Working Paper 00-67
Economics Series 25
October 2000

Departamento de Economía
Universidad Carlos III de Madrid
Calle Madrid, 126
28903 Getafe (Spain)
Fax (34) 91 624-98-75

AN EMPIRICAL ANALYSIS OF THE DEMAND FOR HEALTH USING THE EUROPEAN COMMUNITY HOUSEHOLD PANEL **

Sergi Jiménez-Martín, José M. Labeaga and Maite Martínez-Granado *

Abstract

This paper estimates demand for health equations using three waves of data from the *European Community Household Panel*. The economic model is a typical specification of Grossman's [1] proposal. The paper focuses on three specific points: i) the existence of two stages in the demand for health decision process (to contact a physician and how often to visit him). ii) the analysis of this double-hurdle process in different scenarios (visits to the general practitioners, the specialists and the dentists). iii) the analysis of differences across countries due to the differences on the coverage of the National Insurance Systems. The results suggest that the contact and frequency decisions of visits to either the general practitioner, the specialist or even the dentist are governed by different stochastic processes. As expected, we find some differences in the behaviour of men and women, mainly in the decisions to visit and the number of visits to specialist. We also show that the behavioural differences across countries are not extremely important, being perhaps income a determinant of the decision to contact and the intensity of the treatment in poor countries.

Keywords: count data; poisson; negbin hurdle model.

JEL Classification: C25, C42

* **Jiménez-Martín**, Departamento de Economía, Universidad Carlos III de Madrid. E-mail: jimenez@eco.uc3m.es; **Labeaga**, Departamento de Economía, Universidad Nacional de Educación a Distancia (UNED). E-mail: jlabeaga@cee.uned.es; **Martínez-Granado**, Departamento de Economía, Universidad Carlos III de Madrid. E-mail: mmartine@eco.uc3m.es

** We are very grateful to the participants in the 9th Health and Econometrics Workshop and specially to Eddy van Doorslaer, Daniele Fabbri and Andrew Jones for helpful comments. This study was supported by an unrestricted educational grant from The Merck Foundation, the philanthropic arm of Merck & Co. Inc. Whitehouse Styation, New Jersey, USA." and by DGES PB98-1058-C03-02/03.

INTRODUCTION

The main concern of this paper is to estimate demand for health care equations using three waves of data from the *European Community Household Panel*. While the economic model is a typical specification of Grossman's [1] proposal, we use several count data models for testing different hypotheses concerning the demand for health decision processes. More specifically the paper addresses three points: i) it examines the existence of two stages on the demand for health care, namely the decision to contact a physician and the decision about how often to visit him, which are typically taken by different decision makers (see Pohlmeier and Ulrich [2] relating the demand of health and Jones [3] for the demand of tobacco). ii) it analyses this hurdle process in different count data equations corresponding to general practitioners, specialists and dentists. iii) it identifies behavioural differences across the countries in the sample, possibly due to heterogeneity or differences in the health insurance coverage among them.

Grossman's model of demand for health care is easily derived from a utility maximisation problem and ignoring that the physician can induce the demand (Cromwell and Michell [4]) or can take the decision about future contacts (Pohlmeier and Ulrich, [2]). However the demand for health is often a more complicated process: sometimes the patient only decides whether to visit a general practitioner (*GP*). In this case continuation visits to the *GP* or induced visits to a specialist do not depend on the first decision-maker (see Kenkel and Terza [5] or Kenkel [6]). In other occasions a patient does not purchase health from a general practitioner but she tries to acquire more or better information about her health status in order to make decisions. In all these cases, the demand for health is unobserved and that should be taken into account in any empirical specification.

All these issues suggest the convenience of setting up different models for analysing the visits to different types of physicians. We are interested on testing whether hurdle models adequately identify this double decision process based only on the number of visits to the physicians and without information about the number of spells (see Santos Silva and Windmeijer [7]). We use for the analysis the European Community Household Panel (ECHP) that collects the necessary information for a set of

European countries. The differences on the National Insurance Systems among these countries allow us to identify a different behaviour both on the part of individuals and on the part of health providers.

All the models are estimated by maximum likelihood. We do control by country specific heterogeneity (both in the intercept and slope of the equations) although we do not exploit the panel nature of our data (see Crepon and Duguet [8] or Santos-Silva and Windmeijer [9]) except for the fact that we pool information from several waves in order to construct predetermined explanatory variables, which avoids most of the potential simultaneity issues that arises in this type of analysis. Consequently, we use predetermined (one period lagged) variables relating labour force status, job characteristics, health and income . The results suggest that the contact and the frequency decisions of visits to either the general practitioner, the specialist or even the dentist are governed by different stochastic processes. We find some differences in the behaviour of men and women, mainly in the decisions to visit and the number of visits to the specialist. We also show that the behavioural differences across countries are not extremely important, being perhaps income a determinant of the decision to contact and the intensity of the treatment in Southern countries.

The rest of the paper contains four sections. Section 2 describes the data source and the theoretical framework adopted in the paper. We specify the model and explain the econometric techniques in Section 3. The empirical results together with some diagnostic tests are reported in Section 4. Section 5 contains the conclusions.

DATA AND THEORETICAL ISSUES

Visits to General Practitioners, Specialists and Dentists: Data and stylised facts

In the literature on demand for health it is easy to derive a model using the standard approach by Grossman [1], either including or not household production, when one ignores the role of the physician in the prescription of a treatment. In this paper we are interested in taking account of both the physician and the patient decisions within the same framework. Mullahy [10] summarises several alternatives of doing so. In all of them the demand for health shows two stages. First, the patient decides to seek for medical assistance (in some cases she only seeks to improve information about her health, Kenkel [6]).

In the second stage, both the patient and the physician play a role in deciding the intensity of the treatment.

The process described above is probably valid for most European countries at least with respect to the decision of visiting some type of physicians, although it is not a general rule. However most of the departures from the mentioned process are normally related to the coverage of the Insurance Systems in each country. For instance, a visit to a specialist has to be prescribed by the *GP* in most of the countries considered, while visits (or at least first contacts) to *GP* or the dentist are completely decided by the patient. In these circumstances, the decision process could be more complex in the case of the visits to specialists.

