

Health care utilisation and immigration in Spain

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

Keywords Health care · Immigration · Spain · Access · Equity

JEL classification H75 · F22

Introduction

According to European opinion polls [1], immigration is considered the fourth most important issue concerning Europeans (after unemployment, crime, and the economic situation), with less than half of European Union (EU)-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 by the State, and around 20% of respondents even thought that immigrants should not be given health care under the same conditions as nationals [2].

This paper aims to shed light upon the intensity of health care utilisation among immigrants in Spain. This is the first work using a recent and nationally representative survey that properly captures the migration phenomenon, overcoming the problems of previous research that was based on case studies at health centres or hospitals and household surveys where migrants were not adequately represented. In particular, visits to general practitioners (GPs), specialists, and emergency rooms and hospital stays were analysed using negative binomial and hurdle models. The main findings of this study were that migrants, with the exception of emergency room services, do not use health care more than nationals, even after controlling for health needs and socio-economic characteristics. In addition, the number of visits to specialists among migrants is lower than that among the local population. Therefore, two hypotheses frequently found in the media, i.e. that health care services are overutilised by immigrants and that inequities in health care delivery exist, are not consistent with the evidence presented here.

The rest of the paper is organised into four sections as follows. First, current literature on immigration and health care utilisation is summarised and critically discussed. In the second section, some specific facts about the Spanish health care system and Spanish immigration are offered to allow the reader to better understand the specificity of the case analysed. The third part deals briefly with the main characteristics of the databases used in this work, while the

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fourth part presents the methodology and the main results of the analysis. A final section summarises the main conclusions.

Theoretical and empirical review

Although economists have devoted much effort to the study of the economic consequences of immigration, the topic of the use of public health care systems by immigrants has not received much attention within this discipline. Indeed, it has been addressed much more often by health care professionals in case studies. According to Winkelmann [3], the scant interest of Economics in this issue may be related to a lack of empirical guidance from economic theory.

The Grossman [4] model of demand for health care is a sensible departure point in order to establish a hypothesis. According to this framework, those individuals with better health, lower age and higher education are less likely to use health care services [5, 6].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 to the fact that immigrants in Spain, before controlling for any observable characteristics, are younger, slightly more educated and with a better health status than the native population [7, 8]. Nevertheless, if we control for these observable features, the standard production function model does not give us any a priori hypothesis.²

Drawing on the human capital theory, Winkelmann [3] 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, the same might limit their access to health care services. Although this applies to Spain [9, 10], again, when controlling for observable characteristics like socio-economic status or income, no difference should be expected.

Nevertheless, there are several reasons that may suggest both higher and lower utilisation rates among migrants and natives, even after controlling for observable socio-economic factors. On the one hand, there is room for differences in health service 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 will use health services more often than the latter. On the contrary, from the point of view that immigrants represent pioneers and people with high initiative, one should not expect a higher risk-aversion among foreign workers.³ Preferences can also be related to issues such as fertility. It has been documented that immigrants have higher fertility rates than Spaniards, which, in principle, should drive higher use of gynaecological and obstetric services [11]. On the other hand, there are other factors suggesting a lower use of health services by immigrants. First, the lack of language proficiency may represent an important barrier affecting the possibility of communicating with health care professionals (obviously, the application of this point depends on the migrant's nationality). 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 might be afraid of going to health centres in case their illegal status is eventually discovered and leads to negative consequences such as deportation. Thirdly, there are cultural factors and possible occurrences of xenophobia or racism that could also prevent health care use by immigrants.⁴

Under these premises, i.e. 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 hand, several studies document a lower use of health care services by immigrants, or ethnic minorities in general, after controlling for observable characteristics. For example, Weinik et al. [12, 13] reports that ethnic minorities in the United States—among which immigrants are largely represented—have lower access to health services than whites, even after controlling for 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 [14], in a study also focussed on the United States, analysed access to health care in 13 different areas, finding that the magnitude of differences in consumption of health services varies greatly across states and type of health care, with cases where differences are totally explained by socio-demographic characteristics. In a case study in Switzerland, Lay et al. [15] point out the underutilisation of inpatient mental health services among immigrants with mental disorders. The work of Bilger and Chazer [16] focusses on the same

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

² Winkelmann [3] 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 utilisation rates. This argument does not apply to Spain, since immigrants are not screened and (again) no clear prediction arises of whether 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 [51].

