Is Health Care demand rationed by income and other determinants? An empirical assessment for Italy

IS HEALTHCARE DEMAND RATIONED BY INCOME AND OTHER DETERMINANTS? AN EMPIRICAL ASSESSMENT FOR ITALY

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1. Introduction

The Italian Republic's Constitution defines health as an "individual fundamental right" and as a "public interest"[1]. Hence the entitlement to health is not limited to the individual human being, but is also a public concern given the contribution of the individual to the development of the society he is a part of. This principle obliges the State to program all the activities required to guarantee the health of all citizens and entitles individuals to claim a subjective right to the protection of health not only as a personal good but also as a resource for society's growth. This constitutional right inspired the foundation of a national health service in 1978 with the goal of providing uniform and comprehensive care, sharing the responsibility for healthcare between the State and the Regions. Thirty years after its institution and following several reforms the key principles of the Italian National Health Service are still in place. Although citizens show a certain degree of dissatisfaction with the service provided, they also express strong support for a universalist, egalitarian and publicly-funded healthcare system[2].

An important issue is to what extent the national health service meets the potential demand for health services, given the health needs of the population. The individual, in a moment of extreme need, is ready to pay to pre-

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[1] Art. 32: "La Repubblica tutela la salute come fondamentale diritto dell'individuo e interesse della collettività, e garantisce cure gratuite agli indigenti".

[2] See the results of Eurobarometer in December 2007, where 63% of respondents thought that the quality of Italian hospitals was good and 75% thought the same for specialist and GP visits (EC, 2007).

serve his deteriorating health and improve his well-being: in such circumstance health is a good in an economic sense although, in comparison with other goods, it cannot be directly exchanged but only improved through "intermediate inputs" (health services). Health demand is typically rationed by some measure of cost such as co-payments or waiting lists. However, demand might be constrained by income-related variables if the public healthcare system does not meet the population's health needs and patients are forced to turn to the private market with higher out-of-pocket payments. Does rationing in relation to the socio-economic status of the patient exist which might jeopardize the equity of access to a constitutional right?

The Italian case has been investigated in some recent contributions focused on doctors' visits (Fabbri and Monfardini, 2003; Atella *et al*., 2004; Fabbri and Monfardini, 2006; Atella and Deb, 2008). Fabbri and Monfardini (2003) use count models to investigate the relationship between individual characteristics and the demand – and intensity of use – of generic and specialist visits provided by public and private doctors. Atella *et al.* (2004) study the same issue with a focus on the role of income as a determinant of access to health care. They conclude that the uses of public and private care are driven by different processes and that income strongly influences the mix of services. Fabbri and Monfardini (2006) estimate a simultaneous equation model of doctors' visits to measure effectiveness of user charges and administrative waiting time in curbing the demand for public physicians' care in a market including private providers as an imperfect substitute. Atella and Deb (2008) investigate substitution and/or complementarities in the Italian mixed public-private system. They estimate that public and private specialists are substitute and individuals would opt for care from private specialists if either the cost of public specialists is sufficiently high or their quality sufficiently low.

Indeed generic and specialist consultations represent a primary healthcare service however, as our analysis will show, diagnostic tests and hospital services also deserve specific attention. In particular, the introduction of co-payments for diagnostic tests is under scrutiny as a policy tool for financing public health expenditure deficits in some Regions. This prospect could have a differentiated impact on patients, depending on the determinants of demand for this specific service and on the differences, if any, between public and private providers. In fact, a significant share of utilization of diagnostic tests is provided by private structures and a large part of this cost is also paid by the lower income portion of the population.

This paper offers an empirical assessment of the determinants of healthcare demand in Italy for a detailed range of services. Our approach relies on the literature using two-part models to study healthcare demand (Mullahy,

1986; Pohlmeier and Ulrich, 1995). An econometric hurdle model is applied to study the demand for healthcare, providing insight into how relevant socio-economic variables are in determining both the decision to contact and how frequently to use a service, and the choice between public and the private providers. The empirical analysis is based on a large-scale survey conducted every five years by the Italian National Institute of Statistics which is representative of the population. The survey provides a full account of individual states of health, health care utilization, biometric parameters, socio-economic and other relevant variables. This dataset is matched with other microdata to generate information about the potential individual purchasing capacity and verify any income effects on healthcare demand. We distinguish between the public and the private providers of each healthcare service following the empirical literature mentioned above.

The paper is set out as follows. The description of the structure of the Italian market of health services is presented in Section 2. In Section 3 the theoretical background is presented and the model used is described. A more consistent section of the paper (Section 4) is devoted to an analysis of quantitative and qualitative information revealed by our microdata: we believe that a preliminary descriptive analysis enables a meaningful choice both of the model and of the covariates used in the functions. Results of the empirical analysis are commented in Section 5. Finally, Section 6 presents the conclusions.

2. The Market for Health Care in Italy

The Italian National Health Service (Servizio Sanitario Nazionale, SSN) was established in 1978 and became effective in 1980. In the last twenty years it underwent two main reforms [3] but its general principles were unaffected and are represented by *universalism* (every Italian citizen is entitled to health care regardless of his/her fiscal capacity), *comprehensiveness* (a full range of health services must be provided), *free access* (health services are provided free of charge, except for some co-payments), *equity* (all citi-

[3] The first reform was in 1992-1993 (Dlgs 502/1992 and 517/1993) when local health authorities became public enterprises while before they were a ruled by bodies elected by municipalities belonging to the area. Moreover, major hospitals became hospital enterprises and partial forms of competition and privatization were introduced. The second reform was in 1999 (Dlgs 229/1999) with the introduction of fiscal federalism, all residual transfers from the central state to Regions were abolished, each Region received more own tax resources when the entire matter was reorganized and the system turned towards "planned competition". For an analysis of the reform process of the National Health system see France *et al.* (2005).

zens have equal rights to health care in every part of the country). The SSN is characterised by organizational pluralism at three tiers of responsibilities: the national government, the Regions and the Local Health Enterprises (LHEs). The State is mainly responsible for establishing the institutional settings, planning, controlling, setting the budget and sharing it among Regions and, as a last resort, financing and paying off the debts of Regions. Regions too are responsible for financing the system, for sharing resources among the LHEs, for controlling and appointing top managers of LHEs[4]. Finally LHEs are responsible for providing health services either within their own structures or through contracts with private accredited providers: consequently there is a public-private mix in providing SSN health services.

The Italian SSN is mainly financed by general taxation (97%)[5], by patient co-payments and by borrowing. Depending on a citizen's income, age and health condition, patient co-payments (tickets) are required for specialist consultations, drugs, outpatient treatments, specific diagnostic and laboratory tests, and medical appliances[6]. However, primary care is provided free of charge by general practitioners (GPs). In general they can serve at the most 1,500 patients and are paid according to a capitation fee that applies to the number of people on their list. Moreover, they should act as gatekeepers for access to secondary services the provision of which is refunded by the SSN such as diagnostic tests, hospital admissions, specialist visits. People may choose any physician, among those under contract for the LHA they reside in, provided that the physician's list has not reached the maximum of its capacity. The same organization is envisaged for paediatric care provided by paediatricians working under a public contract and paid on a capitation basis.

Specialized outpatient services, including visits and diagnostics and curative treatment, and hospitals are provided either by LHEs or by accredited public and private facilities with which LHEs have agreements and contracts. People are allowed to access SSN specialist care only after approval by their GP, then the individual is free to choose any provider among those accredited by the SSN, even one outside his LHE. A co-

[4] According to the 2004 data of the Italian Ministry of Health, there are 195 LHEs and 96 Hospital Enterprises (see www.ministerosalute.it).

[5] Taxes are collected by central government and by the regions.

[6] Total exemption from user charges is guaranteed for citizens under 6 and over 65 years old if they have a household income below 36152 Euros. Social pensioners, minimum level pensioners, the unemployed with specific limits on income are also exempted (Law 724, 23 December 1993, art. 1). Total exemption is also provided for individuals affected by chronic and disabling pathologies and by rare diseases.

payment is required as an additional source of financing for the provision of specialist outpatient care and as a way to moderate consumption. However, this fee is quite low compared to the average fees in the private sector[7]. Moreover SSN specialists can provide their services as private practitioners within the public structures besides their schedule as employees if the National Health Service. This arrangement is the so-called "intramoenia" which represents a private practice using the SSN facilities: this service is fully charged to the patient because he can choose the doctor to visit exactly as in the private market.

