



Munich Personal RePEc Archive

Health care utilization and immigration in Spain

Muñoz de Bustillo, Rafael and Antón, José-Ignacio

1 March 2009

Online at <https://mpra.ub.uni-muenchen.de/12382/>
MPRA Paper No. 12382, posted 08 Mar 2009 15:19 UTC

Health Care Utilization and Immigration in Spain

Rafael Muñoz de Bustillo

Department of Applied Economics, University of Salamanca

Phone: +34 923 29 45 00 ext. 3125

Fax: +34 923 29 45 16

Email: bustillo@usal.es

José-Ignacio Antón (corresponding author)

Department of Applied Economics, University of Salamanca

Phone: +34 923 29 45 00 ext. 3125

Fax: +34 923 29 45 16

Email: janton@usal.es

Previous versions of this paper were presented at the European Foundation for the Improvement of Living and Working Conditions in Dublin (August, 2007) and at the 15th Meeting on Public Economics in Salamanca (February, 2008).

Abstract. The aim of this work is to analyze the use of health care services by immigrants in Spain. Using a nationally representative health survey from 2006-2007 that allows overcoming problems present in previous studies and negative binomial and hurdle models, it is found that there is no statistically significant difference in the patterns of visits to physicians and hospital stays between migrants and natives in Spain. However, immigrants have a lower access to specialists and visit emergency rooms with higher frequency than nationals.

Keywords. *health care, immigration, Spain, access, equity.*

Introduction

According to European opinion polls (European Commission, 2006), immigration is considered the fourth most important issue of concern faced by the member states (right after unemployment, crime, and the economic situation), with less than half of European Union-15 citizens considering that immigrants contribute a great deal to their countries. In Spain, in 2006, for the first time, immigration figured as the most important problem faced by the country (59% of answers), well above unemployment (42%) and housing (21%). Around 40% of Spaniards thought that immigrants enjoyed too much protection from the State and roughly 20% even points out that they should be denied health care in the same conditions as nationals (CIS, 2006).

This paper aims to shed light upon the health care utilisation among immigrants in Spain. This is the first work using a recent and nationally representative database that properly captures the migration phenomenon, overcoming the problems of previous studies, based on case studies at health centre or hospital level and household surveys where migrants are not adequately represented. In order to address this issue, we use a recently released nationally representative survey on health conditions and health care utilisation carried out between 2006 and 2007. Particularly, visits to general practitioners, specialists and emergency rooms and hospital stays are analysed using negative binomial and hurdle models. The main findings of this study is that migrants, with the exception of emergency room services, do not use health care more than nationals, even after controlling for needs and socio-economic characteristics. Therefore, both the hypothesis of overutilization of health care services by immigrants and the existence of inequities in health care delivery are not consistent with the evidence presented here.

The rest of the paper is organised in four sections as follows. Firstly, the main literature relating to immigration and the health care utilization is summarized and critically discussed. In the second section, some stylized facts about the Spanish health system and Spanish immigration are offered to allow the reader to understand the specificity of the case analysed. The third part deals briefly with the main characteristics of the databases used in this work, while, in the fourth place, the methodology and the main results of the analysis are presented. Last, section five summarizes the main conclusions obtained.

Theoretical and empirical review

Although economists have devoted much effort to study the economic consequences of immigration, the topic of the use of public health care system by immigrants has not received much attention from the discipline. Actually, it has been addressed much more often by health care professionals in case studies. According to Winkelmann (2002), this scant interest of Economics on this issue may be related to the lack of empirical guidance from economic theory.

Grossman (1972) model of demand for health care is a sensible departure point in order to establish a hypothesis. According to this framework those individuals with worse health, lower age and

higher education are less likely to use health care services (Muurinen, 1982, Wagstaff, 1986).¹ If immigrants are self-selected on the basis of these characteristics, it is reasonable to expect a differential pattern of consumption of health services. There is empirical evidence pointing that Spanish immigrants, before controlling for any observable characteristics, are younger, slightly more educated and with a better health status than the native population (Muñoz de Bustillo and Antón, 2007, Cantarero and Pascual, 2008). Nevertheless, controlling for these observable features, the standard production function model do not give us any *a priori* hypothesis.²

Drawing on the human capital theory, Winkelmann (2002) argues that if immigrants have worse labour market outcomes than natives because of the limited transferability of skills from the country of origin to the host country, then they will achieve worse outcomes than locals, which might limit their access to health care services. Though this is true for Spain (Fernández and Ortega, 2008, Canal-Domínguez and Rodríguez-Gutierrez, 2008), again, when controlling for observable characteristics like socio-economic status or income, no difference should be expected.

Nevertheless, there are several reasons that can suggest both higher and lower utilization rates among migrants and natives, even after controlling for observable socio-economic factors. On the one side, there is room for differences in health services utilisation between foreigners and natives based on their preferences. For example, if immigrants are more risk-averse than natives, it is expected that the former use health services more often than the latter. On the contrary, from a point of view of immigrants as pioneers and people with high initiative, one should expect a lower risk-aversion among foreign workers.³ Preferences can also be related to issues like fertility. It has been documented that immigrants have higher fertility rates than Spaniards, which, in principle, should drive a higher use of gynaecologic and obstetric services (Rivera, 2005). On the other side, there are other factors suggesting a lower use of health services by immigrants. Firstly, the lack language proficiency can represent an important barrier affecting the possibility of communicating with health care professionals. Secondly, in the case of illegal immigrants, although they are entitled to health care by law, it is possible that they do not know their rights or they even are afraid of going to health centres in case their illegal status can be eventually discovered and imply negative consequences for them, like deportation. Thirdly, there is also place for cultural factors and possible episodes of xenophobia or racism that can also prevent health care use by immigrants.⁴

Under these premises, the lack of a clear hypothesis to test, the response is mainly an empirical issue and in this respect the evidence is largely inconclusive. On the one side, there are several works documenting a lower use of health care services by immigrants or, in general, ethnic minorities after

¹ According to the health production function approach, older individuals experienced a faster depreciation of their stock of health and people with higher education are more efficient keeping a good health status.

² Winkelmann (2002) also points out that if immigrants are screened for good health before entering the country (as they are in the United States or New Zealand), this can result in lower health services utilization rates. This argument does not apply to Spain, since immigrants are not screened and (again) no clear prediction arise if it is possible to control for health status.