⁴ For example, Bach et al. [52] report that black patients are treated by less trained physicians with less access to health care resources than doctors treating white patients.

country and shows that health expenditure among foreigners is lower than among nationals, which is interpreted as evidence of differences in preferences. On the other hand, there are some authors reporting no significant effect of race or migrant status on health care equity or utilisation, e.g. Laroche [17] for visits to GP, specialist and nurses and hospital stays in Canada; Hjern et al. [18], who analysed several measures of access to health care in Sweden, with special emphasis on visits to physicians; Krasnik et al. [19] focussed on the duration of hospital stays in Denmark; and Winkelmann [3], for doctor visits in Switzerland. Finally, Sander [20] concluded that there is no inequity in access to health care but a lower frequency of use among foreigners in Germany.

Although, as explained below, immigration is a recent phenomenon in Spain, some studies on the topic of this paper have been published. Most of these are based on case studies in hospitals or primary health centres carried out by health care professionals or analyses of the European Community Household Panel (ECHP). Among the former, the work of Cots et al. [21] reports that, after controlling for age, the cost of emergency room services consumed by migrants in big cities in Spain is lower than that of services consumed by the Spanish-born population. Buron et al. [22], using data from a hospital serving an area of Barcelona (the second most populated city 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 such as surgery or traumatology, not detecting differences in other specialties like gynaecology or minor surgery. García et al. [23] studied the pattern of consumption 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. A major survey [24] carried out by the Health Institute of the City of Madrid—the capital of Spain—reaches similar conclusions: after controlling for observable characteristics, immigrants show a lower use of GP and psychiatric services, and no difference in other services. In contrast, Soler [25], after studying the pattern of health care use in five areas of Lleida, a city in Catalonia, finds higher use of GP and paediatric services, as well as emergency rooms, among migrants. However, the rate of hospital admission is lower among foreign men than among their local counterparts, but the opposite applies to women because of their higher fertility rate. Finally, Cantarero and Pascual [7] used the ECHP to test for the existence of discrepancies in the pattern of visits to GPs and specialists among migrants and Spaniards, finding no robust conclusions due to the limited suitability of the database, whose sample was 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 it is, to our knowledge, the first work capable of drawing meaningful conclusions about health care utilisation by foreign immigrants in Spain, since we use a nationally representative survey carried out between 2006 and 2007 specifically designed to measure health condition and health services utilisation. This database includes a sufficient number of observations of migrants, overcoming the problems of previous studies, which were based on specific health centres, had problems of representivity and insufficiently updated samples.

A brief overview of immigration and health care services in Spain

Immigration is a relatively new phenomenon in Spain, which had traditionally been a country of emigrants [26]. 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 (4.8 points) 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 since the mid-1990 s, from around 50% in 1996 to 20% in 2006; on the other hand, people from the rest of Europe and Latin America have increased in the foreign population (from 5 to 15% and from 15 to 40%, respectively). Africans have maintained their proportion (17%), while the numbers of North Americans and people from Asia and Oceania continues to be low (>5%). In sum, there has been a shift in migration composition from rich to poorer countries.

In studying the pattern of utilisation of health services, some remarks on the Spanish health care system may be useful. The National Health Care System was created in the mid-1980s from the (insurance-oriented) social security health services. This has had a regional organisational structure since the mid-1990s and its coverage is almost universal (99.5%; only a few non-salaried and high income workers are not obliged to join the National Health System). It is financed mainly by taxes and, with the exception of 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, i.e. in order to visit a specialist,

⁵ In the last wave of the ECHP, there were only 109 observations of people born outside the EU.

individuals have to be referred by their GP. 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 popular as, apart from civil servants who prefer to use publicly financed private services, only around 15% of the population is covered by private schemes.

Finally, it is worth mentioning that even illegal immigrants have been entitled to public health care since 2000, when the government passed a law entitling illegal immigrants to health care if they met 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 under, 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 the prevalence of health problems and use of health services among populations resident in Spain. As usual in this type of survey, the database is representative only of the non-institutionalised population, which usually presents lower levels of health care need than the rest of the population. This is a feature common to all these types of study 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 under-represented or at least they are less under-represented than they would be otherwise.

The NHS contains two different modules: one designed for children aged 16 years or under and another for adults (individuals over 16 years old). As is widespread in the literature, this study focuses only on the adult sample as is usual in most such studies. Further analyses of consumption of health services among children 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 previous year.

Although the NHS is not the only available source of information on health issues, this database has several advantages over surveys previously 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 ECHP expired—a period when immigration in Spain was experiencing a huge increase. In addition, the sample of the ECHP was relatively small, including fewer than 5,000 households in 2001. Under these conditions, the mentioned survey contained fewer than 100 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—although larger, does not contain detailed information on health care utilisation and prevalence of diseases and other health problems. As mentioned, the NHS 2006 comprises a much larger set of observations.