A simple look to the data helps to shed some light on the aims of our study. The data set corresponds to the European Community Household Panel (ECHP) conducted since 1994 (see Peracchi [11] for a description of the features of the survey). We use the public release of waves 1 to 3 which contains valid information, for the purposes of this paper, on 12 European countries. Despite that the ECHP focuses on household income and living conditions across EU15 countries it still provides interesting information on individual health and related issues. Apart from the traditionally asked questions on health status, such as a self-statement on global health or whether the person is hampered in daily activities, the survey includes some additional ones. More specifically, it records whether the individual has any chronic physical or mental health problem, illness or disability. Individuals are also asked if they have been admitted to a hospital as in-patients (the number of nights spent in a hospital as in-patient are confidential information for Germany and therefore will not be used in this study). Finally, the survey collects information on how many times an individual has consulted a doctor, a dentist or an optician during the past 12 months (visits to a doctor, optician or dentist are aggregated for the first wave) which allows us to construct some measures of health demand as the quantity of health services purchased.

Lets concentrate on the latter pieces of information namely the counts of visits to *GPs*, specialists and dentists. Table 1 shows a crude descriptive information on the zeros and positive counts in the 12 countries (out of 15) that are analysed herein. Several remarks are in order as regards contacting a physician. First of all, women visit more often doctors than men do at practically all ages.

In all countries it is more frequent to visit a *GP* than a dentist, and to visit any of them than to visit a specialist (being Spain and Portugal exceptions). However, the comparison between dentists and specialists is age dependent. There is more over-dispersion of *GP* and specialist counts than of dentist counts. In fact, in some countries (like Denmark and the Netherlands) there is no over-dispersion at all in dentist counts.

In order to gather a better picture of the differences across countries Figure 1 shows the histogram of visits to the *GPs* (first row), specialists (second row) and dentists (third row) by sex (male on the left) and country. Notorious differences are detected by country, sex and kind of physician. Several reasons can be behind these figures. First, there seems to be a strong relationship between visits to the *GP* or to the dentist and per capita income, since individuals do visit the *GP* or the dentist substantially less frequently in Southern countries and Ireland. Second, the pattern for visits to the specialist is less clear and differences may respond to accessibility criteria, which varies from country to country. And third, the differences by sex are more evident in the case of visits to specialists than in other cases.

Theoretical issues

We assume that medical care (measured by the number of visits) is purchased and used as an input in the household production function of health closely following Grossman's model. The demand of medical services is in this context a derived demand, because services are not consumed per se but to maintain or improve upon a certain health status. The patient perceives the marginal product of the different medical services in order to take her decisions about contacting different physicians. In general, the consumer (the patient) decides whether to visit a physician by comparing the marginal benefits and marginal costs of improving her health. The duration of the treatment would be decided on a second stage by both the patient and more importantly the physician.

The visits to a *GP* or to a dentist are perfectly described by this simple decision process, although probably this is not the case of visits to the specialist. While a visit to the *GP* is also a compulsory step for visiting a specialist (both being normally covered by the National Insurance systems), a visit to the dentist is uniquely the result of the cost-benefit analysis since most dentist's treatments are not covered by the National Insurance system. At a second stage, the *GP* decides upon a possible visit to a specialist and the specialist decides at a third stage the number of visits. No attempt to model this type of complex and interrelated process has been made in this paper given the data we use. Moreover, in all the paper we assume that the individual only suffers an illness spell during the period covered by the survey which seems to be an important assumption concerning the econometric models (see Santos-Silva and Windmeijer [7]).

The lack of information in the survey does not allow to estimate a full structural model. On the contrary, we assume a reduced form as follows:

$$I^*_{kit} = f_{1k}\left(Z_{kit-1}, \varepsilon_{1kit}\right) \tag{1}$$

$$y^*_{kit} = f_{2k}\left(X_{kit-1}, \varepsilon_{2kit}\right) \tag{2}$$

where $I^*_{kit} = 1(I_{kit} > 0)$ is the binary index used for the first decision (latent variable) with $1(A)$ indicating the occurrence of event A. y^*_{kit} is the number of visits to physician k (k = *GP, specialist and dentist*). Finally, X_k and Z_k are conditionings of both dependent variables that can have common elements and ε_1, ε_2 are error terms.

ECONOMETRIC SPECIFICATION AND ESTIMATION PROCESS

Suppose that we have a sample of N_k observations on (y^*_{ki}, w_{ki}) where k = *GP, specialist and dentist* and we omit the sub-index t for simplicity. The vector of covariates w_{ki} includes variables both in X_k and Z_k that, following Winkelman [12], may be disjoint or overlapping. We also assume that $y^*_{ki} = 0$ for N_{k0} observations and $y^*_{ki} > 0$ for N_{k+} and $N_k = N_{k0} + N_{k+}$. We are interested in explaining the conditional expectation of the number of visits to physician k by individual i, y^*_{ki}, given the covariates. In the two-part model, this expectation can be decomposed in two terms, the probability of observing a positive (part one or first hurdle) times the conditional expectation of y^*_{ki} given that it is positive (part two or second hurdle).

The two-part model decomposes this conditional expected value in two parametric models. The first component is usually estimated assuming a discrete choice model (probit or logit). The second component can be seen as a count data model. The most common specification for the count model is the Poisson regression. However, an undesired feature of the model is the equality of mean and variance conditional on the explanatory variables. This equi-dispersion property generally appears as restrictive in empirical applications. A Negative Binomial (negbin from now on) model could be assumed for the data generating process to overcome the previous assumption (see Hausman *et al.*, [13]). The variable of interest y^*_{ki} takes on only non-negative integers (number of visits) or assumes $I(I^*_{ki} > 0)$ when a patient decides to visit a physician (or a physician namely a *GP* decides the visit of a patient to an specialist). Under these circumstances, if y^*_{ki} follows a Poisson distribution with mean λ_k, we can write the probability of y_k visits of patient i to physician k as:

$$P(y^*_{ki} = y_k / \lambda_k) = \frac{e^{-\lambda_k} \lambda^{y_k}}{y_k!} \qquad y_k = 0,1,2,... \tag{3}$$

where $\lambda_k = E(y^*_{ki} / X_{ki}, \varepsilon_{2ki}) = \exp(X_{ki}'\beta + \varepsilon_{2ki})$, where ε_{2ki} represents unobserved heterogeneity and is uncorrelated with the X_k's by assumption.