³ The influence of risk attitudes and their variation across races has been documented by Rosen, Tsai and Downs (2003).

controlling for observable characteristics. For example, Weinik, Zuvekas and Cohen (2000) and Van Houtven *et al.* (2005) reports that in the United States country ethnic minorities have a lower access to health services than natives, even after controlling by observable characteristics, such as health insurance status and financial situation. The authors attribute these findings to cultural differences and linguistic barriers faced by ethnic minorities when they try to contact health care providers. Waidman and Rajan (2000), in a work focused on the same nation, analysed access to health care in thirteen different areas, finding that the magnitude of the differences among races varies a lot across states and type of health care, with cases where differences are totally explained by socio-demographic characteristics. Lay *et al.* (2006), in a case study in Switzerland, points out the underutilisation of inpatient mental health services among immigrants with mental disorders. The work of Bilger and Chazer (2008) on Switzerland shows that health expenditure among foreigners is lower than among nationals, which is interpreted as an evidence of differences in preferences. On the other side, there are some authors reporting no significant effect of race or migrant status on health care equity or utilization, like Laroche (2000) for visits to GP, specialist and nurses and hospital stays in Canada; Hjern *et al.* (2001), who analyse several measures of access to health care in Sweden, with special emphasis on visits to physicians; Krasnik *et al.* (2002), focused on the duration of hospital stays in Denmark; and Winkelmann (2002) for visits to physicians in Switzerland. Finally, Sander's (2008) work for Germany points out no inequity in access to health care but a lower frequency of contacts among foreigners.

Though immigration, as it is explained below, is a recent phenomenon in Spain, some works have been published on this topic. Most of them are based on case studies in hospitals or primary health centres carried out by health care professionals or in the European Community Household Panel. The work of Cots *et al.* (2007) reports that, after controlling for age, the cost of emergency room services consumed by migrants in big towns in Spain is lower than that of services consumed by Spanish-born population. Buron *et al.* (2008), using data from a hospital serving a area of Barcelona (the second most populated town in Spain) with a high proportion of immigrants, find lower aggregated use of health services by foreigners compared to locals, a result that can be extended to specific services as surgery or traumatology, not detecting differences in other specialties like gynaecology or minor surgery. García, González and Saez (2007) study the use of health care services in a Spanish region (Catalonia) in 1994 and 2002, finding a lower use of public health care services by immigrants compared to locals. However, apart from being limited to a very particular Spanish region, this work does not control for demographic and economic characteristics. After standardizing by age, immigrants show a longer hospital stays. A major survey carried out by the health institute of the city of Madrid -the capital of Spain- (Instituto de Salud Pública de Madrid, 2005) reaches similar conclusions: controlling for observable characteristics immigrants show lower use of GP and psychiatric services, and no differences in the rest of services. Finally, Cantarero and Pascual (2008) use the European Community Household Panel to test for the existence of differences in the pattern of visits to general practitioners and specialists among migrants and Spaniards, finding no robust conclusions due to the limited suitability of the database, whose sample was

⁴ For example, Bach *et al.* (2004) reports that black patients are treated by less trained physicians with less access to health care resources than the doctors that treat white patients.

designed in 1994, just before the Spanish immigration boom, and with a low number of observations of immigrants.⁵

As mentioned in the introduction, the main contribution of this paper is that is the first work capable to draw meaningful conclusions of health care utilisation by foreign immigrants in Spain, since we use a nationally representative survey specifically designed for measuring health condition and health services utilisation carried out between 2006 and 2007. This database includes enough observations of migrants, overcoming the problems of previous studies, based on specific health centres, with problems of representativity or with not enough updated samples.

A brief overview of immigration and health care services in Spain

Immigration is relatively new phenomenon in Spain, which had traditionally been a country of emigrants (Oporto del Olmo, 1992). During the last decade, the percentage of foreign population in Spain increased from 1.4 to 10%. In fact, according to Eurostat data, in the context of the EU only Greece experienced a higher increase (6.7 points from 1990 to 2004) and only Ireland (with 4.8) came anywhere close. According to the Spanish Census, this change in the magnitude of the flows has been accompanied by a change in the countries of origin of the immigrants: on the one hand, immigration from EU-15 countries has been decreasing from mid-90s, from around 50% in 1996 to 20% in 2006; on the other hand, people from the rest of Europe and Latin Americans have gained importance in the foreign population (from 5 to 15 and from 15 to 40%, respectively). Africans have maintained their proportion (17%), while the weight of North Americans and people from Asia and Oceania continues to be low (less than 5%). In sum, there has been a shift in migration composition from rich to poorer countries.

In order to study the pattern of utilization of health services, it is useful to provide some remarks on the health care system in Spain. The Spanish National Health Care System was created in the mid-eighties from the (insurance-oriented) social security health services. It has a regional organizational structure since the middle nineties and its coverage is almost universal (99.5%, only some non-salaried and high income workers are not obliged to join the National Health System). It is mainly financed by taxes and, excepting doctors' prescriptions, all health services are free at the point of use, although it is important to note that there is a system of gate-keepers, that is, in order to visit the specialist individuals have to be referred by their general practitioner. However, some civil servants enjoy publicly financed but privately provided health care, so, depending on their insurance company, they may not be constrained by the gate-keeping system.⁶ Private health insurance is not very extended and, apart from civil servants who prefer using publicly financed private services, only around 15% of population is covered by private schemes.

⁵ In the last wave of ECHP there are only 109 observations of people born outside the European Union.

⁶ See Durán, Lara and van Waveren (2006) for a detailed description of the National Health System in Spain and Navarro (2004) for a comprehensive analysis of the main levels and trends in social and health spending in Spain compared to the other countries in the European Union.

Finally, it is worth mentioning that even illegal immigrants are also entitled to public health care since 2000, when the government passed a law entitling illegal immigrants to health care if they accomplished one of the following conditions: registration with their municipal census (which has no implication on their illegal status), visiting an emergency room, being 18 years old or less and being pregnant.⁷

Data

Description of the database

The main database used in this work is the National Health Survey (NHS) from 2006, carried out by the Spanish National Statistics Institute between June 2006 and June 2007.⁸ This cross-sectional survey, based on a two-stage stratified sampling design, is the main source of information on prevalence of health problems and use of health services among population resident in Spain. As usual in this type of surveys, the database is only representative of the non-institutionalised population, which usually presents higher levels of health care need than the rest of the population. This is a feature common to all these sorts of studies but one should bear it in mind. Interestingly, the sampling frame of this survey is based on municipal censuses sections, so illegal immigrants are not necessarily underrepresented or they are less underrepresented than they would be otherwise.

The NHS contains two different modules, one designed for children aged 16 years old or less and other for adults (people aged more than 16). This study only focuses on the adult file, as it is usual in most of studies. Further analyses of the children sample are left for future research. The sample used here comprises more than 25,000 observations of adults interviewed about their health status and health problems, lifestyle and health services utilisation during the last year.