Indeed, the public health care system coexists with a private market for medical services. The public-private mix in the supply of health services varies considerably among Regions, on average approximately 40% of health services are supplied by private providers with a higher percentage in the South. In order to supply specialist care, private providers are subject to authorisation based on minimum standard requirements. Visits to private doctors do not require GP referral and expenditures are covered either by out-of-pocket payments by patients or by private health insurance. In general fees for private health services are much higher than co-payments in public structures, but waiting times may be shorter and better quality may be perceived by patients though this is not always the case.

Total household health expenditure therefore consists of various items which represent a share of 22 per cent of total health services effectively consumed by Italian households in the year 2006 [8]. It's interesting to observe that this household share has been decreasing since the late Nineties when it reached 29 per cent. This evidence can partly be explained by Figure 1 where the major items of household health expenditure at constant prices are shown. The most important category is expenditure for medicines followed by dental visits, other generic and specialist consultations and diagnostic check-ups. Most of these health expenditures are decreasing in real terms while private expenditure for drugs decreased at the beginning of the

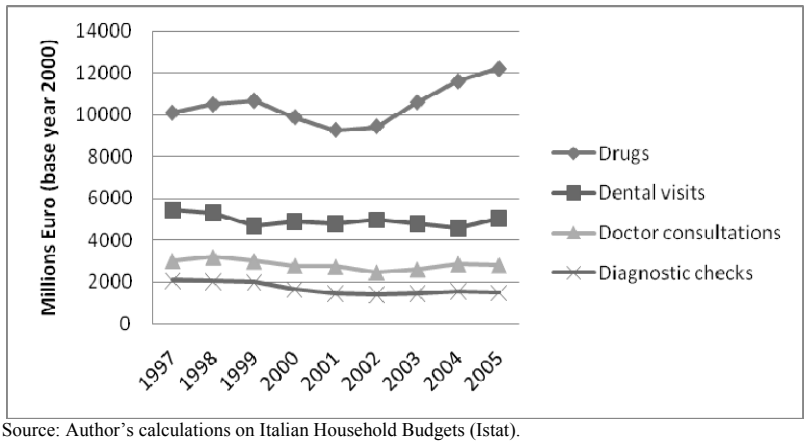
[7] In most Regions – except for Lombardia – the maximum co-payment required for specialist visits is 36.15 Euros while for diagnostic tests the limit is 51.65 Euros for each prescription. Health services for early diagnosis of tumours are exempted from user charges as well as some services provided in special circumstances of social interest (vaccinations, motherhood protection, blood donation, victims of terrorist attacks).

[8] This share is computed as a ratio between the "*household final consumption expenditure*" and the "*effective household consumption expenditure*" for health services as published in the Italian National Accounts. As defined by ESA95, the first concept refers to this sector's *expenditure* on consumption goods and services not to its *acquisition,* thus including only co-payments and out-of-pocket payments for private care utilization and medicines. The second concept also includes health goods and services financed by the government or non-profit institutions but supplied to households as social transfers in kind.

years 2000, in part as a result of the abolition of patient co-payments for drugs, then increasing again after a few years when co-payments were re-introduced in 11 of the 20 Italian regions.

Summing up, the SSN covers most health services provided to Italian households although the relative importance of out-of-pocket payments differs when several categories of health services are considered as shown in section 4.

Fig. 1 – Out-of-pocket household health expenditures: selected categories (1997-2005)



Source: Author's calculations on Italian Household Budgets (Istat).

3. Conceptual framework

Any empirical study on health care utilization must refer to the main theoretical approaches usually used to analyze individual demand for healthcare services. The first traditional approach was formulated by Grossman (1972) and labelled as the human capital model: health is both demanded and produced by consumers as the individual is the sole decision-maker in the process of health care utilization. Health is a source of utility and influences income and wealth levels. Individuals demand health both as a consumption commodity – sick days are a source of disutility – and as an investment commodity – an increase in the stock of health reduces the amount of time lost to market and non-market activities (Grossman, 2000). Typical health demand is thus negatively correlated with the price for medical services but it is also determined by the latent variable "health status", the age variable, the individual wage rate, a time trend, a

vector of environmental effects and the level of education. The rate of depreciation for the health capital stock increases with ageing with a consequent rise in the shadow price. The theory predicts a negative coefficient for education if more educated people are more efficient producers of health. A higher wage leads to a substitution of time for medical services, because time becomes relatively more expensive, increasing the opportunity cost of sick time. One-step econometric models for count data (Poisson or Negative Binomial) have been used to estimate this theoretical paradigm but empirical analysis has usually produced results contrary to theoretical predictions[9].

A second approach to healthcare demand is to assume that the demand is made in two stages and not determined solely by the individual: in fact the patient is responsible for the decision to first contact the health care provider, but then the length and frequency of treatment is largely determined by the doctor. This approach is based upon the principal-agent framework where the patient (the principal) is not able to translate his needs into a demand for a specific treatment so he explains his symptoms to a physician (the agent) who can use his professional knowledge to formulate the demand for the appropriate treatment[10]. At this stage significant information asymmetry may give physicians the opportunity to influence demand not only according to medical criteria but also by reacting to economic incentives (supplier induced demand)[11]. However, a different decision-making process for the contact and the frequency decision may be conditioned by other supply factors such as a long waiting time for accessing the service, the different quality offered by providers, a difference in the cost charged to

[9] See Wagstaff (1986), Cameron and Trivedi (1986). These studies along with many others are reviewed and commented on by Grossman (2000).

[10] In health economics asymmetric information and uncertainty are the main factors influencing physician behaviour. Sources of uncertainty are the following: 1) the classification of the patient in terms of disease condition; 2) uncertainty about the effects of treatment for a given condition; 3) patient preferences may not be known to the physician (McGuire (2000)).

[11] A review of the theory and empirical literature of physician agency is given by McGuire (2000). Physician–induced demand is "when the physician influences a patient's demand for care against the physician's interpretation of the best interest of the patient" (p. 504). This demand inducement must be distinguished from useful agency: inducement is a prescription of care that a fully-informed consumer would not want to use. However supply may induce its own demand also where a third party practically guarantees reimbursement of usage. Empirical analysis usually shows that per-capita consumption of medical services is positively correlated with the physician/population density across areas as summarized by the Roemer law "a bed built is a bed filled".

the patient: all these supply factors may constrain health care demand both at the contact stage and at the frequency of treatment stage[12].

Besides the theoretical connection with a two-step decision-making process, the appeal of the hurdle model is partly driven by an important feature of the demand for medical care, which is the high incidence of zero usage. For instance, approximately 72% of a cross-sectional sample of Italian individuals reports no outpatient visits in the year 2000[13].

The hurdle model was originally presented by Cragg (1971) for use in expenditure models with excess zeros. This model assumes that the participation decision and the positive count are generated by separate probability processes (Jones, 2000; Cameron and Trivedi, 2005). Let an individual with fully observed outcome be a *participant* in healthcare demand. There are two variables of interest: a binary indicator d, with associated covariates x_1 and parameters β_1, and a continuous variable y, with covariates x_2 and parameters β_2 where:

$y = 0$ *if and only if* $d = 0$.

Zero observations may have different meanings depending on the observed variable[14]. In the case of healthcare services we assume that there is something special about zero observations, that is to say they are not simply the reflection of over-dispersion. Indeed, one possible explanation for excess zeros is additional, individual, heterogeneity beyond the differences that can be summarised by the observed explanatory variables. This could be dealt with by adding further heterogeneity and spreading out the distribution of the count variable, meaning that more observations are shifted to the tails of the distribution so that we would expect to observe more zero values and more high values than would be predicted by the basic count model. The most commonly applied model that takes into account addi-

[12] This two-stage modelling approach has been widely used in applied studies: the empirical counterparts of this theoretical approach are the so-called hurdle models of the type proposed by Mullahy (1986) and used, among others, by Pohlmeier and Ulrich (1995). The first part of this econometric model treats the contact decision as the result of a binary choice while the second stage treats the intensity of healthcare utilization as a truncated count model.

[13] A similar issue arises when considering continuous demand measures like expenditure. However, zero expenditures in household healthcare consumption statistics may also arise because they record only out-of-pocket payments and user charges, thus effective demand is underestimated.