On the other hand, the negbin can be written as a compound of a Poisson and Gamma distributions. If we specify λ_k as a Gamma distribution and make the integration over λ_k, we obtain a Negbin for y^*_{ki} (see Cameron and Trivedi [14], for details).

$$\begin{aligned} P(y^*_{ki} = y_k) &= \int_0^\infty P(y^*_{ki} = y_k / \lambda_k) f(\lambda_k) d\lambda_k \\ &= \frac{\Gamma(y_k + v_k)}{\Gamma(y_k + 1)\Gamma(v_k)} \left(\frac{v_k}{v_k + \theta_k} \right)^{v_k} \left(\frac{\theta_k}{v_k + \theta_k} \right)^{y_k} \end{aligned} \tag{4}$$

being Γ a Gamma distribution with parameters y_k and v_k. The moments of the resulting negative binomial are:

$$E(y^*_{ki}) = \theta_k, \quad \theta_k > 0$$

$$Var(y^*_{ki}) = \theta_k + \frac{1}{v_k}\theta_k^2 \tag{5}$$

where we must understand *E(.)* and *Var(.)* as conditional on covariates. Since $\theta_k > 0$, the distribution derived in this way allows for over-dispersion. Moreover, v_k permits to introduce a stochastic error term that captures unobserved heterogeneity and possible measurement errors. Finally, we could include conditioning variables through θ_k, v_k or both. In fact modelling in different ways the variance in (5) yields different negbin models. We will present only results for the negbin 2 in the terminology of Cameron and Trivedi [14]. In these specifications, we also model the parameter $1/v_k$ with some of the conditionings and this cannot be done in the Poisson specifications.

However, the behaviour of the individuals regarding demand for health services, at least in the light of the simple description made in the previous section, seems to follow a double decision process: one in which an individual decides to go to the practitioner and another one in which the practitioner has the decision to determine the length of the treatment. The patient is also competent in this second stage for many reasons: i) a visit to a *GP*, for instance, could have the solely purpose of obtaining information in order to know the specialist she needs to go; ii) although the *GP* has, at least in some countries, the faculty to send patients to the specialist, an individual can decide not to go; iii) the patient can decide the number of visits independently of the opinion of the physician (detecting or not induced demand).

From an econometric viewpoint is very important to note that the results provided by previous models are correct only when the process governing the discrete part of the model (the zero observations) is the same as the process that describes the positive counts. But, even when the same determinants appear as important in the two parts of the decision process, their effects and interpretations could be different. The econometric specification we are going to use closely follows the hurdle models for count data proposed by Mullahy [15], also used by Pohlmeier and Ulrich [2]. Unlike Mullahy, we assume that the underlying distribution for the first stage is normal and we model that decision by a probit. A Poisson or negative binomial distribution governs the second stage. If we denote by $\delta_{k1}=(\beta_{k1}^{'},\sigma_{k1}^{2})$ and $\delta_{k2}=(\beta_{k2}^{'},\sigma_{k2}^{2})$, the parameter vectors in the two decisions, the whole likelihood function can be written as:

$$L=\prod_{i\in N_{k0}} P(I_{ki}^{*}=0/Z_{ki}^{'}\beta_{k1},\sigma_{k1}^{2})\prod_{i\in N_{k1}}[1-P(I_{ki}^{*}=0/Z_{ki}^{'}\beta_{k1},\sigma_{k1}^{2})]$$
$$\prod_{i\in N_{k}}[P(y_{ki}^{*}/X_{ki}^{'}\beta_{k2},\sigma_{k2}^{2})] \qquad (6)$$

where the first two products in (6) govern the binary outcome and the third the number of visits once the first decision has been taken. This specification, the Zero Inflated Model (see Mullahy [15] or Cameron and Trivedi [14]), allows for zero counts once the initial decision to contact a practitioner has been taken. The restriction of absence of zeros in the second stage can be introduced in (6) by using a truncated distribution for the second process. The likelihood for this model can be written as:

$$L=\prod_{i\in N_{k0}} P(I_{ki}=0/Z_{ki}^{'}\beta_{k1},\sigma_{k1}^{2})\prod_{i\in N_{k1}}[1-P(I_{ki}=0/Z_{ki}^{'}\beta_{k1},\sigma_{k1}^{2})]$$
$$\prod_{i\in N_{k1}}\frac{P(y_{ki}^{*}/X_{ki}^{'}\beta_{k2},\sigma_{k2}^{2})}{P(y_{ki}^{*}\geq 1/X_{ki}^{'}\beta_{k2},\sigma_{k2}^{2})} \qquad (7)$$

While in model (6) we allow for the existence of zero visits at the second hurdle, in model (7) the second hurdle is governed by a truncated negative binomial (or Poisson) distribution. Given the nature of the data that we have, specification (6) is not reasonable since we know that a patient decided to contact a physician just when she makes a visit. Therefore, the count for those that decide to visit a physician in the first stage is always at least one. Alternatively Deb and Trevedi, [16] and [17], propose the use of latent class models instead of two part models in estimating the demand for medical care. However in our case we follow a simpler approach and estimate equation (7) by maximum likelihood. The first part is estimated by a probit model and therefore we impose the restriction of unit variance for the identification of the β_{k1} vector of parameters (or we identify the ratio β_{k1}/σ_{k1}, say).

The likelihood in (7) has been expressed as the product of two parametrically independent likelihood functions. The errors of the two parts of the model can be assumed to be correlated although this would imply the use of a different method of estimation (Simulated Method of Moments, as for instance Winkelman[12]).

Our parameter estimates are useful for comparative purposes although it is worth to mention that in general, they are not adequate to calculate elasticities (see Mullahy [10]). This relates to the functional form of equations (1) and (2), how unobservable terms enter them, the necessary transformations to estimate the parameters of interest and the necessary retransformation to recover $E(y_{ki} / w_{ki})$. To solve that, Mullahy proposes two alternatives. One is the smearing estimator, a two-step estimator of the two-part model, in which the parameters of part one are estimated in a discrete choice model and the parameters of the expected value conditional on positive counts is estimated by non-linear least squares in the second step. The second alternative is to estimate the full model in one step without recourse to transformation and retransformation, using the adequate identification restrictions (see for details Mullahy [10]).

In our empirical analysis we estimate Poisson, negative binomial and hurdle models using country specific and pooled data from the ECHP waves 1 to 3. For each unit of analysis we pool data from waves 2 and 3 and we use the remaining wave in order to be able to use predetermined information for some key variables. In more detail, our specification considers five groups of variables: a) Individual and family demographics b) Labour force status and job characteristics c) Health related variables d) Income variables and e) Health coverage controls. Among the first group (individual and family demographics) none of the variables is lagged, except for the condition of being the head of the household which is related to income. All the job and income related variables are lagged, since they may be endogenous to the health condition and, hence, the decision to contact a physician.