Although the NHS is not the only source of information on health issues, this database has several advantages over previous surveys used by other researchers in order to analyse health-related topics in Spain. First of all, the NHS is the only source of information on health services utilisation after 2001, when the European Community Household Panel expired, a period when immigration in Spain was experiencing a huge increase. In addition, the sample of the ECHP was relatively small, including less than 5,000 households in 2001. Under these conditions, the mentioned survey only contained less than a hundred observations corresponding to individuals born abroad, which makes it inappropriate for the purposes of this study. The household survey that replaced the ECHP, the Statistics on Income and Living Conditions Survey, though larger, does not contain detailed information on health care utilisation and prevalence of diseases and other health problems. By contrast, as mentioned the NHS 2006 comprises a much larger sample. The second advantage of the NHS relates to its level of detail, since it contains information not only on visits to general practitioners (GP) and specialists, as the ECHP does, but also on

⁷ See Romero-Ortuño (2004) for details and for a comparative analysis of the Spanish legislation with other European regimes.

⁸ It is worthy to mention that the NHS was been carried out since 1987 from 2001, roughly each two years, by the Spanish Ministry of Health.

days of hospitalisation and emergency room visits and on the nature and source of funding of most of the services used. While information on visits to GP and specialist is referred to the last month, data on hospital stays and uses of emergency rooms are annual. This level of detail explains that most Spanish researchers have extensively used the different waves of this survey in order to account for inequities in health care delivery. However, the main advantage of the NHS is that, in contrast to previous waves of the same survey, includes detailed information on the country of birth of interviewed individuals, which allow clearly distinguishing between immigrants and natives as country of birth is the variable most commonly used by researchers in order to identify migrant status.⁹ Although nationality was recorded previous waves, the existence of important differences in naturalisation laws and procedures make this variable quite unreliable in order to carry out a study on immigrant's health care use.¹⁰ Lastly, this new wave includes a larger sample than previous versions.

Nevertheless, it should also be mentioned that the NHS 2006 presents some problems. The first and most important one is its cross-sectional nature, which prevent us of using panel data techniques. The second one, closely linked to the former, is the scarcity of information on health status prior to the year of the survey, which will introduce some endogeneity problems that are discussed later.

In order to construct a proxy of health care supply –doctors per 1,000 people by province-, a database on health care professionals provided by the National Statistics Institute is also used.¹¹

Selection of variables

This work considers four types of variables: variables on health care use (dependent variables), need or morbidity factors, socio-demographic characteristics and other variables related to and health supply factors. The variables selected for this study are discussed below.

Need variables

Morbidity variables try to capture individuals' need of health care services. In order to avoid any possible endogeneity of health status measures, in principle, we have only take into account if individuals suffer chronic illnesses and have had any accident in the year of the survey. While the former captures a long-term dimension of health, the latter can be considered exogenous to the health care system. Following Gerdtham (1997), two variables related to chronic illnesses have been created: firstly, a dummy variable capturing if the individual suffers a chronic illness which makes him face some limitation of normal activity (e.g. walking for an hour, climb more than ten stairs and the ability to do several types of housework) and, secondly, another one related to the incidence of a non-limiting chronic health problem.

⁹ This is the criterion followed, for example, by Borjas and Trejo (1991), Boeri, Hanson and McCormick (2002) and Hansen and Lofstrom (2003).

¹⁰ For example, in general terms, naturalization takes 10 years of residence in Spain. However, it can be reduced in some circumstances, like in the case marriage with a national, and, particularly, for people born in some countries. For example, people born in Latin America, the main home country of Spanish immigrants, can get the Spanish nationality with only two years of residence or even immediately if they prove the existence of a Spanish ancestor.

¹¹ This database can be accessed at http://www.ine.es/inebmenu/mnu_salud.htm.

Both, the variables related to the existence of chronic diseases and the dummy variable related to the occurrence of any accident, are expected to have a positive effect on health services use.

In addition, it is possible to include a subjective measure of health status that is available in the survey. However, it is reasonable to argue for the existence of two-way causation between health care services utilisation and self-perceived health status, which would make the latter variable and the error term to be correlated. In this case, estimated coefficients of health status would be inconsistent and the same would apply to other variables correlated with it. In spite of this possible shortcoming, all papers using the NHS to study health care delivery have included self-perceived health status and other variables related to acute illnesses and health problems suffered during the reference period as the main need variables (Abásolo, 1998, Urbanos, 2000, Abásolo, Manning and Jones, 2001, Álvarez, 2001). Ideally, we would like to have these variables recorded at the beginning reference period. If we had a longitudinal survey we could include the variable retarded, as most authors who used the ECHP do (Jiménez-Martín, Labeaga and Martínez-Granado, 2004). Nevertheless, it is worthy to mention that the work of Clavero and González (2005) using a cross-section of the ECHP and the panel structure of the same database finds no relevant difference in the effect of health status on the use of health care services. Apart from this problem, there is, of course, the risk of incurring measurement error if this variable is introduced, which would introduce an additional source of inconsistency. For all these reasons, we ruled out the inclusion of this variable.¹²

In principle, the variables related to chronic illnesses and accidents should capture most variability of health status of individuals -according to the ECHP, the correlation between the suffering of chronic diseases and the self-reported health status is 90% (Clavero and González, 2005). Anyway, we include another econometric specification introducing self-perceived health as three dummies (“very good”, “average”, “bad” and “very bad health status”), using “self-perceived good health” as the reference category and the results are remarkably robust.

Other important variables useful to proxy health care needs are age and gender. Age is introduced as a squared polynomial and gender as a dummy (considering “male” as the reference category).

Lastly, we include two variables related to lifestyle, such as the smoker condition and the regular performance of physical exercise. It is not clear how the former affects the use of health care services, since people who exhibit harmful behaviours are less worried about their health (Álvarez, 2001), it is expected that people who do sport are less likely to use health services.

¹² Windmeijer and Santos Silva (1997) suggest a solution based on the Generalised Method of Moments in order to address the simultaneity problem. However, it is hard to find instruments related to subjective health-status and independent of health care use utilisation and their implementation involves complexities that reduce the range of econometric models to be used. Anyway, if the determinants of the type of insurance are among the covariates included in the models, estimates will be consistent as selection will be based on observables.

Socio-demographic characteristics

The key variable in the analysis is immigrant status, which, as mentioned, is created from the information available on the country of birth of individuals. This variable is included in the analysis creating two dummies “EU-15 immigrant” and “Non-EU-15 immigrant”, with people reporting Spain as their country of birth representing the reference category. This distinction is justified by two reasons. In the first place, this distinction is made by recent works on immigration in the European Union, like Boeri, Hanson and McCormick (2002), stating that migrants from EU-15 are quite similar to nationals. Secondly, this definition is the most coherent with the typical perception of native citizens, which tend to identify immigrants with people coming from countries less developed than Spain.