The second advantage of the NHS relates to its level of detail, since it contains information not only on visits to GPs and specialists, as does the ECHP, but also on 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 GPs and specialists refers to the previous month, data on hospital stays and uses of emergency rooms are annual. This level of detail explains why most Spanish researchers have extensively used the different waves of this survey in order to account for inequities in health care or other aspects related to health service delivery. However, the main advantage of the NHS 2006 is that, in contrast to previous waves of the same survey, it includes detailed information on the country of birth of the individuals interviewed, which clearly allows distinguishing between international immigrants and natives, as the country of birth is the variable most commonly used by researchers in order to identify migrant status.⁹ Although nationality was recorded in previous waves, the existence of important differences in naturalisation laws and procedures depending on the country of origin make this variable quite unreliable in order to carry out a study on immigrants' health care use.¹⁰ Lastly, this new wave includes a larger sample than previous versions.

⁶ See Durán et al. [61] for a detailed description of the National Health System in Spain, and Navarro [53] for a comprehensive analysis of the main levels and trends in social and health spending in Spain compared to the other countries in the EU.

⁷ See Romero-Ortuño [54] for details and for a comparative analysis of the Spanish legislation with other European regimes.

⁸ It is worth mentioning that the NHS was carried out since 1987, roughly every 2 years since 2001, by the Spanish Ministry of Health.

⁹ This is the criterion followed, for example, by Borjas and Trejo [55], Boeri et al. [34], and Hansen and Lofstrom [56].

¹⁰ For example, in general terms, naturalisation takes 10 years of residence in Spain. However, it can be reduced in some circumstances, such as in the case of marriage with a national, and, notably, for people born in certain countries. For example, people born in Latin America, the main home country of origin of immigrants to Spain, can obtain Spanish nationality after only 2 years of residence or even immediately if they prove the existence of a Spanish ancestor.

Nevertheless, it should also be mentioned that the NHS 2006 presents some problems. The first and most important is its cross-sectional nature, which prevents us from using panel data techniques. The second problem, 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 as discussed later.

Together with the NHS 2006, and 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 was also used.¹¹

Selection of variables

The present analysis uses four types of variables: variables on health care use (dependent variables), need or morbidity factors, socio-demographic characteristics and other related variables and health supply factors. The right-hand-side variables selected for this study are described briefly and discussed below.

Need variables

Morbidity variables try to capture an individual's need for health care services. In order to avoid any possible endogeneity of health status measures, in principle we consider only whether individuals suffer chronic illnesses or 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 [27], two variables related to chronic illnesses were created: first, a dummy variable capturing if the individual suffers a chronic illness that causes some limitation of normal activity (e.g. walking for an hour, climbing more than ten stairs, or the ability to do some types of housework) and, secondly, another one variable related to the incidence of a non-limiting chronic health problem. 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 service 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 correlate the latter variable with the error term. 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 [28–31]. Ideally, we would like to have these variables recorded at the beginning of the reference period. If we had a longitudinal survey we could include the variable lagged, as do most authors who use the ECHP [32]. Nevertheless, it is worth mentioning that the work of Clavero and González [33], 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 introducing some measurement error if this variable is introduced, which would mean an additional source of inconsistency. For all these reasons, we ruled out 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 suffering a chronic disease and self-reported health status is 90% [33]. In addition, 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 sex. Age is introduced as a squared polynomial and sex as a dummy (considering “male” as the reference category).

Lastly, we include two variables related to lifestyle, such as smoker status 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 [30]. Regarding the latter, it is expected that people who regularly exercise are less likely to use health services.

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”

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

¹² Windmeijer and Santos Silva [57] suggest a solution based on the Generalised Method of Moments in order to address the simultaneity problem. However, it is hard to find instruments correlated with subjective health-status and at the same time 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.

and “non-EU-15 immigrant”, with people reporting Spain as their country of birth representing the reference category. This distinction is justified for two reasons. In the first place, this distinction is used in recent studies on immigration in the EU, e.g. [34], stating that migrants from EU-15 are quite similar to nationals. Secondly, this definition concurs most with the typical perception of native citizens, who tend to identify immigrants as people coming from countries less developed than Spain.

Apart from migrant status, there are other relevant variables helpful to predicting health care demand. First, 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 employed.