We use a set of health variables (as described in the Appendix) that act as proxies of the individual overall health. This makes maximal use of the available information on health status (see Anderson y Burkhauser [18] for details about measures and problems of health variables). In order to minimise the possible endogeneity of the health variables, they refer to the previous year. However there is a notorious exception, since it not possible to have a lagged indicator of the chronic condition because of it was not asked for in the first wave of the survey. This does not cause major problems (except through persistent individual heterogeneity) since the chronic conditions today and yesterday are practically collinear.

RESULTS AND DISCUSSION

Model selection

The negative binomial hurdle equations for visits to the *GP*, the specialist and the dentist are estimated by maximum likelihood as well as the nested models (Poisson, negbin and hurdle Poisson models). The estimation is carried out separately for males and females since differences in behaviour regarding health demand can be expected according to sex. In particular, differences on the visits to the specialist related to fertility can emerge.

Table 2 presents the likelihood ratio tests for all the nested models versus our preferred negbin hurdle specification. The tests of the Poisson versus the negbin model (with or without hurdle) are carried out using a LR statistic, to test the null hypothesis of $\alpha_k = 0$, where $\alpha_k = 1/v_k$ from equation (5) in previous section. We clearly reject the null hypothesis in all cases. This is usually a proof of overdispersion (see for instance Cameron and Trivedi [19]), but it could also be a problem of unobserved heterogeneity or measurement errors as captured by $1/v_k$..

We also reject simpler models (Poisson or negbin) against the alternative of more complex hurdle models. Under the null hypothesis that the two processes underlying the negbin (Poisson) hurdle model are identical, then the likelihood reduces to one of the conventional negative binomial (Poisson) count data model (see Mullahy [14]). A Wald test is therefore valid to select one model against the other. The high χ^2 values obtained for all specifications reveal that the contact and the frequency decision come from different models and have to be separately modelled. Mixing up both decision stages within one regression equation leads to inconsistent estimates. The constrained negbin, Poisson and hurdle Poisson estimates are available from the authors on request.

Hurdle negative binomial estimates

Turning to the estimates, we first discuss the results for males contained in Table 3. For the three relevant equations, the first stage represents the contact decision, while the second stage models the frequency decision. According to the specification test, the hurdle estimation points to important differences between the two decision making stages. In general, the estimates for the first stage are more precisely determined. This result is not surprising since most of the variables used in the analysis refer to characteristics of the individual seeking health care. Variables relating the supply of health services and that could explain the frequency of the visits are unfortunately not available in this study.

For the *GP* equation, age shows a convex relationship in both stages: the probability of a contact with the *GP* as well as the frequency of the consultation afterwards tend to decrease with age to a minimum (age 14 for the contacts and age 32 for the duration) after which the relationship becomes strictly positive. This result has also been found by Cameron *et al* [21] or Pohlmeier and Ulrich [2] using Australian and German data, respectively. For the specialist equation, the convex effect is only seen on the first stage, where the minimum probability of making a contact with the specialist is reached when the individual is 30 years old. For visits to the dentist however the pattern reverses: we find a quite reasonably concave effect of age on the probability of consulting a dentist and less important on the number of visits. It is probably at sooner ages when contacts to dentists are more frequent.

With respect to other demographic characteristics, being married tends to increase the first contact with any type of doctor, *GP*, specialist or dentist. Being separated has the same effect as being married on visits to the *GP* and to the specialist, although it reduces the probability of contacting a dentist. Household size works as a disincentive for visiting any type of doctor, a kind of diseconomies of scale. Not being from the country slightly reduces the length of the treatment with any doctor, specially dentists, which is probably capturing an income effect or a poorer knowledge of foreigner health systems.

Education may eventually correlate with medical knowledge, so that a higher educated person tends to favour specialists over general practitioners. On the other hand, people with higher education can improve their health more efficiently and therefore contact a *GP* less often (see Wagstaff [21] and Pohlmeier and Ulrich [2] for a discussion on the effect of education). In that case the substitution effect should not be present. We find a clear negative effect of education on the decision of contacting a *GP* and on the length of the treatment. At the same time, the decision of contacting a specialist or a dentist is positively affected by education while the duration of the treatment, once the contact is made, is shorter for these more educated individuals. This finding supports a combination of both theories.

Although there is some substitution going on between *GPs* and specialists, it seems that highly educated individuals have a higher marginal product of health and therefore not only contact less the *GP* but have shorter treatments. Occupational dummies reinforce the effect of education: the more skilled the individual is the higher the probability that he contacts a specialist or a dentist. Again, the frequency of the treatment is slightly shorter for this group of individuals. These variables can also be reflecting the opportunity cost of visiting a physician, measured as the cost of losing hours of work (for instance, low for workers belonging to the public sector and high for self-employed).

Job status variables are expected to measure the opportunity cost of visiting the doctor, once we control by income. In this direction, self-employment and unemployment reduce the probability of establishing a contact with any type of physician (the comparison group is inactivity). Employment has a less clear effect: it reduces the duration of the treatment for any type of consultation but it only has a negative effect on the probability of contacting a specialist. Furthermore its effect on the decision to contact a dentist is positive. In order to better interpret these results, we should have information about the characteristics of the job (risks, dangers, etc.). However, the effect of job risk is insignificant in the *GP* and specialist equations, or it could be hidden in the occupational variables. Given that only basic dentist services are covered in most countries by the Public Health System, this positive effect could be associated to an income or potential income effect. Other job characteristics are of little relevance in explaining the dependent variables.

Of special interest is the effect of the variable of income which is introduced with a quadratic term. This variable could have two opposing effects: on the one hand it could reinforce the effect of the educational and occupational variables being also correlated with medical knowledge. In that case we will expect a negative effect of income on the probability of contacting a *GP*. On the other hand it could reflect the willingness to pay for health services. Then it could have a positive effect on the probability of contacting the specialist or the dentist, that could be accessed via private consultation and payment. In this way the individual will skip the normal public system procedure in most countries that forces patients to go first to the *GP* in order to get to the specialist. We do not find any effect of income on the probability of contacting a GP although the variable reduces the length of the visits, reinforcing the educational effect. As expected from the discussion above, income affects the decision of contacting a specialist or a dentist in a concave way.

Not surprisingly, health during the previous year is a major determinant of current demand for health. Self-perceived good health reduces the probability of contacting any type of doctor (apart from the visits to the dentist which are less related to the overall individual health situation) and also reduces the length of the treatment. To suffer a chronic illness or have been admitted as in-patient at a hospital during previous year increase both the probability of contacts and the length of the treatments for the three type of visits. As a measure of incapacity, the dummy that reflects whether the individual is hampered in his daily activities has a positive effect on the contact probability and duration of treatment for both visits to the *GP* and to the specialist. However it has a negative effect on the probability of contacting a dentist and the length of the resulting treatment. That could just be reflecting the difficulties of these individuals to get to the dentist.