Apart from the migrant status, there are other relevant variables helpful to predict health care demand. Firstly, the main activity status of individuals during the year is able to capture the “time price” of health care use, since it is expected that, in spite of the absence of co-payment, working individuals use health services to a lesser extent than unemployed or inactive people. This variable is introduced as a fictitious variable indicating if the individual is working.

Secondly, we consider the socio-economic status of individuals, which is imperfectly recorded in the survey. The researcher has two possible alternatives to consider the economic position of households in the analysis: using household income recorded in intervals or introducing an indicator of the occupational prestige of the household head. The direction of the effect of socio-economic status is not easy to predict. In principle, one can expect that a higher income allows purchasing more health services. However, since visits to health services and hospital stays are free at the point of use in the public system, the effect of income is far from being clear. In the case of specialists, because of the gatekeeper system operating in the national health system, it is possible that higher economic status allows individuals to directly visit specialists, avoiding visiting their GPs before (and, thus, reducing the visits to latter doctors). Therefore, the effect of economic level on health care utilisation is *a priori* unclear, though it is reasonable to expect that, other things equal, wealthier individuals can afford more visits to private specialists. Previous works focused on Spain reported ambiguous results. While Álvarez (2001) finds no significant effect of income on doctor and emergency room visits, Jiménez-Martín, Labeaga and Martínez-Granado (2004) points that household income positively affects specialist visits but does not affect GP visits and Clavero and González (2005) report a negative effect of income on GP visits and a positive one on specialist visits. It is worthy to mention that the comparative study of Jiménez-Martín, Labeaga and Martínez-Granado (2004) for twelve European Union countries suggests that the effect of economic status on health care use is far from robust. Both alternatives are considered in the analysis, yielding robust results in both cases, so only the results obtained using income bands are reported here.

A third control included in the analysis is level of schooling. The NHS records this variable using ten categories that have been re-coded to four: elementary (primary education or less), basic (lower secondary education and lower vocational training), medium (upper secondary education and upper vocational training) and high educational level (any university degree). According to economic theory, the expected sign of the coefficient of this variable is positive. According to Grossman’s model, people with higher levels of schooling are more efficient in the production of health. In addition, medical studies

have pointed out that low-educated individuals are more risk-averse than people with higher levels of schooling.

A fourth variable related to individual and household characteristics included in the model is related to the quality of the environment where people live. The NHS offers information about the level of noise, pollution, water quality, bad smell, street cleanliness and the presence of disturbing animals at home. Following Clavero and González (2005), we create an index capturing the unhealthiness of the home environment using Principle Component Analysis (PCA). This methodology basically allows reducing a multidimensional dataset to a single variable aiming to explain as much variability as possible. Results from PCA are not showed here, but they are available from the authors on request.

In the fifth place, it is relevant to consider the type of insurance of individuals. In Spain, roughly 85% sampled population has only (publicly or privately provided) public insurance, around 15% have double coverage. Since legally all citizens have right to public health care, the expected effect of this variable is unclear in the Spanish case. As the public system is based in gate-keeping as a cost-control mechanism, on the one side, it is possible that a privately insured individual facing a certain problem would choose to directly visit a specialist, lowering his GP visits and increasing his demand for specialist health care (Álvarez, 2001). In the second place, an individual with double coverage may visit less the doctor if he perceives that the private treatment is more efficient (Vera-Hernández, 1999). On the other side, it is also possible that an individual would visit first a public doctor and, then, a private one in order to contrast the diagnostic, which would mean greater health care use, or that the double insurance increases moral hazard and hence encourages more health care use. It is often argued the endogenous nature of health care insurance, particularly, the existence of a simultaneous relationship between private insurance choice and health care utilisation. In this case, estimates that do not take account of this fact will be inconsistent. However, for the Spanish case, the particular structure of health system allows arguing for the exogeneity of hiring private health care insurance. As Álvarez (2001) suggests, the bulk of people with private insurance are civil servants (entitled to choose between publicly and privately provided –but publicly funded- health care) and individuals employed by large firms who offer their workers firm-sponsored private health plans. In addition, several studies focused on health insurance have found very scarce evidence of endogeneity (Szabó, 1997; Vera-Fernández, 1999). In particular, Rodríguez and Stoyanova (2004), using the ECHP, point out that the people who subscribed, maintained and stopped their private insurance membership showed similar patterns of utilisation of health services in the past. Therefore, in this work this variable is treated as exogenous, leaving for further research the study of this particular issue.

Other additional controls related to social and demographic characteristics, such as household size, number of children aged 5 or less, and civil status (as a dummy using “single” as the reference category) have been included in the econometric specification.

Location and services supply variables

In order to consider not only the influence of regional differences on health, but also the particularities of the regional health systems, eighteen dummy variables are included in all the specifications. In addition, five dummy variables capturing the size of the municipality are considered. Finally, the number of

doctors per 1,000 people by province has been computed and introduced in the empirical analysis using information from the National Statistics Institute. This variable is included with the expectation that a larger health care supply has a positive effect on the demand side.

Descriptive statistics of the sample used in the multivariate analysis are reproduced in table 1.

Table 1. Main descriptive statistics of the sample.

	Mean	Standard deviation
Visits to GPs	0.432	0.864
Visits to specialists	0.216	0.706
Hospital days	0.866	5.122
Visits to emergency rooms	0.512	1.847
EU15 immigrant	0.018	0.134
Non-EU15 immigrant	0.103	0.304
Female	0.510	0.500
Age	46.05	18.54
Non-limiting chronic illness	0.517	0.500
Limiting chronic illness	0.239	0.426
Accident	0.104	0.305
Smoker	0.264	0.441
Sport	0.605	0.489
Working	0.503	0.500
Basic education	0.190	0.392
Médium education	0.221	0.415
High education	0.170	0.375
601-900 euros	0.128	0.334
901-1,200 euros	0.213	0.410
1,201-1,800 euros	0.269	0.443
1,801-3,600 euros	0.245	0.430
More than 3,600 euros	0.053	0.225
Unhealthy enviroment	0.107	1.490
Private insurance	0.149	0.356
Household size	3.284	1.392
Married	0.634	0.482
Physicians density	4.500	0.808

Source: Authors' analysis from NHS 2006.