[14] Extensive debate has been devoted in literature to the difference between consumption as a variable of interest and expenditure as the observed variable. For an example of modelling zero expenditures in household consumption see Bardazzi and Barnabani (1998).

tional unobservable heterogeneity is the *negative binomial* or *negbin model* which allows for overdispersion by assuming that the individual error term comes from a particular probability distribution (the gamma distribution). However, like the Poisson, the *negbin model* assumes that there is a single process underlying all of the observed values of the dependent variable, whether y equals 0 or is greater than 0. Instead, our interest lies in the type of factors that distinguish users and non-users of health care, in particular to verify whether socio-economic and supply variables determine access to health services or influence the choice between providers. Therefore, we use a hurdle model where the assumption that zeros and positives come from the same data-generating process is relaxed (Cameron and Trivedi, 2005). The zeros are determined by the density $f_1(. \mid \theta_1)$ so that Pr $[y = 0 \mid X] = f_1(0 \mid \theta_1)$. The positive counts come from the truncated density f_2 (y | y>0 | X) = f_2 (y | θ_2) / (1 – f_2 (0 | θ_2), which is multiplied by Pr [y>0] = 1 – $f_1(0 \mid \theta_1)$ to ensure that probabilities sum to unity. In general f_1 (. | θ_1) is a Logit/Probit model while f_2 (. | θ_2) is a Poisson/Negbin model. Thus the observed data has density

$$g(y) = \begin{cases} f_1(0 \mid \theta_1) & \text{if } y = 0 \\ \dfrac{1 - f_1(0 \mid \theta_1)}{1 - f_2(0 \mid \theta_2)} f_2(y \mid \theta_2) & \text{if } y > 0 \end{cases}$$

Maximum likelihood estimation of the hurdle model involves separate maximization of the two terms in the likelihood, one for the zeros and the other for positives [15].

The covariates of the two stages need not be the same although in practice they are often the same: if so, the interpretation of the explanatory variables may be different between the meaning of overcoming the hurdle (being a participant or not) and the frequency decision (how intense the demand is, given that one is a participant). However in hurdle models overdispersion is a function of explanatory variables while in the negbin models zero observations are due to unobserved heterogeneity which is treated as a fixed parameter. All these reasons explain the appeal of two-part models compared to one-step specifications. Nonetheless some drawbacks of this approach must be mentioned: first of all it is not a parsimonious specification as the number of parameters is typically doubled and their interpretation is not as straightforward as in the same model without hurdles. Another limitation was pointed out by Pohlmeier and Ulrich (1995)

[15] See Jones (2000).

and was subsequently explored by Santos Silva and Windmeijer (2001). The hurdle model assumes a sharp dichotomy between users and non-users which may be appealing when modelling data on episodes of medical care but this distinction is only tenable if we assume that an individual's visit to a physician corresponds to a single spell of illness during the period covered by the survey: this issue may be especially problematic with annual data and especially for primary care. Moreover, with no additional information the first count in the observation period may be misclassified, because it may belong to an illness episode of the preceding period. A longer observation period may reduce the probability of misclassification at the expense of the other specification problem due to multiple illness spells as mentioned above. Deb and Trivedi (1997, 2002) introduce an alternative approach to model the unobservable heterogeneity among individuals, dividing the population among frequent and infrequent health care users depending on their health status, attitudes to health risk, and choice of life-style. These characteristics can be captured by latent class models (LCM) which can distinguish between groups with high average demand and low average demand thus avoiding the sharp distinction implied by hurdle models and the problem of multiple illness spells[16].

In this paper we have chosen to adopt a double hurdle model for all health care service equations on the grounds that the distinction between a first contact and multiple contacts makes sense theoretically when one is focussing on income-related effects and that our data characteristics mitigate the problem of multiple spells of illness within the period surveyed. In our data setting the observation period is four weeks for all healthcare services except hospital admissions, for which it is three months. Thus we believe that the time span is short enough to avoid the problem of multiple illness spells, although it is perhaps too short to assume that an illness spell is entirely covered by the interview period for the majority of patients so that a problem of misspecification for the second step of the process may arise[17].

[16] This theoretical framework has been applied in several empirical works. Jimenez-Martin *et al.* (2002) find strong evidence that LCM is superior to the hurdle model for GP visits but not for specialists visits. They argue that over a period of 12 months, multiple spells of illness (treatment) are more likely for GP visits than for specialist care. The LCM theoretical framework is applied for the Italian case by Fabbri and Monfardini (2006) and Atella and Deb (2008).

[17] In a previous study (Bardazzi, 2007) a comparison between a negative binomial model and a two-part model was performed on generic and specialist consultations. Estimates showed that although there are a number of difficulties in capturing the major determinants of multiple visits (such as the competition among doctors and the preferences for income and leisure of the physicians), there are significant differences between the two deci-

4. Data and descriptive analysis

Empirical studies of health care demand have taken place at the market and at the individual level. The first-generation studies were based on standard demand theory, sometimes building a model of both supply and demand using macrodata in order to allow for international comparisons[18]. More recently, emphasis has been put on the use of individual level data and on microeconomic analysis and techniques, as microdata become increasingly available in health economics.

In this study we use the individual data collected by the Italian Statistical Institute within a system of Multipurpose surveys – "Indagini Multiscopo sulle Famiglie" – where every 5 years a special survey is devoted to the theme of health and utilization of health services (MS). The years covered by these data so far are 1994, 2000 and, the most recently distributed to the public, 2005. The survey provides a full account of individual health conditions, health care utilization, biometric parameters, socio-economic and other relevant variables. The MS survey presents some useful characteristics for our purposes: i) data are collected at the individual level: health and healthcare is mainly an individual matter as it depends on personal well-being and perception; ii) the survey contains information on individual conditions of health and the utilization of medical services which is fundamental for estimating health care demand and not available from other sources with such a large sample[19]; iii) finally, information on waiting times for medical services is recorded and can be used to estimate a possible source of rationing on demand (Martin and Smith, 1999; Blundell and Windmeijer, 2000). However this dataset does not enable assessment of the relationship between income and medical care needs because neither information on income nor on total expenditure is collected. Therefore, a measure of "household purchasing capacity" is imputed performing a statistical match with microdata from the Istat "Household Budgets Survey"[20].

sion processes – contact and frequency of use – which are lost in the negative binomial model and emphasized by the double hurdle model suggesting that this approach could give a more valuable insight into the estimation of health care demand.

[18] See various chapters in Culyer and Newhouse (2000) for examples of these models.

[19] The sample is representative both at the national and at the regional level. Sampling was based on a combination of stratification, multistage sampling and clustering. Stratification was performed at the level of municipalities, clustering within the municipalities and the households. Information was collected through a face-to-face interview and the completion of an individual, written questionnaire.

[20] A possible alternative source is the survey conducted by the Bank of Italy as in Proto and Solipaca (2001) and in Atella *et al*. (2004). The reason for our choice lies in the fact that the definition of the survey unit is identical and that the Household Budgets survey could be

The matching procedure is performed according to the methodology described by Inglese and Oropallo (2004) where the Household Budgets is the donor survey and the host survey is the MS, thus matching is at the household level and the imputed variable is total household expenditure[21]. This choice does not penalize our analysis because we believe that health expenses are influenced by the family rather than the individual economic conditions. Following the application of the method to different sets of data, we have decided to use the survey of the year 2000 for which the statistical method has given better results with more than 90 per cent of exact matching over the total of cells[22].

This integrated dataset enables assessment of demand for the following items: visits to a general practitioner and to several specialists, diagnostic tests, hospital services, rehabilitation care, pharmaceutical products. In this study, we focus on generic and specialist visits[23], on diagnostic tests[24] – all measured as the utilization counts in the four weeks before the interview – and hospital services – the number of hospital admissions in the three months before the interview – to test if the population's health requirements are met by the Italian health service and what the main determinants of health care demand are.

4.1. Generic and specialist visits

Table 1 shows the tabulations respectively for the number of visits to a general practitioner or a paediatrician (GP) and to a specialist (SP) in the four weeks before interview[25]. Zero counts are more than 80% for generic

useful for further developments when moving from an analysis of count variables to expenditures.

[21] Some common variables between the two surveys were selected and used for statistical matching (household size, age of household head (HH), education of HH, job status of HH, region of residence of HH, maximum education level within the household, kids under 5 years old, older members of the household over 65). These variables were combined and a total of 864 cells identified to perform the matching.

[22] The MS survey used has been conducted from September 1999 to August 2000 when a sample of 52,300 households, comprising approximately 140,000 individuals, was interviewed.

[23] Specialist visits in following sphere: paediatrics, geriatrics, cardiology, obstetrics-gynaecology, ophthalmology, ear, nose and throat, orthopaedics, neurology, psychiatry, psychology, urology, gastro-enterology, dietetics, dermatology.