The type of public health system in the country has its own effect (Table 5 states the type of system for each country).We consider three types of National Insurance systems (NIS): Beveridge (universal coverage, financed by taxes, public property and control), Bismarkian (universal and compulsory coverage, financed by individual and employer contributions, private property) or mixed (that is, a combination of the previous systems). Notice that is not very easy to fit the countries' NIS into these three groups, since the specific systems tend to combine characteristics of the pure types. Individuals in countries with a Beveridge type NIS tend to contact less any type of doctor and once a contact is made the length of the visits to the *GP* and the specialist is smaller. The probability of contacting a dentist his higher although the length of the visits is shorter in these countries than in the reference group (mixed systems). Individuals in countries with a Bismarkian type National Insurance System () show a lower probability of visiting the *GP*. The probability of contacting a specialist is also lower although the duration of the treatment is longer. Finally to contact a dentist is more probable. Therefore it seems that the Beveridge model of public health implies a more rational use of the resources than the mixed or Bismark systems that incentive longer treatments with specialists. The country dummies have a strong effect reflecting differences in the health system not picked up by the previous variables.

Finally, the dummy variable that equals one if the individual is covered by private insurance has a positive effect on the contact stage of the visits to the specialist and dentist, as expected. We must note that this variable can not be identified for the countries with a Bismarkian health system since the ECHP does not give a detailed description of the type of insurance and all individuals are assumed to be privately insured. Private patients can choose their *GP* and specialists freely, so that it is not compulsory to visit the *GP* in order to get an appointment with an specialist. The variable also reduces the treatment with the *GP* and increases the treatment with the specialist. This evidence gives some support to the hypothesis of a supplier-induced demand (Pohlmeier and Ulrich [2] find similar evidence for Germany).

The maximum likelihood estimates for females appear in Table 4. In general, the direction of the results is similar than for males. However some differences emerge that are worth to mention. First the convex age effect for the contacts with the *GP* and the specialist is stronger. The probability of contacting a *GP* reach a minimum at 37 while the probability of contacting a specialist decreases for all the relevant age range. With respect to the second stage, both the duration of the visits to the *GP* and to the specialist show a less clear convex relationship. The behaviour relating dentist is similar for both males and females.

An important difference between males and females is the clear positive and strong effect of marriage (and divorce/widowhood) on the female contacts and length of the treatment of visits to the *GP* and specialist. This positive relationship just reflect the fact that a considerable amount of the visits to the doctor of married women are related with fertility issues. The absence of any effect of marital status on the visits to the dentist just corroborates the previous hypothesis.

Education and income play for females a better defined effect: they reduce the probability and length of the visits to the *GP* and increase the probability and length of the visits to the specialist. Therefore, better informed females (higher educated or with higher income) tend to substitute the visits to the *GP* by the visits to the specialist. Finally, the highly significant and positive effect of holding a private insurance on the length of dentists' and specialists' treatments strongly supports the hypothesis of a supplier induced demand. Finally, health related variables have almost the same effects both in males and females.

Differences across countries

The analysis presented in previous section is made on the basis that the differences across countries are differences on the constant or that can be summarised by the variables reflecting the type of insurance system they have. Although a formal test is not carried out in this section we try to provide some evidence with respect to the differences across countries. We estimate the hurdle negbin model for each country and we then present in Table 5 a summary of the main differences across countries of the effect of three of the most relevant variables, namely, age and income that allow for a quadratic effect, and the dummy reflecting whether the individual is privately insured. As it can be seen there is some variation across countries although the precision is low in several of them.

We find some interesting regularities across the EU. For example, in most of the countries age and income have a concave (or at least linear positive) effect on the probability of contacting a dentist, specially for females, while these variables have a negligible effect on the frequency of the visits to the dentist (for males and females). Also the positive effect of the dummy of private insurance on the decision of visiting a specialist or a dentist is quite general. Finally, the behaviour with respect to the specialist which seems to follow a common pattern across the European countries considered here.

Figures 2 and 3 show a more detailed description of the age and income effects. They present either access probabilities or expected number of visits by country, sex and age or income, respectively. Both figures are constructed on the basis of a common reference person with the following characteristics: head of the family, living in a household with two other persons, full-time employed in an industrial blue collar occupation and declaring having good health, not married, not having any private insurance and either having the country average age or average income (depending on the graph). Although the differences across countries in age and income effects are evident, some regularities among Mediterranean (Italy, Portugal, Spain and to a lesser extend Greece) and among Northern countries are found. For example, is worth mentioning that individuals in Mediterranean countries have lower probability of visiting any type of doctor.

CONCLUDING COMMENTS

This paper estimates a demand for health equation using three waves of data from the *European Community Household Panel* on the basis of a typical specification of Grossman's [1] theoretical proposal. Three different measures of health services are analysed, namely visits to the *GP*, visits to the specialist and visits to the dentist. A hurdle negative binomial model proves to be the one that best adjusts to the data from 12 European countries. The particularity of such model is that it allows for two different processes underlying the demand for health: one that drives the decision of contacting a physician and another that drives the duration of the treatment with the physician.

Our results clearly support the hypothesis that contact and frequency decisions for *GPs*, specialists and dentists are governed by different stochastic processes and need to be modelled separately. We find some evidence of supplier induced demand of specialists and dentist services, which they are not publicly provided in some countries.

Behavioural differences between male and female are not really big and they are only important with respect to the probability of contacting specialists and the number of visits. This is related to the need of visiting this type of practitioners because of fertility reasons. We have considered five types of covariates namely individual and family demographics, labour force status and job characteristics, health related variables, income variables and health coverage controls. We find the expected results for most of these conditionings. It is worth to mention that income has no effect on the decision to contact a *GP*, both in the females and males models, since health services by *GPs* are publicly provided in all countries. Health related variables have almost the same expected effects both in males and females. Good health condition reduces both the probability of contacts and the frequency while bad health conditions increases both probabilities. On the other hand, the coverage by private insurance increases the probability of a contact and the number of contacts to specialists and dentists, both for males and females.

Although we do not provide formal tests, we show that differences across countries, although existent are not specially relevant. This allows us to formulate a joint model for the 12 countries considered. To some extent, we can mention that two groups of countries can be considered in the decision to contact physicians (mainly specialist and dentists) as regards income and age, mediterranean countries (Italy, Portugal, Spain and to a lesser extend, Greece) and northern ones.