Empirical analysis

Econometric strategy

As it is well-known, Ordinary Least Squares (OLS) are not appropriate when data are nonnegative integers, since they can predict negative values of the dependent variable (Wooldridge, 2002, Cameron and Trivedi, 1998 and 2005). The point of departure in the econometrics of count data is the Poisson model. There is a fundamental problem affecting the Poisson model, consisting in that it assumes equidispersion, that is, the equality of the mean and the variance. However, for count data, we usually observe that the variance exceeds the mean. This feature, called overdispersion, is a source of inefficiency in the Poisson model. In addition, the predicted frequency of zeros is not consistent with the observed one (Cameron and Trivedi, 2005). In order to deal with overdispersed count data, the negative binomial regression model (NBRM) is often proposed. The NBRM is a generalisation of the Poisson model, since it introduces an individual unobserved effect into the conditional mean (Greene, 2008). This model adds an error term accounting for unobserved heterogeneity among individuals, assumed to be uncorrelated with the covariates and with an exponential form that follows a gamma distribution. Since the Poisson model and the NBRM are nested, it is possible to test for overdispersion using a Likelihood Ratio (LR) test.

Nevertheless, the models explained above, though widely used in health economics, might present some shortcomings. One of the problems relates to the nature of the decision making in health care. The demand for health care is often governed by a process that takes two steps. In a first stage, the patient decides to go to the doctor and, in the second place, the doctor determines the intensity of the treatment, that is, the frequency of subsequent visits. A similar argument applies to hospital days. According to Zweifel (1981), it is possible that the physician that decides the length of hospital stay is different from the doctor that controls the decision of hospitalization (sometimes a GP or a specialist). This argument is weakly justified in the case of emergency room visits. In order to take into account the two-stage decision making process, Pohlmeier and Ulrich (1995) propose a hurdle or two-part model, where the decision to contact health care services and the frequency of utilization for individuals with nonnegative contacts are modelled separately. The first part of the model estimates the probability of having used health care services, while the second one uses a truncated model to model how often an individual with positive counts has visited a physician or how long it has been in the hospital (Jones, 2000). These models, firstly proposed by Mullahy (1986), can take several forms. The most frequent choices are a *probit* or a *logit* model for the first stage and a zero-truncated Poisson or a zero-truncated negative binomial model for the second one. In this paper, as Urbanos (2000) and Abásolo *et al.* (2001) do, a *probit* is ran in order to estimate the determinants of contacting health care services. For the second stage, zero-truncated Poisson and zero-truncated negative binomial models are used, a choice made by authors such as Urbanos (2000), Jiménez-Martín, Labeaga and Martínez-Granado (2004) and Clavero and

González (2005). Hurdle models, as Poisson and NBRM, are estimated by maximum likelihood.¹³ Since both processes are assumed to be independent, it is possible to maximize the likelihood function corresponding to each part separately. As in single-part models, it is possible to test for overdispersion using a LR test.

There is another secondary reason for using two-part models: the Poisson and the negative binomial models often predict a substantially lower proportion of zeros than is observed in the sample (Cameron and Trivedi, 2005).

As Poisson and NBRM are not nested within two-part models, in order to compare the performance of the different econometric approaches the Akaike information criterion (AIC), the Bayesian information criterion and the consistent Akaike information criterion (CAIC) are used (Cameron and Trivedi, 1998).¹⁴

In the presence of unobserved heterogeneity not captured by the specifications proposed above, estimates may be inconsistent. In such case, the econometric approaches suggested here still have a descriptive value, which is also interesting as long as we are interested in health care use utilization of immigrants *versus* natives. However, it is worthy to point out that the use of cross-sectional data does not represent a serious shortcoming in this framework, since the use of fixed-effects models, which would allow controlling for unobserved heterogeneity, would prevent us to estimate the effects of migrant status, which is a time-constant covariate.

All calculations are performed using the software Stata 10 and programs are available on request. In order to make interpretation easier we compute marginal effects evaluated at covariates means following Primoff (1997).

Results¹⁵

Visits to GPs

In the first place, a Poisson model and a NBRM were initially estimated. The LR test described above strongly rejected the null hypothesis of equidispersion. Secondly, a hurdle model using a *probit* and a Poisson-hurdle model is estimated. Then, we tried to estimate a hurdle model based a negative binomial hurdle model. However, the zero-truncated negative binomial model is not parsimonious and the likelihood function sometimes fails to converge (Greene, 1995; Gerdtham, 1997; Cameron and Trivedi, 2005; Jones, 2007). This was the case here, even after estimating several more parsimonious specifications (excluding regional dummies and other covariates) and ruling out the existence of possible collinearities among regressors, which can be a cause of non-convergence of likelihood function (Gould,

¹³ See Grogger and Carson (1991) and Cameron and Trivedi (1998) for a detailed derivation of the log-likelihood function of truncated and non-truncated Poisson and negative binomial models.

¹⁴ Examples of the use of these criteria to evaluate the goodness of fit of different models in health economics can be found, among others, in Gerdtham and Trivedi (2001), Jiménez-Martín, Labeaga and Martínez-Granado (2004) and Cotter (2008).

¹⁵ In the next pages, we only show the results of models that best fit data for reasons of space. Detailed results from other econometric models and specifications are available on request.

Pitblado and Sribney, 2006).¹⁶ Apart from the intrinsic complexity of the NBRM, one possible cause of this problem is that, since only monthly GP visits are recorded in the survey, there is very little variation among health care users (roughly 80% of the individuals with positive counts visited the doctor only once). Following the suggestion of Greene (1995), we estimate a restricted –and a more parsimonious version- of the negative binomial model, imposing a fixing value to the parameter α . Particularly, zero-truncated geometric model was estimated, which is a version of the zero-truncated NBRM with $\alpha = 1$, and that, hence, allows for some overdispersion.¹⁷ All the Bayesian criteria commented in the previous section point out that the model that best fitted the data is the NBRM. This result is similar to that obtained by Cotter (2008) for Portugal.¹⁸ Therefore, only results for the NBRM are presented and commented below (table 2). In all cases, we present only the marginal effects evaluated at the mean of the covariates. Coefficients are to a great extent in line with previous works. First, women visit more often their GPs, while age is not significant. Education, income, being married, living in an unhealthy environment, physicians density and need variables and doing exercise have positive effects on visits to GPs, while household size and having private health insurance diminishes the frequency of visits. Smokers, other things being equal, show a lower frequency of visits, a finding also reported by Álvarez (2001), which may be related to reluctance of people with bad habits to go to see a physician. Regarding migrant status, being a non-EU15 migrant has no effect on visits to GP, before and after controlling for socio-economic and need variables. There is no difference either among individuals born in EU15 countries and natives once we control for need variables.

