.138	0.627	0.3828	0.3245	1.179
NHS coverage	-0.095	0.140	-0.673			
Smoked	0.059	0.032	1.852	0.0180	0.0577	0.311
Pharmacy density	0.627	0.166	3.772	0.419	0.329	1.273
Doctors density	-2.534	1.683	-1.506	0.165	0.317	0.521
Compulsory health insurance	-0.158	0.095	-1.668	-0.3925	0.2707	-1.45
PHI	0.049	0.043	1.132	-0.2203	0.1248	-1.765
Intercept	-0.034	0.252	-0.134	3.6964	.	.
LR test	1318.000					
R square	0.130					
Wald test				1908.65		
Rho				0.8	0.17	4.53

Table. 6 Out-of pocket pharmaceutical expenditure model (censured ML model)

	All		Elderly retired		Disabled	
lfarmexp	Coef.	t	Coef.	t	Coef.	t
SOCIOECONOMIC CHARACTERISTICS						
Couple (no children)	0.249	1.591	0.033	0.026		
Couple & children	0.579	3.626	0.596	0.451	-2.342	-1.625
Alone &children	0.564	3.163	-0.034	-0.022	-1.719	-1.062
Alone & other	0.510	2.300			-3.031	-1.736
Couple& Children & other	0.658	3.751	0.939	0.663	-2.872	-1.801
Other alternatives	0.517	2.784	1.635	1.056	-1.733	-0.816
Household members	0.131	6.394	0.138	1.236	0.259	2.238
age	-0.009	-2.597	-0.033	-0.935	-0.034	-1.09
age2	0.001	2.452	0.001	0.974	0.001	1.52
No studies	-0.113	-1.389	0.340	0.452	-1.056	-1.319
Primary studies	-0.027	-0.433	-0.200	-0.358	-0.431	-0.846
Secondary	-0.107	-1.396	1.103	1.727	0.249	0.363
INCOME AND EMPLOYEMENT						
Unemployed	-0.062	-1.326	1.298	0.923		
Log (household Income)	0.014	0.327	0.298	0.807	-0.228	-0.562
Disability	-0.426	-2.370				
INSURANCE STATUS						
NHS coverage	-0.095	-0.549				
Compulsory insurance	0.073	0.634	1.443	1.310		
Voluntary insurance	0.130	2.357	0.094	0.157		
Self medication	-0.033	-0.421	0.228	0.437	0.796	1.27
Pharmacy density	-0.231	0.365	-0.034	-0.939	-0.002	0.0003
Doctors density	-1.39	1.31	-0.004	0.038	9.89	-9.384
Intercept	7.145	22.613	9.772	1.843	9.773	3.859
	193.78		23.58		15.520	
	0.020		6.00E-02		0.070	

Figure 1. Prescription sales though pharmacies (ex-factory price) 1988-1998 in millions of euros in Spain



Appendix

Table A1. Out of pocket pharmaceutical expenditure by health care most frequently used

Individuals	N	Mean age	% head household retired	%Head of household disabled	Mean expenditure	Std. Dev expenditure
NHS	10210	41.2	2.8	1.6	7312.241	21706.49
PHI	1286	39.18	1.0	0.46	9971.793	24136.57
Private visits	1625	31.6	1.6	0.86	8224.852	22024.74
No use	1789	37.9	2.4	1.6	8572.898	24732.54

Source: Catalan Health Survey, 1994.

Table A2. Auxiliary equation accounting for the demand for health care (visit to the GP)

	Coefficient	S.E	t-value
Age	-0.0081	0.0030	-2.7020
Age^2	0.0002	0.0000	5.3610
Primary studies	0.0003	0.0425	0.0080
Secondary studies	0.0526	0.0551	0.9540
A levels	0.1034	0.0794	1.3020
PHI	-0.4024	0.0531	-7.5840
Log (Income)	-0.0388	0.0379	-1.0240
Members	-0.0171	0.0135	-1.2630
Sex	-0.1799	0.0367	-4.9050
Intercept	-0.7236	0.1933	-3.7440