[24] Type of diagnostic test: blood tests, urine tests, ultrasound, CAT scan, MRI, other radiography tests, electrocardiogram, pap test, mammography, gastroscopy.

[25] Visits to a general practitioner and to a paediatrician share some characteristics: they are both provided mainly by the public health care system and are largely free of charge.

visits and even higher for specialists consultations[26]. We define our variables of interest by dividing both visits between those free of charge or with a co-payment (provided both by the public SSN and the accredited private providers) and those charged fully to the patient (provided either by private facilities or by SSN doctors, after their normal schedule within the public structures, as private professionals). We intend to verify if there are different determinants for these two services which are distinguished mainly by their price, the waiting time and, sometimes, by the (perceived) quality of the service. For the sake of simplicity we have referred to the first group of services as *public* and to the second as *private* although the distinction by provider is not clear-cut, as we have explained above.

In the case of generic visits, the use of an SSN general practitioner or paediatrician is largely prevailing (95%) and demand for fully-charged private care is generally accounted for by paediatric visits for children up to 1 year old. On the other hand, specialist visits with full payment are almost 60% of the total with a certain variability across Regions. Most fully-charged visits are for dental care followed by gynaecological visits. In fact dental services are the weak spot in SSN coverage, where most care is provided privately and covered by out-of-pocket payments since few of the private health insurance policies cover this kind of expenditure. Therefore we have decided to exclude dental visits from our sample as they have distinctive characteristics of demand compared to other specialist visits.

Data shows evidence of overdispersion as the sample variance is almost twice the mean in the case of generic visits and even more for private specialist consultations.

From our data we may argue that the choice between public or private specialist visits appears to be driven more by a specific preference of the individual than by a state of necessity. Asked about the motivation behind the choice of the provider for their last visit[27], almost 70 per cent of our sample answered that the fully-charged private specialist was chosen for a specific preference while one third of the sample felt constrained by necessity. As shown in Table 2, the percentage of fully-charged visits within the public structures is small (3.2%) but with a larger share of individuals motivated by a state of necessity. This reason may be linked to a time constraint, to the quality of the service provided and to the health status of the patient.

[26] This survey data is representative of the population. Sample weights were then used in this work to evaluate the model for the Italian population.

[27] The question is framed as follows: "indicate the type of specialist and if out of choice or need".

Tab. 1 – Tabulations of generic and specialist visits

	GP visits			*Specialist visits*					
				PUBLIC			PRIVATE		
count	Freq.	%	Cum.	Freq.	%	Cum.	Freq.	%	Cum.
0	47,812,781	83.63	83.63	53,217,416	93.08	93.08	52,092,084	91.11	91.11
1	6,651,514	11.63	95.26	3,026,058	5.29	98.38	3,641,002	6.37	97.48
2	1,832,525	3.21	98.47	606,152	1.06	99.44	880,309	1.54	99.02
3	476,141	0.83	99.30	181,017	0.32	99.75	271,121	0.47	99.50
4	266,628	0.47	99.77	80,873	0.14	99.89	189,057	0.33	99.83
5+	132,628	0.23	100.00	60,695	0.11	100.00	98,640	0.18	100.00
Total	57,172,217	100.00		57,172,217	100.00		57,172,217	100.00	
Mean	0.238			0.095			0.133		
Variance	0.432			0.182			0.279		
Conditional mean*	1.457			1.362			1.308		

* Average number of visits given once a contact has taken place.

Tab. 2 – Reason of the last specialist visit by specialist type

Specialist type	*Total**	*For preference***
Accredited private	10.1	67.3
Full charge private	52.8	69.7
Public	33.4	67.2
Full charge public	3.2	53.9
Unknown	0.4	73.3
Total	100	68.1

* For 100 persons who had a specialist visit.
** For 100 persons who had a specialist visit with the same specialist type.

4.2. Diagnostic tests and hospital services

Diagnostic tests may be performed both by public structures and private providers. Data shows that the use of SSN and of accredited private services is prevalent (81 per cent) over the fully-charged private providers. As for hospitals, 88 per cent of patients were admitted to a public structure while 11 per cent used an accredited private hospital and only 1 per cent of the patients chose to be admitted to a fully-charged private hospital.

Table 3 presents the tabulation for the number of public and private tests (in the four weeks before the interview) and of public hospital admissions (in the three months before interview). As one can see zero counts are very large for both services and overdispersion is evident.

Tab. 3 – Tabulations of diagnostic tests and hospital admissions

	Hospital admissions			*Diagnostic tests*					
				PUBLIC			*PRIVATE*		
count	Freq.	%	Cum.	Freq.	%	Cum.	Freq.	%	Cum.
0	55,169,736	96.50	96.50	51,528,155	90.13	90.13	55,582,448	97.22	97.22
1	1,774,321	3.10	99.60	2,869,943	5.02	95.15	1,054,932	1.85	99.06
2	162,058	0.28	99.88	1,742,444	3.05	98.20	350,974	0.61	99.68
3	40,192	0.07	99.95	582,232	1.02	99.21	116,676	0.20	99.88
4	14,613	0.03	99.98	257,935	0.45	99.67	40,625	0.07	99.95
5+	11,297	0.01	100.00	191,508	0.33	100.00	26,502	0.05	100.00
Total	57,172,217	100.00		57,172,217	100.00		57,172,217	100.00	
Mean	0.047			0.181			0.042		
Variance	0.076			0.449			0.091		
Conditional mean*	1.184			1.831			1.533		

* Average number of counts given once a contact has taken place.

Another important characteristic of the demand for hospital care is the number of patients who decide to move out of their province of residence to be treated in a hospital: only 13 per cent of our sample was admitted to a structure outside their province or abroad with a larger share in Italy's southern Regions. For the purposes of our research it's important to understand if this behaviour can be explained by a supply problem such as the availability of a hospital bed thus the demand is rationed or by other factors such as the quality of the hospital care. Some insights may be gained from our data: from answers to a survey question about the reason for a hospital admission outside the province of residence, we grouped the results into three different categories[28]:

– SUPPLY_PROBLEM: the patient was forced to move outside the province because of the unavailability either of a hospital or of an appropriate unit for a specific health problem;
– WAITING_LIST: the patient moved outside the province because of an unacceptably long waiting list;

[28] The detailed options listed for this question are: 1) there is no hospital in my province; 2) there is no appropriate unit in the hospitals of my province; 3) I was not sure of the quality of the service; 4) I trusted more the structure I have chosen; 5) the waiting list was too long; 6) I followed somebody else's advice.

– CHOICE: the patient's decision was due to an individual preference for a specific structure at the suggestion of friends or relatives, low confidence in the hospital within the province.

As shown in Table 4, only 22 per cent of the sample declared migrating to a different province because of a supply restriction either due to hospital unavailability or to a long waiting list, while almost 80 per cent of patients decided upon a specific individual preference. However, this preference is also strictly connected with a supply factor: in fact on average 42 per cent of these patients admitted having moved to a hospital far from home because of their lack of confidence in the quality of care provided in the nearest hospital. Finally there are clear-cut differences between Italian macroareas: the "no-confidence motive" represents only 27 per cent of the CHOICE group of answers in Northern Italy while it rises to 56 per cent in the South.

Tab. 4 – Factors explaining admission to a hospital outside the province of residence (%)

	North West	*North East*	*Center*	*South*	*ITALY*
SUPPLY_PROBLEM	11.7	18.7	24.9	18.6	18.1
WAITING_LIST	5.5	6.2	0.8	3.5	3.9
CHOICE	82.8	75.2	74.3	74.6	77.9

4.3. Waiting time, health care quality and economic status of patients

Hospital waiting lists are not a relevant reason for migrating to another structure but waiting time is generally used as a tool for rationing public health care. From the consumer's point of view, the existence of waiting times for health care makes time a sort of cost for these services. If there is an alternative to the public provider the consumer will decide to switch to the private provider if the additional cost of this service is compensated in terms of additional consumer surplus. Waiting times can be considered as a signal that health care demand is rationed[29]. Moreover if a (private) market for substitutes exists we may want to verify how many of these services are demanded because of the rationing operating in the public sector: this issue helps us to understand if the Italian SSN is in tune with the needs of the population in terms of health care. The MS survey provides information about the waiting time for obtaining the last visit, test and hospital admission as reported by patients who had at least one in the observed period. Table 5 reports the average number of days waiting for each health care service.