Visits to specialists

The same econometric issues mentioned above apply here again: the Poisson model was rejected by the LR test, while a hurdle-Poisson model was easily estimated, and the hurdle NBRM failed to converge, so we estimated a zero-truncated geometric regression model. Based on the AIC, BIC and CAIC, the NBRM is the model that performs best again. This finding is not different from the results obtained by Urbanos (2000) using the NHS 1993 and 1995, where she rejects two-part models in favour of a Poisson one. Results are quite similar than those found for the visits to GPs, with the exception of age, which is highly significant now. Most variables have the same sign as in the previous regression, but in the case of visits to specialists, age and having private insurance have a positive effect on health services utilization. Regarding migration, before and after controlling for socio-economic background and health status, non-EU15 immigrants visit the specialist less than similar Spaniards. Particularly, they report 0.034 visits less.

¹⁶ We tried to estimate the same models using LIMDEP, another econometric package with canned routines for fitting zero-truncated negative binomial models and the same convergence problems remain.

¹⁷ This model has been widely used in health economics. See, for example,

¹⁸ It is also worthy to mention that some authors like Jiménez-Martín, Labeaga and Martínez-Granado (2004), in their comparative work for European countries, finds that two-part models perform worse than other single-stage models in health care systems with gate-keepers, like latent class models that are based on the distinction between low and high users. They use the ECHP 1996, which includes annual visits to GPs and specialists. As mentioned, the database used in this study only comprises monthly visits, which greatly reduces the variability of health care utilization among users, making little appropriate a latent class model, which is based on a distinction between low and high users.

Exponentiation of the raw coefficient tells us that the frequency of visits to specialist physicians among immigrants is 19.7% less than among nationals.

Days of hospital care

In this case, all the proposed specifications successfully converged. LR tests rejected equidispersion when the Poisson and the NBRM and the hurdle-Poisson and the hurdle-NBRM are compared. Then, all the criteria of goodness of fit suggested that the hurdle-NBRM is the most appropriate specification.

Interestingly, other things equal, being a woman reduces the length of stay, a result also reported, though not commented, by Urbanos (2000) for 1995. This circumstance may be explained by the cause of hospitalization, because, according to the Spanish Hospital Morbidity Survey 2006, most of female part hospital stays corresponds to childbirths, which on average last three days, far below the length of the average stay, roughly seven days.¹⁹ Regarding migrant status, there is no statistically significant difference in access to hospital facilities or the length of stays among natives and foreigners.

Emergency room visits

The same problems present in the estimation of the determinants of GP and specialist visits applies in the case of emergency room visits. The use of the rules followed in the previous subsection suggests that the model that best fit the data is the NBRM. In contrast to the findings related to visits to physicians and hospital stays, non-EU15 immigrants show higher rates of utilisation of emergency health services, while EU15 immigrants, other things equal, visit emergency rooms less than Spaniards. Particularly, being a non-EU15 immigrant means roughly 0.10 visits more to emergency rooms. Apart from the hypothesis of overutilization based on preferences, this result can be linked to a lack of knowledge of the rules of the Spanish National Health System and, particularly among just arrived illegal migrants, to the fear that their irregular status might be discovered, with subsequent negative consequences for them. As mentioned before, the law establish the right to free public health care, but the mechanisms are not simple and it is quite possible that just arrived migrants might not be acquainted with of them. For example, they can use all types of health care services if they are registered in the municipal censuses, a procedure completely independent of their legal or illegal residence in the country. In addition, the law establish that urgent care will not be denied to illegal immigrants irrespective of their status or the mentioned registration in local censuses and, as a general rule, in Spanish hospitals health care professionals tends to see all patients whatever their insurance is. Therefore, one can hypothesize that some migrants, because of lack of knowledge of both the law and how the health system works could be substituting visits to physicians by urgent care.

¹⁹ The main results of this survey can be found at the website of the Spanish National Statistics Institute at <http://www.ine.es/inebase/cgi/um?M=%2Ft15%2Fp414&O=inebase&N=&L>.

Table 2. Estimation results for health care utilization in Spain

	Visits to GPs Marginal effects (NBRM)	Visits to specialists Marginal effects (NBRM)	Having stayed in a hospital Marginal effects (<i>probit</i>)	Non-zero hospital days Marginal effects (ZTNBRM)	Visits to emergency rooms Marginal effects (NBRM)
EU15 immigrant	-0.0487	-0.0314	0.0096	3.2986	-0.0988***
Non-EU15 immigrant	0.0183	-0.0340***	0.0024	0.8013	0.1392***
Female	0.0477 ***	0.0239 ***	-0.0017	-1.9847 ***	0.0358***
Age	-0.0052	0.0226 *	0.0468 ***	0.4870	0.0320*
Age squared	0.0049	-0.0792 **	-0.1486 ***	-1.5689	-0.1478**
Age cubic	0.0002	0.0012 **	0.0019 ***	0.0230	0.0020**
Age quartic	0.0000	0.0000 ***	0.0000 ***	-0.0001	0.0000**
Working	-0.0551 ***	-0.0451 ***	-0.0450 ***	-1.8525 ***	-0.0428**
Basic education	0.0304 **	0.0380 ***	0.0082	-0.5776	0.0180
Médium education	0.0067	0.0296 ***	0.0115 *	-0.7744	-0.0036
High education	-0.0492 ***	0.0287 **	0.0082	-1.1357 **	-0.0347*
601-900 euros	0.0173	0.0082	-0.0088	-1.2904 ***	-0.0527***
901-1,200 euros	-0.0249 *	-0.0028	-0.0042	-0.9511 *	-0.0357
1,201-1,800 euros	0.0062	0.0082	-0.0067	-1.6735 ***	-0.0535**
1,801-3,600 euros	-0.0043	0.0173	-0.0138 **	-1.6502 ***	-0.0791***
More than 3,600 euros	-0.0592 **	0.0041	-0.0176 *	-1.8142 **	-0.0210
Unhealthy enviroment	0.0097 ***	0.0048 **	0.0014	0.2862 **	0.0137***
Private insurance	-0.0753 ***	0.0563 ***	0.0245 ***	-1.0975 **	0.0242
Household size	-0.0082 **	-0.0174 ***	0.0024	0.0299	-0.0171 ***
Married	0.0233 **	0.0456 ***	0.0228 ***	-0.7335 *	0.0436***
Physicians density	0.0399 ***	0.0015	0.0028	0.4124	0.0333**
Non-limiting chronic illness	0.2813 ***	0.1238 ***	0.0089	-0.5009	0.1825***
Limiting chronic illness	0.7612 ***	0.4236 ***	0.1092 ***	2.2221 ***	0.8195***
Accident	0.0884 ***	0.0625 ***	0.0448 ***	-0.0226	0.5635***
Smoker	-0.0473 ***	-0.0424 ***	-0.0117 ***	0.0990	-0.0026
Sport	-0.0108	-0.0121 **	-0.0197 ***	-1.8107 ***	-0.0716***
Observations	25,033	24,867	25,009	2,443	25,033
LR test	$\chi^2(49) = 3,548.1$ ***	$\chi^2(49) = 1536.6$ ***	$\chi^2(49) = 1208.7$ ***	$\chi^2(49) = 414.8$ ***	$\chi^2(49) = 3,384.4$ ***
McFadden R ²	0.0762	0.0554	0.0754	0.0275	0.0730

*** significant at 1%; ** significant at 5%; * significant at 1%. An intercept and regional and town size controls are included in all models.