Secondly, we consider the socio-economic status of individuals, which is imperfectly recorded in the survey. The researcher has two possible alternatives when considering the economic position of households in the analysis: (1) using household income recorded in intervals, or (2) introducing an indicator for the occupational status of the head of the household. The direction of the effect of socio-economic status is not easy to predict. In principle, once we control for health needs, one would expect that a higher income allows the purchasing of 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 visit specialists directly, avoiding visiting a prior visit to their GP (thus reducing visits to the latter). Therefore, the effect of economic level on health care utilisation is a priori unclear, although it is reasonable to expect that, other things being equal, wealthier individuals can afford more visits to private specialists. Previous studies focussed on Spain have reported ambiguous results. While Álvarez [30] found no significant effect of income on doctor and emergency room visits, Jiménez-Martín et al. [32] pointed out that household income positively affects specialist visits but does not affect GP visits and Clavero and González [33] report a negative effect of income on GP visits and a positive effect on specialist visits. It is worth mentioning that the comparative study of Jiménez-Martín, Labeaga and Martínez-Granado [32] for 12 EU 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 education. 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 higher educational (any university degree). According to Grossman’s model, the expected sign of the coefficient of this variable is positive, as people with higher educational attainments are more efficient in their maintenance of good health. In addition, medical studies have pointed out that lower-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 associated to the quality of the environment where people live. The NHS offers information about the level of noise, pollution, water quality, bad smells, street cleanliness and the presence of disturbing animals at home. Following Clavero and González [33], we create an index capturing the unhealthiest aspects of the home environment using principle component analysis (PCA). This methodology basically allows reduction of a multidimensional dataset to a single variable aiming to explain as much variability as possible. Results from PCA are not shown here, but they are available from the authors on request.

In the fifth place, it is relevant to consider the type of insurance carried by individuals. In Spain, roughly 85% of the sampled population have only (publicly or privately provided) public insurance, and around 15% have double coverage. Since legally all citizens have a right to public health care, the expected effect of this variable is unclear in the case of Spain. As the public system is based on gate-keeping as a cost-control mechanism, on the one hand it is possible that a privately insured individual facing a certain problem would choose to visit a specialist directly, lowering his GP visits and increasing his demand for specialist health care [30]. In the second place, an individual with double coverage may make fewer visits to the NHS doctor if he perceives the private treatment to be more efficient [35]. On the other hand, it is also possible that an individual would visit a public doctor first, and then a private one in order to compare diagnoses, which would mean greater health care use, or that the double insurance increases moral hazard and hence encourages more health care use. The endogenous nature of health care insurance is often argued, i.e. 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, in the case of Spain, the particular structure of the health system allows the exogenous hiring of private health care insurance to be argued. As Álvarez [30] 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 focussed on health insurance have found very scarce evidence of endogeneity [35, 36]. In particular, Rodríguez and Stoyanova [37], using the ECHP, pointed out that people who subscribed, maintained or stopped 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 the study of this particular issue open for further research.

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

Location and service supply variables

In order to consider not only the influence of regional differences on health, but also the particularities of the regional health systems, regional dummies are included in all the specifications. In addition, fictitious 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 into the empirical analysis. 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.

Empirical analysis

Econometric strategy

It is well-known that the ordinary least squares (OLS) method is not appropriate when data are nonnegative integers, since it can predict negative values of the dependent variable [38–40]. The point of departure in the econometrics of count data is the Poisson model. However, a fundamental problem affecting the Poisson model is that it assumes equidispersion, i.e. 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 frequency [39]. 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

Table 1 Main descriptive statistics of the sample. Source: authors' analysis from the Spanish National Health Survey (NHS) 2006. GP General practitioner, EU European Union

	Mean	SD
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
Medium education	0.221	0.415
Higher 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 environment	0.107	1.490
Private insurance	0.149	0.356
Household size	3.284	1.392
Married	0.634	0.482
Physician density	4.500	0.808

an individual unobserved effect into the conditional mean [41]. 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, while widely used in health economics, might have some shortcomings. One of the problems relates to the nature of decision making in health care. The demand for health care is often governed by a two-step process. In a first step, the patient decides to go to the doctor and, in the second step, the doctor determines the intensity of the treatment, i.e. the frequency of subsequent visits. A similar argument applies to hospital days. According to Zweifel [42], it is possible that the physician who decides the length of hospital stay is different from the doctor who controls the decision to hospitalise (sometimes a GP or a specialist). This argument

hardly holds in the case of emergency room visits. In order to take into account the two-stage decision making process, Pohlmeier and Ulrich [43] propose a hurdle or two-part model, where the decision to contact health care services, and the frequency of utilisation for individuals with non-negative contacts are modelled separately. The first part of the model estimates the probability of having used health care services, while the second uses a truncated model to model how often an individual with positive counts has visited a physician or how long he has been in hospital [44]. The most frequent formulation of two-part models comprises 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. In this paper, as in Urbanos [31] and Abásolo et al. [29], a probit is run 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 [31], Jiménez-Martín et al. [32], and Clavero and González [33]. Hurdle models, as Poisson and NBRM, are estimated by maximum likelihood.¹³ Since both processes are assumed to be independent, it is possible to maximise 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: Poisson and negative binomial models often predict a substantially lower proportion of zeros than is observed in the sample [39].