[29] On this issue, see Martin and Smith (1999), Blundell and Windmeijer (2000).

Tab. 5 – Average number of days waiting for health care services in relation to Italian macro-regions

Macro-areas	*GP visits*		*SP visits*		*diagnostic tests*		*hospital*
	public	*fully-charged*	*public*	*fully-charged*	*public*	*fully-charged*	*public*
North-West	0.74	3.74	11.54	7.02	9.44	8.74	8.68
North-East	0.73	5.66	17.5	8.76	12.47	10.75	11.21
Centre	0.80	3.37	11.31	6.45	8.39	6.98	9.53
South	0.78	1.87	7.15	4.9	4.68	4.12	5.7
Islands	0.85	2.01	10.47	5.35	5.92	6.61	5.4
Total	0.77	3.43	11.84	6.69	8.48	7.43	8.16

For generic visits waiting times are negligible, while they are more significant although limited in the case of other services. However a notable difference between the public and private specialist visits is worth mentioning: the number of days' waiting between the decision to contact a specialist and the provision of the service is almost double in the SSN structures compared to private providers. A substantial variability across geographical areas is also observed: the North-East shows the highest waiting time, not only for specialist visits but also for other health services both public and private, while in the South the number of days waiting is about one-third below the average. This information needs to be interpreted with caution: the highest values for the North-Central Italian Regions could be read as a sign of inefficiency of the SSN in meeting the population's healthcare needs but this is contradicted by the degree of consumer satisfaction with SSN services with the highest positive score observed in the Northern part of the country while in the South one quarter of the population is totally dissatisfied with the healthcare provided within the public system (see Istat, 2007). Moreover to some extent a "congestion effect" may be assumed to be at work in Northern and Central Italy due to the migration of patients from areas of the country where the quality and the availability of health care is inadequate. Therefore, waiting times and waiting lists are only one element contributing to the quality of healthcare perceived by patients: indeed, demand has a propensity to concentrate where the quality of services is seen as superior and, for this reason, quite often in those areas waiting times are longer[30].

[30] France *et al.* (2005) pointed out that dual practices (public and private) have encouraged doctors to run long waiting lists in their public practice to increase demand for their private practice.

Perceived quality of health care is also a key element in driving choice between public and private services: the main reason for selecting a given structure is the confidence the patient has in the provider, whether private or public, particularly for private (specialist) visits and hospital admissions but also for more than half of patients who preferred the fully charged diagnostic tests although in this case one-third of patients are willing to pay to avoid a long waiting time. This behaviour is particularly noticeable in the Southern regions for all healthcare services (Istat, 2007).

Finally, one may wonder if access to private healthcare is conditioned by the economic household conditions. In our empirical analysis we estimate to what extent household income has a significant direct role in determining the demand for various types of treatments. Observed data reveals that although poorer individuals have lower access to private services, the share of patients fully charged among them is fairly high (Table 6). If access to healthcare is significantly related to income then equity among socio-economic groups may be jeopardized[31]: equitable health care utilization exists only when there is a correlation between health care provision and indicators of need (equal treatment for equal need) but not with economic indicators (payments according to ability to pay)[32].

This descriptive analysis raises questions concerning the founding principles of universalism and equity of the Italian National Health Service: equal access for citizens living in the South and with poorer economic conditions is apparently not fully guaranteed by the SSN which shows some difficulties in providing appropriate responses to individual needs. Equity in health care has two dimensions: social (inter-group) and geographic. Both aspects appear to be at risk in the Italian SSN but only the second has been tackled with several attempts to reduce the diversity of access among Regions, mainly in terms of the distribution of public healthcare facilities[33].

[31] There is a huge amount of literature devoted so far to the issue of equity in health care. In Europe leading researchers on this topic have worked jointly in the ECuity project which has been partly funded by the European Commission. For a summary of results obtained under this project see the July 2004 issue of Health Economics completely devoted to ECuity research. At the OECD level the issue of equity is studied by the OECD Health Equity Group.

[32] Van der Heyden *et al.* (2003) pointed out that differences in the rates of utilization of certain services by different socio-economic groups do not automatically reflect inequality: equal access relates to the opportunity to use the services needed rather than to the actual receipt of care (there might be some unnecessary treatments in higher income groups which one would not want to extend to other groups).

[33] In 2001 an agreement between the State and the Regions established the "essential level of care" (LEA, Livelli essenziali di assistenza) that should be guaranteed to every citizen in the country. Basically it stated that all services currently provided are essential excluding dental care and other minor services (e.g. aesthetic surgery, physiotherapy, etc.).

Tab. 6 – Household economic resources and private health care services (2000)

*Self Assessed Evaluation of Household Economic Resources**	*Fully charged specialist visit*	*Fully charged diagnostic test*
Very good	70.2	34.7
Adequate	62.4	23.9
Scarce	55.4	19.7
Too low	51.2	17.3
Total	60.5	22.8

* For 100 individuals with the same economic resources who had at least one visit or one test.

4.4. Variables description

Our analysis of health care demand is based on a model specification which is essentially similar for all categories of services considered here, though there are some minor differences which will be explained hereafter. Our dependent variables – generic visits, specialist visits and diagnostic tests – are divided between "public" and "private" according to the share of cost charged to the patient as described above. As far as hospital services are concerned, our data can only estimate a model for public and accredited hospitals since the number of observations for private hospital admissions is very low.

Andersen (1968, 1995) categorised the explanatory variables of the utilization of health services into three useful groups: factors resulting in a predisposition to use services – such as age, sex, and other demographic characteristics –, variables that enable or impede utilization such as income, education, and health insurance and those that generate use i.e. need. In general, the demand for hospital services is mainly explained by need and demographics, since these services are demanded in severe health conditions, while the demand for health services which are based on individual's priorities are also explained by social and enabling factors.

A full list of the explanatory variables used in our model along with their description is presented in Table 7. A first set consists of socio-economic variables: besides individual demographic information, we used the imputed variable of total expenditure as a measure of household purchasing capacity. A dummy for holding a private insurance should be relevant in estimating the demand for specialist visits as well as diagnostic tests where co-payments are higher and the share covered by the private sector is more significant. Then we have two groups of variables reflecting the individual' short term health status and his health endowments or stocks.

Tab. 7 – Variables description

Dependent variables	*Description*
DVISITS	Number of consultations with a GP or a paediatrician in the past 4 weeks (public or fully charged)
SVISITS	Number of consultations with a specialist in the past 4 weeks (public or fully charged)
DIAG. TEST	Number of diagnostic tests in the past 4 weeks (public or fully charged)
HOSPITAL	Number of hospital admissions in the past 3 months (public provider)
Explanatory variables	
-Socioeconomic	
MALE	1 if male
AGE	Age in years
LTEXP	ln(monthly family total expenditure)
EDUC	Education in years
- insurance	
INSUR	1 if covered by private health insurance
- health status (short term)	
ACTDAYS	Number of days of reduced activity in past four weeks due to illness or injury
OUTWORKDAYS	Number of days off work in past four weeks due to illness or injury
- health status (long term)	
POOR_HEALTH	1 if self-perceived health is poor
DAILYDIFF	1 if the person suffers from a condition that limits activities in daily life
PHYS_LIM	1 if limitation of activity due to chronic illness
SMOKE	1 if smoker or has smoked daily in the past
- supply side	
PHYSDENS	Number (per 10,000 inhabitants) of general practitioners and paediatricians (regional)
DOCDENS	Number (per 10,000 inhabitants) of specialists in public and private institutes (regional)
TEST_EQUIP	Quantity (per 100,000 inhabitants) of advanced equipments for tests (regional)
BEDS	Number (per 1000 inhabitants) of beds in public and accredited hospitals (regional)
EXEMPT1	1 if exempted from diagnostic test co-payment for chronic illness
EXEMPT2	1 if exempted from diagnostic test co-payment for age, income or other
- rationing	
WAIT_DVISITS	Days waiting days for visits with a GP or a paediatrician
WAIT_SVISITS	Days waiting days for visits with a specialist doctor
WAIT_DIAG. TEST	Days waiting days for diagnostic test
WAIT_HOSPITAL	Days waiting days for hospital admittance (if booked)

REFERENCE INDIVIDUAL: female, without private insurance, with no physical limitations or disabilities, no smoking, in good health

Finally, a separate treatment of the contact and the frequency decision, which could be potentially induced by the physician and could be influenced by other supply factors, requires the inclusion of variables reflecting the consumption and leisure preferences of the doctor at the second stage of the estimation process. Unfortunately, the MS survey does not offer much information on the supply side factors of the health care system. Therefore,

we use some indicators from the "Health for all" database produced by the Italian Statistical Office – such as physician density – to proxy both the demand response (at the first level this variable may represent an availability effect) and the supplier-induced-response (at the second stage it reflects competition among physicians). Obviously for each health service category we use the appropriate supply indicator such as the number of beds for hospital care or the quantity of advanced technology equipment for diagnostic tests. More precisely, in the models we introduce as covariates the interactions between these supply side indicators and the residential macroareas to capture the variance of resources and of geographical location.