Source: Authors' analysis from the NHS.

Conclusions

Based on the analysis of the most recent health survey available for Spain, this work has analysed the determinants of the demand for health care with special emphasis in the differences between migrants and natives patterns of utilization. The findings reported here are not completely conclusive. On the one side, immigrants do not show a larger frequency of visits to GPs or days in hospital and reports less visits to specialists than Spaniards. On the other side, they visit emergency rooms with higher frequency than nationals.

At the moment, based on the use of the National Health System, in spite of this partially mixed evidence, it is not possible to strongly defend the hypothesis of clear over-utilisation of health care services by immigrants in Spain and the argument that immigration represents a higher than proportional burden for the Spanish Welfare State. Popular belief about supposed overutilization by migrants might be explained by several mutually reinforcing factors. First, there is a large concentration of foreigners in specific geographical areas and medical specialties. Second, this happens within a just decentralized system that yields different degrees of satisfaction among citizens by region, with a possible worsening of services in some dimensions. Third, as Spain has a relatively very homogenous population and migration flows means a very recent phenomenon, the popular belief of over-utilization can be reinforced when migrant-born users belong to a different ethnic group.

On the other hand, the hypothesis of a significant lack of equity in health care access based on migrant status is not supported by our results either. It seems that immigrants do not use more primary and hospital care, but they significantly show a higher rate of utilisation of emergency services. A possible explanation

Additional studies are needed, with more detailed information on migration (political status and years of residence, among other relevant issues). Furthermore, longitudinal databases could also help in this task providing lagged indicators of health status and lifestyle.

Acknowledgments. We are grateful to Francisco-Javier Braña and participants in the 15th Spanish Meeting of Public Economics in 2008 for helpful comments on a previous draft.

References

- Abásolo, I. (1998): "Equidad horizontal en la distribución del gasto público en sanidad por grupos socioeconómicos en Canarias: Un estudio comparado con el conjunto español", *Hacienda Pública Española*, 147(4), 1473-27.
- Abásolo, I., Manning, R. and Jones, A.M. (2001): "Equity in Utilization of and Access to Public-Sector GPs in Spain", *Applied Economics*, 33(3), pp. 349-364.
- Álvarez, B. (2001): "La demanda atendida de consultas médicas y servicios urgentes en España", *Investigaciones Económicas*, 25(1), 93-138.

- Bach, P.B., Pham, H.H., Schrag, D., Tate, R.C. and Hargraves, J.L. (2004): "Primary Physicians Who Treat Blacks and Whites", *The New England Journal of Medicine*, 5(6), 575-584.
- Bilger, M. and Chaze, J.P. (2008): "What Drives Individual Health Expenditure in Switzerland", *Swiss Journal of Economics and Statistics*, 144(3), 337-358.
- Boeri, T.; Hanson, G. and McCormick, B. (2002): *Immigration Policy and the Welfare System*, Oxford: Oxford University Press.
- Borjas, G.J. and Trejo, S.J. (1991): "Immigrant Participation and the Welfare System", *Industrial and Labor Relations Review*, 44(2), 195-211.
- Burón, Aandrea; Cots, Francesc; García, Óscar; Vall, Oriol y Castells; Xavier (2008): "Hospital emergency department utilization rates among the immigrant population in Barcelona, Spain", *BMC Health Services Research*, 8(51).
- Cameron, A.C. and Trivedi, P.K. (1998): *Regression analysis of count data*, New York: Cambridge University Press.
- Cameron, A.C. and Trivedi, P.K. (2005): *Microeconometrics. Methods and Applications*, New York: Cambridge University Press.
- Canal-Domínguez, J. and Rodríguez-Gutiérrez, C. (2008): "Analysis of wage differentials between native and immigrant workers in Spain", *Spanish Economic Review*, 10(2), 109-134.
- Cantarero, D. and Pascual, M. (2008): "Inmigración, Salud y Utilización en España", paper presented at the 15th Conference in Public Economics, Salamanca (Spain), February 7-8.
- Centro de Investigaciones Sociológicas (CIS) (2006) *Barómetro Septiembre 2006*, Madrid: CIS.
- Clavero, A. and González, M.L. (2005): "La demanda de asistencia sanitaria en España desde la perspectiva de la decisión del paciente", *Estadística Española*, 47(158), 55-87.
- Cots, Francesc; Castells, Xavier; García, Óscar; Riu, Marta; Aida, Felipe and Vall, Oriol (2007): "Impact of immigration on the cost of emergency visits in Barcelona (Spain)", *BMC Health Services Research*, 7(9).
- Cotter, J. (2008): "The Determinants of Health Care Use Utilization in Portugal: An Approach with Count Data Models", *Swiss Journal of Economics and Statistics*, 144(3), 437-458.
- European Commission (2006): *Eurobarometer 66. Full Report*, Brussels: European Commission.
- Eurostat (2007)
- Fernández, C. and Ortega, A.C. (2008): "Labor market assimilation of immigrants in Spain: employment at the expense of bad job-matches?", *Spanish Economic Review*, 10(2), 83-107.
- García, P., González, S. and Sáez, M. (2007): "Diferencias en estado de salud y en los condicionantes de utilización de los servicios sanitarios entre la población de origen extranjero", en Argullol i Morgadas, E. and López i Casanovas, G. (dirs.) *Inmigración y transformación social en Cataluña*, Bilbao: Fundación BBVA, 257-304.
- Gerdtham, U.G. (1997): "Equity in health care utilization: further evidence based on hurdle models and Swedish micro data", *Health Economics*, 6(3), 303-319.
- Gerdtham, U.G. and Trivedi, P.K. (2001): "Equity in Swedish health care reconsidered: new results based on the finite mixture model", *Health Economics*, 10(6), 565-572.