REFERENCES

1. Grossman, M. *The Demand for Health-A Theoretical and Empirical Investigation.* New York: Columbia University Press, 1972.
2. Pohlmeier, W. and Ulrich, V. An econometric model of the two-part decision making in the demand for health care. *The Journal of Human Resources* 1995; **30**: 339-361.
3. Jones, A. "A Double Hurdle Model of Cigarette Consumption". *Journal of Applied Econometrics* 1989; **4**: 23-29.
4. Cromwell, J. and Michell, J. Physician-induced demand for surgery. *Journal of Health Economics* 1986; **1**: 293-313.
5. Kenkel, D.S. and Terza, J.V. *A censored probit model of the demand for preventive medical care.* Manuscript, 1999.
6. Kenkel, D.S. Consumer health information and the demand for medical care. *Review of Economics and Statistics* 1990; **22**: 587-595.
7. Santos Silva, J.M.C. and Windmeijer, F. *Two-part multiple spell models for health care demand.* IFS WP Series No. W99/2, 1999.
8. Crepon, B. and Duguet, E. Research and Development, competition and innovation. Pseudo-maximum likelihood and simulated maximum likelihood methods applied to count data models with heterogeneity. *Journal of Econometrics* 1997; **79**: 355-378.
9. Santos Silva, J.M.C. and Windmeijer, F. Endogeneity in count data models: An application to demand for health care. *Journal of Applied Econometrics* 1997; **12**: 281-294.
10. Mullahy, J. Much ado about two: Reconsidering retransformation and the two-part model in health econometrics. *Journal of Health Economics* 1998; **17**: 247-281.
11. Peracchi, F. "The European Community Household Panel Survey", in W. Voges (eds.), *Dynamic Approaches to Comparative Social Research*, 2000, Avery Publishers, Aldershot.
12. Winkelmann, R. "Count data models with selectivity". *Econometrics Reviews* 1998; **17**: 339-359.
13. Hausman, J., Hall, B.H. and Griliches, Z. "Econometric models for count data with an application to the patents-R&D relationship". *Econometrica* 1984; **52**: 909-938.
14. Cameron, A.C. and Trivedi, P.K. "Econometric models based on count data: Comparisons and applications of some estimators and tests". *Journal of Applied Econometrics* 1986; **1**: 29-53.
15. Mullahy, J. "Specification and testing of some modified count data models". *Journal of Econometrics* 1986; **33**: 341-365.
16. Deb, P., and P.K. Trivedi (1999), "Demand for Medical Care by the Elderly in the United States: A Finite Mixture Approach", *Journal of Applied Econometrics*, 12, 313-336.
17. Deb, P., and P.K. Trivedi (1999), "The Structure of Demand for Health Care: Latent Class versus Two-Part Models", mimeo
18. Anderson, K. and Burkhauser, R. "The retirement-health nexus: a new measure of an old puzzle", *Journal of Human Resources* 1985; **20**: 315-330.
19. Cameron, A.C. and Trivedi, P.K. "Regression-based tests for over-dispersion in the poisson model". *Journal of Econometrics* 1990; **46**: 347-364.
20. Cameron, A. C., P. K. Trivedi, F. Milne, and J. Piggot "A Microeconometric Model of the Demand for Health Care and Health Insurance in Australia", *Review of Economic Studies* 1988; **55**: 85-106.
21. Wagstaff, A. "The Demand for Health. Some New Empirical Evidence", *Journal of Health Economics*; **5**: 195-233.

Table 1. Descriptive statistics of visits counts by sex and country.

		PRACTICIONER		SPECIALIST		DENTIST	
Country		female	male	female	male	female	male
	%	0.784	0.737	0.706	0.460	0.857	0.793
Germany	mean	4.457	3.644	3.618	2.269	2.348	1.911
	st-dev	7.586	7.190	6.972	5.827	3.095	2.514
	%	0.793	0.632	0.308	0.236	0.874	0.825
Denmark	mean	3.287	1.936	1.040	0.679	1.977	1.744
	st-dev	5.139	3.772	2.978	2.299	1.962	1.594
	%	0.756	0.626	0.385	0.300	0.844	0.798
Nether.	mean	3.149	1.897	1.903	1.170	1.905	1.718
	st-dev	4.657	3.633	5.054	3.460	1.693	1.612
	%	0.839	0.786	0.604	0.371	0.650	0.575
Belgium	mean	4.368	3.314	2.282	1.301	1.703	1.400
	st-dev	6.311	5.483	4.295	3.446	2.770	2.363
	%	0.807	0.757	0.769	0.436	0.789	0.702
luxem.	mean	3.155	2.539	2.712	1.496	1.922	1.658
	st-dev	3.610	3.752	4.137	3.370	3.064	3.034
	%	0.831	0.697	0.358	0.299	0.723	0.615
U.K.	mean	4.217	2.554	1.146	0.934	1.706	1.401
	st-dev	5.534	4.326	3.169	2.756	1.918	1.764
	%	0.737	0.575	0.230	0.170	0.397	0.342
Ireland	mean	3.617	2.259	0.771	0.460	0.855	0.682
	st-dev	5.985	4.898	2.331	1.897	1.765	1.400
	%	0.757	0.639	0.412	0.255	0.385	0.332
Italy	mean	3.851	2.648	1.296	0.777	1.284	0.997
	st-dev	5.915	4.940	3.084	2.672	3.116	2.599
	%	0.470	0.382	0.380	0.240	0.301	0.252
Greece	mean	1.676	1.195	1.501	1.023	0.915	0.729
	st-dev	3.311	2.554	3.342	3.499	2.365	2.047
	%	0.661	0.551	0.461	0.305	0.341	0.284
Spain	mean	3.681	2.354	1.792	1.141	1.012	0.755
	st-dev	6.804	5.306	4.081	3.635	2.652	2.120
	%	0.667	0.518	0.393	0.223	0.268	0.203
Portugal	mean	3.172	1.888	1.349	0.714	0.722	0.501
	st-dev	4.784	3.201	3.117	2.234	1.749	1.418
	%	0.887	0.846	0.836	0.584	0.817	0.768
Austria	mean	4.611	3.707	2.911	2.060	2.110	1.768
	st-dev	7.299	5.965	5.532	4.919	2.727	2.481

Note. % means percentage of positive observations

Table 2: Specification Tests for the EU12 specification.