For diagnostic tests, we also use information about possible patient exemption from co-payment either due to chronic illness, age or income. These variables are expected to be significant in influencing individual choice towards the public/accredited structures since the patient is completely exempted from any co-payment and could take advantage of this benefit by increasing the frequency of use.

Finally, we exploit information on the waiting time to evaluate the relevance of health demand rationing. As previously described, our data includes information about the waiting time for obtaining the last visit, test or hospital admission as reported by patients who had at least one in the period surveyed. These figures were averaged across patients and standardized at the macro-region level.

5. Estimation Results

In this study we apply a hurdle model – built around the assumption of two different processes respectively for the contact and the frequency decision – consisting in a logit specification for the first hurdle and a zero-truncated negative binomial for the second stage to estimate the demand for several healthcare services. Moreover, we aim at empirically verifying if a rationing effect is operating in the demand for several health care services. The results of this model are presented in Tables 8-14 where both steps are estimated for each healthcare service. A summary of results in terms of signs of the statistically significant covariates is presented in Table 15. A first look at this summary table shows that the first stage model proves a better fit than the second one (respectively Panels A and B of the table). One reason is the substantial reduction in sample size for the frequency analysis. Another explanation is that while in the dataset we find the most relevant variables to explain the contact decision, it is more difficult to capture the major determinants of multiple visits, such as the competition among doctors, and the preferences

for income and leisure of the physicians. Despite these shortcomings, the model highlights a number of issues concerning differences between the estimated parameters across the two stages.

Tab. 8 – Demand for public generic visits

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	-0.093***	0.021	-8.9	0.011	0.041	1.1
AGE	0.008***	0.001	0.8	0.006***	0.001	0.6
LTEXP	-0.292***	0.035	-25.4	-0.114	0.059	-10.8
EDUC	-0.062***	0.003	-6.0	-0.043***	0.005	-4.2
INSUR	0.025	0.035	2.5	-0.186*	0.075	-16.9
ACTDAYS	0.057***	0.002	5.8	0.028***	0.003	2.9
OUTWORKDAYS	0.053***	0.007	5.5	0.006	0.007	0.6
POOR_HEALTH	0.510***	0.040	66.5	0.420***	0.052	52.1
DAILYDIFF	-0.213***	0.064	-19.5	-0.065	0.080	-6.3
PHYS_LIM	0.301***	0.044	35.1	0.159*	0.065	17.3
SMOKE	0.121***	-0.026	-11.4	-0.041	0.060	-4.1
PHYSDENS_NWEST	0.009*	0.004	0.9	-0.012	0.008	-1.2
PHYSDENS_NEAST	0.026***	0.004	2.7	-0.022**	0.007	-2.2
PHYSDENS_SOUTH	-0.027***	0.004	-2.7	0.023***	0.006	2.4
WAIT_DVISITS				0.002	0.007	0.2
_cons	2.771***	0.544		0.429	0.927	
N	140011			18381		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

5.1. Generic and Specialist Visits

A distinction between generic and specialist visits is due to institutional reasons and this is partly confirmed by the difference in the sign of some variables for the respective equations of the first step. As estimated by other empirical studies, the variables income (total expenditure) and education have different impacts on the two visit types[34]. Individuals are more likely to seek care from private specialists – +24.5 per cent change in probability with all other variables constant – and less likely to consult public GPs and SPs as income increases (-25 per cent change in odds) while income is not

[34] This evidence was first estimated by Pohlmeier and Ulrich (1995) for Germany where the institutional setting is similar. Then, among others, for Italy by Fabbri and Monfardini (2003) and Atella *et al.* (2004), for Belgium by Van der Heyden *et al.* (2003) and for a set of European countries by Economou *et al.* (2007). On the issue of equity, Van Doorslaer, Koolman and Jones (2003) conclude that in Italy doctor access is high and equitable but while general practitioner access is pro-poor, specialist access is pro-rich. Giannoni (2008) confirms the evidence that there is no significant inequality in primary care utilization in Italy while there are inequities in access for specialist and diagnostic cares.

statistically significant in explaining the demand for private generic visits and public specialist consultations. This result may be explained by the opportunity cost of visiting a doctor: to seek care in the public sector costs more in terms of waiting-time (moreover to consult a public specialist requires a visit to the GP as well). However, the household economic status does not affect the frequency of visits.

Tab. 9 – Demand for private generic visits

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	-0.005	0.076	-0.5	0.433	0.237	54.1
AGE	-0.022***	0.002	-2.1	0.003	0.007	0.3
LTEXP	-0.095	0.151	-9.0	0.028	0.404	2.8
EDUC	-0.091***	0.010	-8.7	-0.102**	0.038	-9.7
INSUR	0.562***	0.110	75.4	0.019	0.361	1.9
ACTDAYS	0.046***	0.006	4.7	0.033*	0.017	3.4
OUTWORKDAYS	0.029*	0.014	2.9	0.016	0.027	1.6
POOR_HEALTH	0.678***	0.155	97.0	0.724	0.426	106.2
DAILYDIFF	0.022	0.227	2.3	-0.688	0.668	-49.7
PHYS_LIM	0.171	0.183	18.6	-0.150	0.467	-13.9
SMOKE	-0.270*	0.113	-23.6	-0.087	0.397	-8.3
PHYSDENS_NWEST	0.015	0.013	1.5	0.076*	0.038	7.9
PHYSDENS_NEAST	-0.037**	0.014	-3.6	-0.022	0.045	-2.2
PHYSDENS_SOUTH	-0.064***	0.013	-6.2	0.030	0.039	3.1
WAIT_DVISITS				-0.071**	0.026	-6.8
_cons	-1.838	2.338		-11.408	6.318	
N	140011			1125		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

Education may correlate with medical knowledge, so that higher educated people tend to favour (public and private) specialists over general practitioners. Private insurance is not significant in determining visits to public GPs and SPs while it has a positive effect on other consultations where a full price is charged to the patient: being privately insured increases the probability of visiting a private GP and SP with all other variables constant. This is a common result in applied literature that could be explained as the effect of an adverse selection process making frequent health service users look for supplementary coverage. Another interpretation could be represented by the moral hazard whereby there are incentives for the patient and the physician for over-treatment. This last explanation has to do with supplier-induced demand in a wide sense and there is no evidence of this effect in our findings, since holding a private insurance has no impact in the frequency equation which describes the outcome of the joint decision of the physician and the patient.

Tab. 10 – Demand for public specialist visits

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	-0.140***	0.032	-13.1	-0.015	0.073	1.5
AGE	0.012***	0.001	1.3	0.003	0.003	0.3
LTEXP	-0.097	0.051	-9.2	-0.247	0.115	-21.9
EDUC	0.012***	0.004	1.2	0.004	0.009	0.4
INSUR	0.023	0.051	2.3	-0.007	0.124	-0.7
ACTDAYS	0.047***	0.002	4.8	0.026***	0.004	2.6
OUTWORKDAYS	0.038***	0.006	3.9	0.029***	0.008	3.0
POOR_HEALTH	0.699***	0.055	101.2	0.498***	0.088	64.6
DAILYDIFF	-0.538***	0.084	-41.6	0.099	0.142	10.5
PHYS_LIM	0.552***	0.059	73.8	0.339***	0.098	40.4
SMOKE	-0.064	0.038	-6.2	0.047	0.092	4.8
DOCDENS_NWEST	-0.004	0.003	-0.4	0.003	0.006	0.3
DOCDENS_NEAST	0.002	0.003	0.2	0.012*	0.006	1.2
DOCDENS_SOUTH	-0.016***	0.002	-1.6	0.002	0.006	0.2
WAIT_SVISITS				-0.001	0.002	-0.1
_cons	-1.967**	0.784		-6.590	1.903	
N	140011			8781		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

Being a smoker is significant in increasing the frequency of private specialists visits while non-smoking behaviour apparently determines a higher number of generic consultations. As for the other demographic characteristics, women appear to seek more medical care than men – mostly due to childbearing – in line with the literature[35]. Individual age plays a significant role in both equations for public visits: the coefficient strictly increasing except in the case of private generic visits which are mainly paediatric consultations.