- Gould, W., Pitblado, J. and Sribney, W. (2006): *Maximum Likelihood Estimation with Stata*, 3rd edition, College Station, Texas: Stata Press.
- Greene, W.G. (2008): *Econometric Analysis*, 6th edition, New Jersey: Pearson.
- Greene, W.H. (1995): *LIMDEP Version 7.0 User's Manual*, Bellport, New York: Econometric Software, Inc.
- Grogger, J.T. and Carson, R.T. (1991): "Models for truncated counts", *Journal of Applied Econometrics*, 6(3), 225-238.
- Grossman, M. (1972), "On the concept of health capital and demand for health", *Journal of Political Economy*, Vol. 80, No. 2, pp. 223-255.
- Hansen, M. and Lofstrom, J. (2003): "Immigrant Assimilation and Welfare Participation: Do Immigrants Assimilate Into or Out of Welfare?", *Journal of Human Resources*, 38(1), 74-98.
- Hjern, A., Haglund, B., Persson, G. and Rosén, M. (2001): "Is there equity in access to health care ethnic minorities in Sweden", *European Journal of Public Health*, 11(2), 147-152.
- Instituto de Salud Pública de Madrid (2005): *Encuesta de Salud de la Ciudad de Madrid 2004-2005*, Madrid: Instituto de Salud Pública de Madrid.
- Instituto de Salud Pública de Madrid (2005): *Encuesta de Salud de la Ciudad de Madrid 2004-2005*, Madrid: Instituto de Salud Pública de Madrid.
- Jiménez-Martín, S.; Labeaga, J.M. and Martínez-Granado, M. (2004): "An empirical analysis of the demand for physician services across the European Union", *European Journal of Health Economics*, 5(2), 150-165.
- Jones, A.M. (2000): "Health Econometrics", in Newhouse, J.P. and Culyer, A.J. (eds.) *Handbook of Health Economics*, 1A, Amsterdam: Elsevier, 265-344.
- Jones, A.M. (2007): *Applied Econometrics for Health Economists: A Practical Guide*, 2nd edition, Oxford: Office of Health Economics.
- Krasnik, A., Norredam, M., Sorensen, T.M., Michaelsen, J.J., Nielsen, A.S. and Keiding, N. (2002): "Effect of ethnic background on Danish hospital utilization Patterns", *Social Science & Medicine*, 55(7), 1207-1211.
- Laroche, M. (2000): "Health Status and Health Services Utilization of Canada's Immigrant and Non-Immigrant Population", *Canadian Public Policy/ Analyse de Politiques*, 26(1), 51-75.
- Mullahy, J. (1986): "Specification and testing of some modified *count data* models", *Journal of Econometrics*, 33(3), 341-365.
- Muñoz de Bustillo, R. and Antón, J.I. (2007): "Inmigración y Estado de Bienestar. Una aproximación al caso español", en Domínguez, R. (coord.) *Inmigración: crecimiento económico y bienestar social*, Santander: Universidad de Cantabria and Parlamento de Cantabria, 117-146.
- Muurinen, J. M. (1982), "Demand for health: A generalised Grossman model", *Journal of Health Economics*, 1(1), 5-28.
- Navarro, V. (dir.) (2004): *El Estado de Bienestar en España*, Madrid: Tecnos.
- Pohlmeier, W. and Ulrich, V. (1995): "An Econometric Model of the Two-Part Decisionmaking Process in the Demand for Health Care", *Journal of Human Resources*, 30(2), 339-361.

- Primoff, J. (1997): "Gender differences in days lost from work due to illness", *Industrial and Labor Relations Review*, 50(2), 304-323.
- Rivera, B. (2005), "Inmigración y Atención Sanitaria en España: Impacto sobre los Sistemas de Salud de las Comunidades Autónomas", paper presented at the the *Conference of the Spanish Health Economics Association 2005*, November 1-5, Gran Canaria, Spain.
- Rodríguez, M. and Stoyanova, A. (2004): "The effect of private insurance access on the choice of GP/specialist and public/private provider in Spain", *Health Economics*, 13(7), 689-703.
- Romero-Ortuño, R. (2004): "Access to health care for illegal immigrants in the EU: should we be concerned", *European Journal of Health Law*, 11(3), 245-272.
- Rosen, A.B., Tsai, J.S. and Downs, S.M. (2003): "Variations in Risk Attitude across Race, Gender, and Education", *Medical Decision Making*, 23(6), 511-517.
- Sander, M. (2008): "Is there migration-related inequity in access to or in the utilization of health care in Germany", SOEP Papers on Multidisciplinary Panel Data Research, 147.
- Szabó, T. (1997): *La demanda de seguros médicos privados y el uso servicios sanitarios en España*, Msc Dissertation, 9706, Center for Monetary and Financial Studies.
- Urbanos, R.M. (2000): "La prestación de los servicios sanitarios públicos en España: cálculo y análisis de la equidad horizontal interpersonal para el período 1987-1995", *Hacienda Pública Española*, 153(2), 139-160.
- Van Houtven, C.H.; Voils, C.I.; Oddone, E.Z., Weinfurt, K.P., Friedman, J.Y., Schulman, K.A. and Bosworth, H.B. (2005): "Perceived Discrimination and Reported Delay of Pharmacy Prescriptions and Medical Tests", *Journal of General Internal Medicine*, 20(7), 578-583.
- Vera-Hernández, A.M. (1999): "Duplicate coverage and demand for health care. The case of Catalonia", *Health Economics*, 8(7), 579-598.
- Wagstaff, A. (1986), "The Demand for Health: A Simplified Grossman Model", *Bulletin of Economic Research*, 38(1), 93-95.
- Waidman, T.A. and Rajan, S. (2000): "Race and ethnic disparities in health care access and utilization: an examination of state variation", *Medical Care Research Review*, 57(1), 55-84.
- Weinik, R., Zuvekas, S. and Cohen, J. (2005): "Racial and ethnic discrimination in access to and use of health services, 1977 to 1996", *Medical Care Research Review*, 57(1), 36-54.
- Windmeijer, F. and Santos Silva, J. (1997): "Endogeneity in Count Data Models: An Application to Demand for Health Care", *Journal of Applied Econometrics*, 12(3), 281-294.
- Winkelmann, R. (2002): "Work and health in Switzerland: Immigrants and Natives", Socioeconomic Institute, University of Zurich, Working Paper 203.
- Wooldridge, J.M. (2002): *Econometric Analysis of Cross-Section and Panel Data*, MIT: The MIT Press.
- Zweifel, P. (1981): "Supplier-induced demand in a model of physician behavior", in van der Gaag, J. and Perlman, M. (eds.) *Health, Economics, and Health Economics*, New York: North Holland, 245-267.