Null	Alternative	Distrib.	GP	Specialist	Dentist
				Males	
Poisson	Negbin	LR: $\chi(1)$	1.26×10^5	1.12×10^5	46299.06
Poisson	Hurdle Poisson	W: $\chi(36)$	3371.7	2046.5	15553.5
Negbin	Hurdle Negbin	W: $\chi(36)$	2409.7	564.6	8248.9
Hurdle Poisson	Hurdle Negbin	LR: $\chi(1)$	36362.93	24099.97	7169.05
				Females	
Poisson	Negbin	LR: $\chi(1)$	1.62×10^5	1.43×10^5	62135.37
Poisson	Hurdle Poisson	W: $\chi(36)$	2828.4	4260.2	19025.9
Negbin	Hurdle Negbin	W: $\chi(36)$	1938.9	2003.9	10606.9
Hurdle Poisson	Hurdle Negbin	LR: $\chi(1)$	53771.7	36100.26	15704.94

Notes: LR: Likelihood ratio test; W: Wald test.

Table 3. Negative Binomial Distributed Hurdle Model for Males

	Visits to the GP				Visits to the Specialist				Visits to the Dentist			
	1st Stage		2nd Stage		1st Stage		2nd Stage		1st Stage		2nd Stage	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Age	-0.0254	-8.020	-0.0056	-1.409	-0.0178	-5.292	0.0070	0.875	0.0047	1.419	-0.0047	-0.877
Age Squared	0.0004	10.145	0.0002	4.362	0.0003	6.540	-0.0001	-1.061	-0.0001	-3.980	0.0001	1.544
Head of HH	0.0256	1.764	0.0342	1.965	0.0062	0.410	-0.0161	-0.473	-0.0034	-0.232	-0.0063	-0.277
Married	0.1873	12.001	-0.0319	-1.545	0.1271	7.529	-0.0312	-0.740	0.0858	5.278	-0.0054	-0.206
Separated	0.0892	2.816	0.0324	0.856	0.0617	1.901	0.1229	1.649	-0.0778	-2.422	0.0574	1.140
HH size	-0.0229	-6.314	0.0127	2.653	-0.0349	-8.802	-0.0167	-1.737	-0.0487	-12.763	-0.0021	-0.339
Not National	-0.0083	-0.242	-0.0585	-1.494	-0.0325	-0.958	-0.0960	-1.258	0.1638	4.934	-0.1043	-2.105
High School	-0.0565	-3.822	-0.1386	-7.137	0.0251	1.628	-0.0612	-1.720	0.1446	9.485	-0.0432	-1.998
Employed	0.0049	0.218	-0.1702	-6.646	-0.0393	-1.758	-0.0993	-2.054	0.1100	4.899	-0.0915	-2.464
Self-employed	-0.1266	-7.865	-0.0099	-0.453	-0.1106	-6.324	-0.0591	-1.356	-0.1164	-6.941	-0.0127	-0.454
Unemployed	-0.0618	-2.465	-0.0238	-0.828	-0.1120	-4.406	0.0197	0.345	-0.0473	-1.871	-0.0132	-0.301
Part Time	-0.0301	-0.937	-0.0025	-0.058	-0.0600	-1.726	0.0374	0.431	-0.0597	-1.799	0.0333	0.611
Professional	0.0001	0.008	-0.0854	-4.521	0.0949	6.230	-0.0517	-1.430	0.1750	11.735	-0.0224	-1.008
Clerical	0.0765	3.706	-0.0501	-1.932	0.1023	4.766	-0.0403	-0.790	0.1591	7.661	0.0118	0.371
Services	0.0217	1.061	-0.0533	-1.923	0.0489	2.193	-0.0678	-1.221	0.0914	4.304	0.0251	0.716
Public Sector	0.0383	2.677	0.0675	3.703	0.0797	5.349	0.0088	0.250	0.0713	4.818	0.0241	1.106
Not supervisory job	0.0185	1.533	0.0322	2.049	-0.0459	-3.587	0.0302	0.980	-0.0816	-6.530	0.0128	0.682
Job risk	-0.0010	-0.351	-0.0129	-3.322	-0.0002	-0.072	-0.0022	-0.280	-0.0007	-0.222	0.0052	1.088
HH Income	-0.0006	-0.011	-0.1974	-3.005	0.5852	9.181	-0.0215	-0.128	0.9936	19.255	0.0610	0.795
HH Income Squared	-0.0027	-0.096	0.0501	1.321	-0.2465	-5.053	0.0594	0.410	-0.2741	-9.350	-0.0164	-0.439
Good Health	-0.2593	-18.556	-0.3589	-22.216	-0.2482	-17.785	-0.3016	-9.687	0.0306	2.167	-0.1320	-5.694
Chronic illness	0.4358	26.747	0.7688	46.455	0.7367	48.663	0.7873	26.587	0.0446	2.774	0.1665	6.864
Hampered	0.1214	6.595	0.2492	13.050	0.1320	7.579	0.1770	5.038	-0.0432	-2.376	-0.0327	-1.144
At Hospital	0.2114	10.172	0.3244	15.446	0.4496	23.341	0.4384	11.967	0.0297	1.499	0.0694	2.289
SS Bismark model	-0.2400	-8.219	-0.0076	-0.237	-0.3263	-9.484	0.5213	8.195	0.7659	27.209	-0.0405	-1.006
SS Beveridge model	-0.3530	-11.616	-0.5179	-15.044	-0.8480	-23.075	-0.3780	-5.178	0.2106	7.395	-0.1336	-3.112
Private Insurance	0.0200	1.439	-0.0398	-2.176	0.1161	7.838	0.0696	1.945	0.1410	9.920	0.0283	1.204
Denmark	-0.1526	-5.288	-0.0336	-0.915	-0.1278	-4.152	0.0863	1.117	0.6292	20.442	-0.1262	-3.213
Netherlands	-0.2786	-12.004	-0.5759	-20.280	-0.3863	-16.596	-0.3124	-6.011	0.0293	1.173	-0.1643	-5.590
Belgium	---	---	---	---	-0.5580	-15.012	0.0703	0.971	---	---	---	---
Luxembourg	0.0937	2.302	-0.4248	-9.356	-0.0896	-2.331	-0.5761	-7.154	-0.3316	-8.302	-0.0560	-1.075
Ireland	-0.5355	-19.119	-0.2852	-8.662	-1.0868	-29.687	-0.4790	-6.066	-0.4484	-16.865	-0.3554	-7.736
Italy	-0.4120	-15.588	-0.1617	-5.445	-0.7175	-21.763	-0.1124	-1.772	-0.3718	-15.000	0.3497	8.791
Greece	-1.0763	-38.288	-0.5832	-16.023	-0.7390	-21.136	0.2926	4.191	-0.5934	-21.987	0.3210	6.907
Spain	-0.6697	-26.218	-0.2263	-7.814	-0.6550	-19.278	0.0781	1.189	-0.5734	-23.882	0.1320	3.295
Portugal	-0.7977	-28.241	-0.4889	-14.484	-0.8804	-25.100	-0.2230	-3.169	-0.7081	-25.671	0.0224	0.452
Austria	0.2052	5.159	-0.1172	-3.047	---	---	---	---	0.6729	18.320	-0.1173	-2.406
Intercept	1.2340	16.896	1.1642	12.949	0.3443	4.340	-0.2346	-1.218	-0.3526	-4.780	0.3931	3.293
Ln(Alfa)			0.3103	15.200			1.8200	21.779			0.5182	14.661
Log Likelihood	-145,860.25				-86,507.34				-102,294.94			
N. observations	78,238				77,704				78,076			