It is not surprising that individuals who were ill (with days of reduced activity, out-of-work, in poor-health conditions) required more treatment both from general doctors and from specialists. Finally, the last set of variables aiming to proxy accessibility to medical services, was introduced to the model through interactions with the macroregion of residence. In fact, we tested that the geographic areas almost completely explain the variance of healthcare supply variables. Results show that the interactions between the Southern regions and physician (specialist) density are statistically significant in decreasing the demand for generic (specialist) consultations compared to health resource provision in Central Italy.

According to our results it appears that the frequency of visits depends mainly on a patient's health status including being a smoker which in-

[35] Among others, see Santos Silva and Windmeijer (1997), Pohlmeier and Ulrich (1995) and Winkelmann (2004).

creases the expected number of SP private visits. In particular, income, education and a private insurance do not affect frequency behaviour. This is consistent with previous findings for Italy based on different data[36]. Finally, the waiting time between the request and the effective day of the visit is never statistically significant thus the intensity of doctoral consultation demand is not rationed by waiting time possibly because the public-private mix in the supply satisfies healthcare needs.

Tab. 11 – Demand for private specialist visits

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	-0.548***	0.033	-42.2	-0.020	0.087	-2.0
AGE	-0.004***	0.001	-.4	0.000	0.003	0.0
LTEXP	0.117*	0.052	12.4	0.035	0.153	3.5
EDUC	0.039***	0.003	4.0	0.016	0.010	1.6
INSUR	0.439***	0.045	55.1	-0.036	0.123	-3.6
ACTDAYS	0.046***	0.002	4.7	0.019***	0.005	2.0
OUTWORKDAYS	0.043***	0.006	4.4	0.041***	0.012	4.1
POOR_HEALTH	0.631***	0.060	87.9	0.455***	0.120	57.6
DAILYDIFF	-0.371***	0.090	-31.0	0.076	0.243	7.8
PHYS_LIM	0.483***	0.063	62.1	0.331*	0.157	39.3
SMOKE	0.035*	0.037	3.6	0.314**	0.098	36.9
DOCDENS_NWEST	-0.012***	0.003	-1.2	0.003	0.007	0.3
DOCDENS_NEAST	-0.005*	0.003	-0.5	0.05	0.007	0.5
DOCDENS_SOUTH	-0.011***	0.002	-1.1	0.009	0.006	0.9
WAIT_SVISITS				-0.001	0.003	-0.1
_cons	-4.965***	0.810		-11.062***	2.388	
N	140011			11722		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

5.2. Diagnostic Tests

The probability of a first contact for a diagnostic test is influenced by demographic variables, health status and the insurance variable in the same way as the specialist visits (Tables 12 and 13). However a special role is performed by the educational level of the patient which shows a strong positive effect on the demand for tests at both stages: this result is consistent with the interpretation of a higher efficiency of more educated people to maintain their health stock through preventive care. Higher income increases the probability of private tests by more than one-third.

[36] See Fabbri and Monfardini (2003). The same results were obtained by Pohlmeier and Ulrich (1995) for Germany.

Tab. 12 – Demand for public diagnostic tests

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	-0.209***	0.026	-18.9	0.022	0.033	2.2
AGE	0.014***	0.001	1.4	0.003***	0.001	0.3
LTEXP	-0.034	0.042	-3.4	-0.054	0.048	-5.2
EDUC	0.025***	0.003	2.5	0.011**	0.004	1.1
INSUR	0.142***	0.041	15.3	-0.062	0.055	-6.0
ACTDAYS	0.036***	0.002	3.6	0.010***	0.002	1.0
OUTWORKDAYS	0.048***	0.006	4.9	0.014*	0.005	1.4
POOR_HEALTH	0.578***	0.046	78.2	0.247***	0.046	28.0
DAILYDIFF	-0.575***	0.071	-43.7	-0.173*	0.073	-15.9
PHYS_LIM	0.246***	0.050	27.9	0.113*	0.053	11.9
SMOKE	-0.033	0.031	-3.3	-0.026	0.040	-2.6
EXEMPT1	0.853***	0.040	134.7	0.150***	0.042	16.2
EXEMPT2	0.655***	0.039	92.6	0.049	0.047	5.0
TEST_EQUIP_NW	-0.004	0.003	-0.4	-0.000	0.003	-0.0
TEST_EQUIP_NE	0.004	0.002	0.4	-0.000	0.003	-0.0
TEST_EQUIP_SO	-0.014***	0.003	-1.4	0.019***	0.004	1.9
WAIT_DIATEST				-0.000	0.001	-0.0
_cons	-2.725***	0.643		0.378	0.747	
N	140011			13147		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

Tab. 13 – Demand for private diagnostic tests

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	-0.528***	0.048	-41.0	0.033	0.080	3.3
AGE	0.007***	0.001	0.8	0.003	0.002	0.6
LTEXP	0.305***	0.076	35.6	-0.123	0.162	-11.6
EDUC	0.044***	0.005	4.5	0.024**	0.009	2.4
INSUR	0.470***	0.061	60.1	0.124	0.110	13.2
ACTDAYS	0.042***	0.004	4.3	0.019***	0.006	1.9
OUTWORKDAYS	0.030***	0.008	3.1	0.006	0.011	0.6
POOR_HEALTH	0.349***	0.096	41.7	0.352*	0.148	42.2
DAILYDIFF	-0.877***	0.175	-58.4	-0.242	0.272	-21.5
PHYS_LIM	0.172	0.105	18.7	-0.040	0.152	-3.9
SMOKE	0.030	0.053	3.0	-0.077	0.090	-7.4
EXEMPT1	-0.082	0.085	-7.9	-0.248	0.150	-21.9
EXEMPT2	-0.663***	0.102	-48.5	-0.005	0.177	-0.5
TEST_EQUIP_NW	-0.032***	0.005	-3.1	-0.009	0.008	-0.9
TEST_EQUIP_NE	-0.013**	0.004	-1.3	0.007	0.007	0.7
TEST_EQUIP_SO	-0.017***	0.005	-1.6	0.025**	0.009	2.6
WAIT_DIATEST				-0.001	0.002	-0.1
_cons	-8.616***	1.169		0.457	2.445	
N	140011			3678		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

In these equations we introduce two additional variables to assess whether exemptions from co-payments may affect contact and frequency decisions. It is important to remember that EXEMPT1 is relative to the exemption for chronic illness – about 10% of the population equally distributed in the macroregions – while EXEMPT2 refers to the co-payment exemption mainly for age and low income – on average another 10 per cent of the Italian population with a higher concentration in the Southern regions –. Our results show that being exempted increases both the probability (+134.7 per cent change in odds) and the frequency (+16.2 per cent change in expected counts) of diagnostic tests in public and accredited structures where the service is paid in full by the SSN. At the same time the exemption for age and income negatively affects the use of fully charged diagnostic tests as expected. It's hard to say to what extent the frequency of treatment increases because of the poor health status due to the chronic illness and to old age or because of free riding behaviour since the service is free of charge. Finally, waiting time doesn't seem to affect the patient demand for diagnostic tests.

5.3. Hospital Admissions

Obviously the probability and the higher frequency of hospital admissions is positively affected by a poor health status and by chronic illnesses (Table 14). The age effect is statistically significant and convex as emerges from the squared age variable introduced in the model. In fact the participation rate is hump-shaped with high values both for children up to 1 year olds (births) and for older people[37]. The level of education has a negative effect on the demand for hospital care: this result may be explained by the higher efficiency in preserving the health stock already noticed in the other preventive care services which reduces the need of hospitalization. The negative signs of income capacity and private insurance – although not statistically significant – are as expected since they seem to decrease the tendency to use a public or accredited structure. At the second stage (frequency decision) age and health conditions are the only significant variables but the waiting time negatively affects patients' frequency of use only slightly. We recall that on average, waiting times are longer in the Northern and Central regions as a result of a congestion effect due to the migration of patients from the South. The geographical supply variables are not relevant at either stage of the decision-making process as the reason for migration is not the unavailability of hospital beds but the quality of care provided.

[37] This U-shaped pattern is consistent with a number of other studies (Cameron *et al.*, 1998, Economou *et al.,* 2007).