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, the Bayesian information criterion and the consistent Akaike information criterion are used [38].¹⁴

In the presence of unobserved heterogeneity, not captured by the specifications proposed above, estimates may be inconsistent. In such cases, the econometric approaches suggested here still have a descriptive value, which is also interesting as long as we are interested in health care use utilisation of immigrants versus natives. However, it is worth pointing 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 from estimating the effects of migrant status, which is a time-constant covariate.

¹³ See Grogger and Carson [58] and Cameron and Trivedi [38] 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 in, among others, Gerdtham and Trivedi [59], Jiménez-Martín et al. [32], and Cotter [49].

All calculations were performed using the software Stata 10 and programs are available on request. To facilitate interpretation we compute marginal effects evaluated at covariates means following Primoff [45].

Results

Visits to GPs

First, a Poisson model and a NBRM were initially estimated.¹⁵ The LR test described above strongly rejected the null hypothesis of equidispersion. Secondly, a hurdle model using a probit and a Poisson-hurdle model were estimated. We then tried to estimate a hurdle model based on a negative binomial hurdle model. However, the zero-truncated negative binomial model is not parsimonious and the likelihood function sometimes fails to converge [27, 39, 46, 47]. 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 [48].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 individuals with positive counts visited the doctor only once). Following the suggestion of Greene [46], we estimate a restricted—and more parsimonious version—of the negative binomial model, imposing a fixing value to the parameter α . Specifically, a zero-truncated geometric model was estimated, which is a version of the zero-truncated NBRM with $\alpha = 1$, hence allowing for some overdispersion. 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 [49] for Portugal.¹⁷ Therefore, only results for the NBRM are presented and discussed below (Table 2). In all

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

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 remained, even for very parsimonious specifications.

¹⁷ It is also worth mentioning that some authors, e.g. Jiménez-Martín et al. [32] in their comparative work for European countries, find that two-part models perform worse than other single-stage models in health care systems with gate-keepers, such as latent class models that are based on the distinction between low and high users. These latter authors use the ECHP 1996, which includes annual visits to GPs and specialists. As mentioned, the database used in this study comprises only monthly visits, which greatly reduces the variability of health care utilisation among users, making a latent class model based on a distinction between low and high users less appropriate.

Table 2 Estimation results for health care utilisation in Spain. An intercept and regional and town size controls are included in all models. Source: authors' analysis from the NHS 2006

	Visits to GPs Marginal effects (NBRM)	Visits to specialists Marginal effects (NBRM)	Having stayed in a hospital Marginal effects (probit)	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
Medium education	0.0067	0.0296***	0.0115*	-0.7744	-0.0036
Higher 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 environment	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***
Physician 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	$\chi^2(49) = 3,548.1***$	$\chi^2(49) = 1,536.6***$	$\chi^2(49) = 1,208.7***$	$\chi^2(49) = 414.8***$	$\chi^2(49) = 3,384.4***$
McFadden R^2	0.0762	0.0554	0.0754	0.0275	0.0730

*** Significant at 1%; ** significant at 5%; * significant at 10%

cases, we present only the marginal effects evaluated at the mean of the covariates. Coefficients are to a great extent in line with previous studies. First, women visit their GPs more often, while age is not significant. Education, income, being married, not being employed, living in an unhealthy environment, physician density and need variables have a positive effect 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 [30], which may be related to a reluctance of people with bad

habits to go and see a physician. Regarding migrant status, being a non-EU15 migrant has no effect on GP visits, before and after controlling for socio-economic and need variables. There is also no difference 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 again the model that best fits our data. This finding is in agreement with results obtained by Urbanos [31] using the NHS 1993 and 1995, where she rejects two-part models in favour of a Poisson model. The results are quite similar to those found for GP visits, with the exception of age, which is now highly significant. 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 service utilisation. Regarding migrant status, before and after controlling for socio-economic background and health status, non-EU15 immigrants visit specialists less often than similar Spaniards; specifically, they report 0.034 less visits. 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 either the Poisson and the NBRM, and the hurdle-Poisson and the hurdle-NBRM were compared. Then, all goodness-of-fit criteria suggest 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 on, by Urbanos [31] for 1995. This circumstance may be explained by the reason for hospitalisation, because, according to the Spanish Hospital Morbidity Survey 2006, most female hospital stays relate to childbirth, and last on average 3 days, far below the length of the average stay, at roughly 7 days.¹⁸ Regarding migrant status, there is no statistically significant difference in access to hospital facilities or length of stay among natives and foreigners.