Tab. 14 – Demand for public hospitals

	Contact decision			*Frequency of treatment*		
	Coef	*Std Err*	*%(a)*	*Coef*	*Std Err*	*%(b)*
MALE	0.071	0.043	7.4	0.231	0.141	25.9
AGE	-0.025***	0.004	-2.5	0.030*	0.014	3.0
AGE2	0.030***	0.005	3.1	-0.032*	0.014	-3.2
LTEXP	-0.022	0.068	-2.2	0.152	0.206	16.4
EDUC	-0.018***	0.005	-1.8	-0.013	0.015	-1.3
INSUR	-0.130	0.074	-12.2	0.081	0.274	16.4
ACTDAYS	0.056***	0.003	5.8	0.007	0.007	-1.3
OUTWORKDAYS	0.071***	0.007	7.3	0.008	0.013	8.4
POOR_HEALTH	0.850***	0.067	134.1	0.372*	0.182	0.7
DAILYDIFF	0.013	0.096	1.3	0.161	0.194	0.8
PHYS_LIM	0.393***	0.077	48.1	0.846***	0.209	45.0
SMOKE	-0.086	0.055	-8.3	-0.319	0.187	17.5
BEDS_NW	0.001	0.009	-0.1	-0.012	0.028	133.1
BEDS_NE	0.018	0.010	1.8	-0.003	0.033	-27.3
BEDS_SO	0.009	0.007	0.9	0.008	0.022	-1.2
WAIT_HOSPITAL				-0.006*	0.002	-0.3
_cons	-2.918**	1.049		-20.964***	3.135	0.8
N	140011			4997		

* p < 0.05, ** p < 0.01, *** p < 0.001
(a) percent change in odds for unit increase in X
(b) percent change in expected count for unit increase in X

Tab. 15 – Synoptic Table of Estimation Results

Panel A. Contact Decision (first hurdle)

	GENERIC VISITS		*SPECIALIST V.*		*DIAGN. TESTS*		*HOSPITAL*
Explanatory variables	PUBLIC	PRIVATE	PUBLIC	PRIVATE	PUBLIC	PRIVATE	PUBLIC
MALE	-		-	-	-	-	
AGE	+	-	+	+	+	+	Agesq +
LTEXP	-			+		+	
EDUC	-	-	+	+	+	+	-
INSUR		+		+	+	+	
ACTDAYS	+	+	+	+	+	+	+
OUTWORKDAYS	+	+	+	+	+	+	+
POOR_HEALTH	+	+	+	+	+	+	+
DAILYDIFF	-		-	-	-	-	
PHYS_LIM	+		+	+	+		+
SMOKE	-	-					
SUPPLY_NWEST	+			-		-	
SUPPLY_NEAST	+	-		-		-	
SUPPLY_SOUTH	-	-	-	-	-	-	
EXEMPT1 (a)					+		
EXEMPT2 (a)					+	-	

REFERENCE INDIVIDUAL: female, without private insurance, with no physical limitations or disabilities, no smoking, in good health (a) Only for diagnostic tests

segue tab. 15

Panel B. Frequency Decision (second hurdle)

	GENERIC VISITS		*SPECIALIST V.*		*DIAGN. TESTS*		*HOSPITAL*
Explanatory variables	PUBLIC	PRIVATE	PUBLIC	PRIVATE	PUBLIC	PRIVATE	PUBLIC
MALE							
AGE	+				+		Agesq +
LTEXP							
EDUC	-	-			+	+	
INSUR	-						
ACTDAYS	+	+	+	+	+	+	
OUTWORKDAYS			+	+	+		
POOR_HEALTH	+		+	+	+	+	+
DAILYDIFF					-		
PHYS_LIM	+		+	+	+		+
SMOKE				+			
SUPPLY_NWEST		+					
SUPPLY_NEAST	-						
SUPPLY_SOUTH	+				+	+	
EXEMPT1 (a)					+		
EXEMPT2 (a)							
WAITING TIME		-					-

REFERENCE INDIVIDUAL: female, without private insurance, with no physical limitations or disabilities, no smoking, in good health (a) Only for diagnostic tests

6. Conclusions

This paper investigates the determinants of the individual demand for health care services – generic and specialist visits, tests and check-ups, hospital admissions – in Italy, distinguishing between the public and private provision of these services. Empirical studies so far have been focussed on doctor's consultations, although other healthcare services represent a significant share of out-of-pocket household health expenditure. We intend to verify if there are different determinants behind the demand for public/private healthcare services varying mainly in terms of price, waiting time, and the (perceived) quality of the service.

The Italian constitutional right to health is guaranteed by free, universal, public provision of services but a private market has also developed over the years, with some differences across Regions. Indications of horizontal and vertical inequality result from various survey sources and policies have been implemented to deal almost exclusively with the first type. However socio-economic, individual characteristics may account for different healthcare utilization between social groups both in terms of the probability of demanding a service, of the intensity of use and of the choice of provider. If access to healthcare is significantly related to income then equity among socio-economic groups may be jeopardized.

An empirical, two-part model has been estimated on a very large dataset for all the health services mentioned above. This approach assumes that the demand for health care can be thought of as a two-stage decision process: one for the contact and one for the frequency decision which may be conditioned by a supplier-induced demand effect and other supply factors such as a long waiting time for accessing the service, different quality between providers, a difference in the cost charged to the patient.

Our evidence shows that, all in all, the most important determinants of healthcare utilization appear to be variables approximating the need for these services. Therefore, at a first glance, in Italy equitable health care utilization exists since there is a correlation between health care provision and indicators of need. However, a correlation with individual economic indicators exists for some specific services. Higher household purchasing capacity and the additional coverage of a private insurance are both significant in the decision to contact a private provider for all services although these variables do not influence the intensity of use. Therefore we may conclude that having higher economic resources the patient may access the private health care market where out of pocket payments are needed while publicly provided care is not affected by economic status.

A special role is performed by the educational level of the patient which shows a strong positive effect on the decision to seek care. In particular in the demand for diagnostic tests higher education also increases the frequency of use: this result is consistent with the interpretation of a higher efficiency of more educated people to maintain their health stock through preventive care.

Interactions between supply indicators and geographical macroareas have been used to proxy both the demand response and the supplier-induced-response. Results show that there is a problem of access in Southern Italian regions compared to the rest of the country for all healthcare services except hospitals. In this last case, patients' migration to North-Central Italy may help to mitigate the problem.

The intensity of health care utilization is mainly explained by the need variables and by age. Most of the supply variables are not relevant at this stage of the decision-making process showing that there is no evidence in our findings of a supplier-induced demand effect with the possible exception of health check-ups in the South where the presence of accredited and private structures is predominant with likely economic incentives for over-treatment. Exemption from co-payments increases both the probability and the number of check-ups paid for by the SSN: it's hard to distinguish between an effective necessity motivated by a chronic illness or old age and patient free riding behaviour since the service is free of charge.

To summarize, some accessibility problems seem to arise for persons who have fewer alternatives in the private market – with lower income, less educated, not privately insured – and living in the Southern part of the country. Therefore, past reforms of the SSN trying to equally distribute financial resources across Regions have failed their mission at least partially. Some vulnerabilities – such as chronic illnesses, old age – are tackled by user-charge exemptions in the case of check-ups. Others are more related to the quality of the service provided which unfortunately could not be proxied by any variable in our dataset though some insights in this direction were provided by our descriptive analysis. In terms of policies, the fundamental role of education should be interpreted in a positive sense: more educated individuals treat their health as a valuable good and seek for more qualified and preventive care, intensifying the use of check-ups. Cohorts of individuals who will enter old age in the coming decades should be more efficient consumers of healthcare: this is hopefully a good outcome but it also implies adequate responses from the national health service to preserve health as a right established by the Italian Constitution.

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Abstract

Is Healthcare Demand Rationed by Income and Other Determinants? An Empirical Assessment for Italy

The Italian national health service was funded in 1978 with the goal of providing uniform and comprehensive care under the inspiration of the Republic's Constitution. It is important to assess to what extent the health service meets the potential demand of the population and if the socio-economic status of the patient – mainly income and education – may ration the access to healthcare. This paper offers an empirical assessment of the determinants of healthcare demand in Italy for a detailed range of services including diagnostic tests and hospital services, not often analyzed in the empirical literature. An econometric hurdle model is applied to individual microdata from a large-scale survey. From our results, some accessibility problems seem to arise for persons who have fewer alternatives in the private market – with lower income, less educated, not privately insured – and living in the Southern part of the country.

JEL Classification: C34, C35, C51, D12, I11

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