Emergency room visits

The same problems present in the estimation of the determinants of GP and specialist visits also apply in the case of emergency room visits. Using the rules followed in the previous subsection suggests that the model that best fits 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 factors being equal, visit emergency rooms less than Spaniards. In particular, being a non-EU15 immigrant means roughly 0.14 visits more to emergency rooms, i.e. 15% more visits than locals. Apart from the hypothesis of overutilisation 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 newly arrived illegal migrants, to the fear that their irregular status might be discovered, with subsequent negative consequences (e.g. deportation). As mentioned above, the law establishes the right to free public health care, but the mechanisms are not simple and it is quite possible that newly arrived migrants might not be acquainted with them. For example, they can use all types of health care services if they are registered in the municipal census, a procedure completely independent of their legal or illegal residence in the country. In addition, the law establishes 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 despite the status of their insurance. Therefore, one can hypothesise that some migrants, because of lack of knowledge of both the law and how the health system works could be substituting visits to physicians with emergency care.

Conclusions

Based on the analysis of the most recent health survey available for Spain, this paper has analysed the determinants of the demand for health care with special emphasis on the differences between the patterns of utilisation of migrants and natives. The findings reported here are not completely conclusive. On the one hand, immigrants do not show a larger frequency of visits to GPs or days in hospital and report fewer visits to specialists than Spaniards. On the other hand, 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 either the hypothesis of clear over-utilisation of health care services by immigrants in Spain or the argument that immigration represents a higher than proportional burden for the Spanish Welfare State. Popular belief about supposed overutilisation by migrants might be explained by several mutually reinforcing factors. First, there are large concentrations of foreigners in specific geographical areas and medical specialties. Second, this happens within a newly decentralised system that yields different degrees of satisfaction among citizens by region, with a possible worsening of services in some dimensions.

¹⁸ The main results of this survey can be found on the website of the Spanish National Statistics Institute at <http://www.ine.es/inebase/cgi/um?M=%2Ft15%2Fp414&O=inebase&N=&L>.

Third, as Spain has a relatively very homogenous population and migration flows are a very recent phenomenon, the popular belief of over-utilisation among migrant population can become reinforced when foreign-born users belong to a different and easily identifiable ethnic group. This perception could be more evident in the case of hospital emergency services, which suffer some degree of congestion in Spain, linked to increasing utilisation rates in recent years [50].

However, even if there is no differential pattern of utilisation between natives and foreigners, such huge increases in the foreign population might have put some additional pressure on the demand for public health care, especially in those geographical areas with a larger concentration of immigrants and in those types of medical services with higher rates of utilisation among foreign populations. Although definitely relevant to understanding public opinion on migration in Spanish society, this question addresses an issue different from that addressed here (the possible differential intensity of utilisation among foreigners, other things being equal) and is beyond the scope of this work.

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

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 by providing lagged indicators of health status and lifestyle.

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References

1. European Commission: Eurobarometer 66. Full report. European Commission, Brussels (2006)
2. Centro de Investigaciones Sociológicas (CIS): Barómetro Septiembre 2006. CIS, Madrid (2006)
3. Winkelmann, R.: "Work and health in Switzerland: immigrants and Natives", Socioeconomic Institute. University of Zurich, Working Paper 203. (2002)
4. Grossman, M.: On the concept of health capital and demand for health. *J. Polit. Econ.* **80**(2), 223–255 (1972)
5. Muurinen, J.M.: Demand for health: a generalised Grossman model. *J. Health Econ.* **1**(1), 5–28 (1982)
6. Wagstaff, A.: The demand for health: a simplified Grossman model. *Bull. Econ. Res.* **38**(1), 93–95 (1986)
7. Cantarero, D., Pascual, M.: "Inmigración, Salud y Utilización en España", paper presented at the 15th conference in public economics, Salamanca (Spain), February 7–8. (2008)
8. de Muñoz Bustillo, R., Antón, J.I.: "Inmigración y Estado de Bienestar. Una aproximación al caso español". In: Domínguez, R. (ed.) *Inmigración: crecimiento económico y bienestar social*, pp. 117–146. Universidad de Cantabria and Parlamento de Cantabria, Santander (2007)
9. Canal-Domínguez, J., Rodríguez-Gutiérrez, C.: Analysis of wage differentials between native and immigrant workers in Spain. *Span. Econ. Rev.* **10**(2), 109–134 (2008)
10. Fernández, C., Ortega, A.C.: Labor market assimilation of immigrants in Spain: employment at the expense of bad job-matches? *Span. Econ. Rev.* **10**(2), 83–107 (2008)
11. Rivera, B.: "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. (2005)
12. Van Houtven, C.H., Voils, C.I., Oddone, E.Z., Weinfurt, K.P., Friedman, J.Y., Schulman, K.A., Bosworth, H.B.: Perceived discrimination and reported delay of pharmacy prescriptions and medical tests. *J. Gen. Intern. Med.* **20**(7), 578–583 (2005)
13. Weinik, R., Zuvekas, S., Cohen, J.: Racial and ethnic discrimination in access to and use of health services, 1977 to 1996. *Med. Care Res. Rev.* **57**(1), 36–54 (2005)
14. Waidman, T.A., Rajan, S.: Race and ethnic disparities in health care access and utilization: an examination of state variation. *Med. Care Res. Rev.* **57**(1), 55–84 (2000)
15. Lay, B., Lauber, C., Rössler, W.: Prediction of in-patient use in first-admitted patients with psychosis. *Eur. Psychiatry* **21**, 401–409 (2006)
16. Bilger, M., Chaze, J.P.: What drives individual health expenditure in Switzerland. *Swiss J. Econ. Stat.* **144**(3), 337–358 (2008)
17. Laroche, M.: Health status and health services utilization of Canada's immigrant and non-immigrant population. *Canadian Public Policy/Analyse de Politiques* **26**(1), 51–75 (2000)
18. Hjern, A., Haglund, B., Persson, G., Rosén, M.: Is there equity in access to health care ethnic minorities in Sweden. *Eur. J. Public Health* **11**(2), 147–152 (2001)
19. Krasnik, A., Norredam, M., Sorensen, T.M., Michaelsen, J.J., Nielsen, A.S., Keiding, N.: Effect of ethnic background on Danish hospital utilization Patterns. *Soc. Sci. Med.* **55**(7), 1207–1211 (2002)
20. Sander, M.: "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. (2008)
21. Cots, F., Castells, X., García, Ó., Riu, M., Aida, F. and Vall, O.: "Impact of immigration on the cost of emergency visits in Barcelona (Spain)", *BMC Health Serv. Res.*, 7(9). (2007)
22. Burón, A., Cots, F., García, Ó., Vall, Oriol, Castells, X.: "Hospital emergency department utilization rates among the immigrant population in Barcelona, Spain". *BMC Health Serv. Res.*, 8(51). (2008)
23. García, P., González, S., Sáez, M.: "Diferencias en estado de salud y en los condicionantes de utilización de los servicios sanitarios entre la población de origen extranjero". In: Argullol, I., Morgadas, E., López, I., Casanovas, G. (eds.) *Inmigración y transformación social en Cataluña*, pp. 257–304. Fundación BBVA, Bilbao (2007)
24. Instituto de Salud Pública de Madrid: Encuesta de salud de la ciudad de Madrid 2004–2005. Instituto de Salud Pública de Madrid, Madrid (2005)
25. Soler, J.: *Inmigración: estado de salud incapacidades laborales, farmacia y utilización de los servicios sanitarios*. Consejo Económico y Social, Madrid (2008)
26. Oporto del Olmo, A.: *Emigración y ahorro en España 1959–1986*. Ministerio de Trabajo y Seguridad Social, Madrid (1992)
27. Gerdtham, U.G.: Equity in health care utilization: further evidence based on hurdle models and Swedish micro data. *Health Econ.* **6**(3), 303–319 (1997)

28. Abásolo, I.: 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), 3–27 (1998)
29. Abásolo, I., Manning, R., Jones, A.M.: Equity in Utilization of and Access to Public-Sector GPs in Spain. *Appl. Econ.* **33**(3), 349–364 (2001)
30. Álvarez, B.: La demanda atendida de consultas médicas y servicios urgentes en España. *Investigaciones Económicas* **25**(1), 93–138 (2001)
31. Urbanos, R.M.: 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 (2000)
32. Jiménez-Martín, S., Labeaga, J.M., Martínez-Granado, M.: An empirical analysis of the demand for physician services across the European union. *Eur. J. Health Econ.* **5**(2), 150–165 (2004)
33. Clavero, A., González, M.L.: La demanda de asistencia sanitaria en España desde la perspectiva de la decisión del paciente. *Estadística Española* **47**(158), 55–87 (2005)
34. Boeri, T., Hanson, G., McCormick, B.: *Immigration policy and the welfare system*. Oxford University Press, Oxford (2002)
35. Vera-Hernández, A.M.: Duplicate coverage and demand for health care. The case of Catalonia. *Health Econ.* **8**(7), 579–598 (1999)
36. Szabó, T.: La demanda de seguros médicos privados y el uso servicios sanitarios en España, Msc dissertation, 9706. Center for Monetary and financial studies. (1997)
37. Rodríguez, M., Stoyanova, A.: The effect of private insurance access on the choice of GP/specialist and public/private provider in Spain. *Health Econ.* **13**(7), 689–703 (2004)
38. Cameron, A.C., Trivedi, P.K.: *Regression analysis of count data*. Cambridge University Press, New York (1998)
39. Cameron, A.C., Trivedi, P.K.: *Microeconometrics methods and applications*. Cambridge University Press, New York (2005)
40. Wooldridge, J.M.: *Econometric analysis of cross-section and panel data*. MIT Press, Cambridge, MA (2002)
41. Greene, W.G.: *Econometric analysis*, 6th edn. Pearson, New Jersey (2008)
42. Zweifel, P.: “Supplier-induced demand in a model of physician behavior”. In: van der Gaag, J., Perlman, M. (eds.) *Health, economics, and health economics*, pp. 245–267. North Holland, New York (1981)
43. Pohlmeier, W., Ulrich, V.: An econometric model of the two-part decision making process in the demand for health care. *J. Hum. Resour.* **30**(2), 339–361 (1995)
44. Jones, A.M.: “Health econometrics”. In: Newhouse, J.P., Culyer, A.J. (eds.) *Handbook of health economics*, 1A, pp. 265–344. Elsevier, Amsterdam (2000)
45. Primoff, J.: Gender differences in days lost from work due to illness. *Ind. Labor Relat. Rev.* **50**(2), 304–323 (1997)
46. Greene, W.H.: *LIMDEP Version 7.0 user’s manual*, Bellport. Econometric Software, New York (1995)
47. Jones, A.M.: *Applied econometrics for health economists: a practical guide*, 2nd edn. Office of Health Economics, Oxford (2007)
48. Gould, W., Pitblado, J., Sribney, W.: *Maximum likelihood estimation with Stata*, 3rd edn. Stata Press, Texas (2006)
49. Cotter, J.: The determinants of health care use utilization in Portugal: an approach with count data models. *Swiss J. Econ. Stat.* **144**(3), 437–458 (2008)
50. Puig-Junoy, J., Saez, M., Martínez-García, E.: Why do patients prefer hospital emergency visits? A nested multinomial logit analysis for patient-initiated contacts. *Health Care Manag. Sci.* **1**(1), 39–52 (1998)
51. Rosen, A.B., Tsai, J.S., Downs, S.M.: Variations in risk attitude across race, gender, and education. *Med. Decis. Mak.* **23**(6), 511–517 (2003)
52. Bach, P.B., Pham, H.H., Schrag, D., Tate, R.C., Hargraves, J.L.: Primary physicians who treat blacks and whites. *N. Engl. J. Med.* **5**(6), 575–584 (2004)
53. Navarro, V.: *El Estado de Bienestar en España*. Tecnos, Madrid (2004)
54. Romero-Ortuño, R.: Access to health care for illegal immigrants in the EU: should we be concerned. *Eur. J. Health Law* **11**(3), 245–272 (2004)
55. Borjas, G.J., Trejo, S.J.: Immigrant participation and the welfare system. *Ind. Labor Relat. Rev.* **44**(2), 195–211 (1991)
56. Hansen, M., Lofstrom, J.: Immigrant assimilation and welfare participation: do immigrants assimilate into or out of welfare? *J. Hum. Resour.* **38**(1), 74–98 (2003)
57. Windmeijer, F., Santos Silva, J.: Endogeneity in count data models: an application to demand for health care. *J. Appl. Econ.* **12**(3), 281–294 (1997)
58. Grogger, J.T., Carson, R.T.: Models for truncated counts. *J. Appl. Econ.* **6**(3), 225–238 (1991)
59. Gerdtham, U.G., Trivedi, P.K.: Equity in Swedish health care reconsidered: new results based on the finite mixture model. *Health Econ.* **10**(6), 565–572 (2001)
60. Eurostat (2007)
61. Durán, A., Lara, J.L., Van Waveren, M.: Spain: health system review. *Health Systems in Transition* **8**(4) 1–208 (2006)