Note. Omitted country dummies for Germany, UK and Austria

Table 4. Negative Binomial Distributed Hurdle Model for Females

	Visits to the GP				Visits to the Specialist				Visits to the Dentist			
	1st Stage		2nd Stage		1st Stage		2nd Stage		1st Stage		2nd Stage	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Age	-0.0147	-4.709	-0.0299	-9.958	-0.0004	-0.148	-0.0445	-8.258	0.0292	9.505	0.0079	1.717
Age Squared	0.0002	5.712	0.0004	10.562	-0.0001	-1.887	0.0003	4.844	-0.0005	-13.675	-0.0001	-1.655
Head of HH	0.0255	1.637	0.0240	1.658	0.0323	2.190	0.1023	3.981	0.0124	0.803	0.0486	2.278
Married	0.2113	12.778	0.2176	13.147	0.3537	21.995	0.4082	14.029	-0.0128	-0.772	-0.0224	-0.938
Separated	0.1808	7.404	0.2231	9.930	0.2725	11.929	0.2879	7.265	-0.0165	-0.691	0.0275	0.803
HH size	-0.0328	-8.510	-0.0112	-2.917	-0.0748	-19.634	-0.0966	-14.265	-0.0433	-11.157	-0.0126	-2.089
Not National	0.0741	2.137	-0.0912	-2.852	0.0096	0.290	-0.1328	-2.555	0.1421	4.257	0.0379	0.848
High School	-0.0965	-6.045	-0.1477	-8.761	0.0661	4.272	0.0623	2.311	0.1510	9.206	-0.0645	-3.081
Employed	0.0191	1.128	-0.0683	-4.069	0.0098	0.601	-0.0865	-2.874	0.0730	4.350	0.0036	0.147
Self-employed	-0.0348	-1.412	-0.0079	-0.313	-0.0989	-4.142	0.0311	0.703	-0.0793	-3.199	0.0203	0.542
Unemployed	-0.0029	-0.148	0.0067	0.347	-0.0357	-1.885	-0.0660	-1.872	-0.0332	-1.709	0.0643	2.227
Part Time	-0.0487	-2.683	-0.0378	-2.132	-0.0274	-1.583	-0.0181	-0.593	0.0287	1.544	-0.0126	-0.532
Professional	-0.0588	-3.027	-0.0696	-3.555	0.1529	8.197	0.0176	0.534	0.2018	10.173	0.0145	0.561
Clerical	-0.0001	-0.003	-0.0618	-3.104	0.1316	6.783	-0.0588	-1.712	0.2429	11.842	-0.0395	-1.483
Services	0.0006	0.030	-0.0335	-1.760	0.0502	2.697	-0.0048	-0.140	0.1015	5.259	0.0034	0.127
Public Sector	0.0278	1.595	0.0198	1.153	0.0563	3.399	0.0579	1.999	0.0579	3.235	-0.0019	-0.086
Not supervisory job	0.0616	3.965	0.0478	3.081	-0.0083	-0.556	0.0461	1.715	-0.0501	-3.168	0.0329	1.594
Job risk	-0.0024	-0.655	-0.0036	-0.988	-0.0055	-1.540	0.0077	1.209	-0.0106	-2.805	-0.0061	-1.226
HH Income	-0.0474	-0.861	-0.4439	-7.769	0.8717	15.567	0.2748	3.100	1.1282	20.827	-0.0735	-0.957
HH Income Squared	0.0151	0.401	0.1612	3.930	-0.3188	-7.588	-0.1087	-2.048	-0.3756	-10.232	-0.0341	-0.683
Good Health	-0.3306	-23.676	-0.4342	-35.539	-0.1892	-14.968	-0.3809	-17.364	0.0312	2.369	-0.1276	-6.498
Chronic illness	0.4090	24.05	0.6564	51.170	0.6580	44.953	0.7353	32.803	0.0348	2.245	0.1450	6.760
Hampered	0.0993	5.389	0.1981	13.859	0.1199	7.521	0.2022	8.048	-0.0757	-4.488	0.0134	0.552
At Hospital	0.1700	8.675	0.2749	17.741	0.3537	20.502	0.3995	15.502	0.0133	0.743	0.0414	1.695
SS Bismark model	-0.5121	-13.209	0.0652	2.229	-0.5126	-14.273	0.5081	11.730	0.2039	5.576	0.0886	2.282
SS Beveridge model	-0.3112	-7.687	-0.0606	-1.999	-1.5487	-41.948	-0.3963	-7.587	-0.3512	-9.631	-0.1695	-4.088
Private Insurance	-0.0349	-2.376	-0.0136	-0.944	0.1089	7.737	0.0927	3.581	0.2061	14.347	0.0893	4.130
Denmark	-0.1406	-4.508	-0.1904	-6.959	-0.1779	-6.286	0.2078	3.504	0.5174	15.943	-0.1012	-2.862
Netherlands	-0.0575	-2.433	-0.3577	-16.268	-0.8586	-38.407	-0.1609	-4.317	-0.0372	-1.416	-0.3248	-12.192
Belgium	-0.1777	-4.231	0.1138	3.577	-0.8235	-21.63	0.0947	1.904	-0.7059	-18.719	-0.0089	-0.199
Luxembourg	0.1449	3.423	-0.3725	-9.747	0.1616	3.973	-0.5292	-9.713	-0.3339	-7.849	-0.1513	-3.147
Ireland	-0.4895	-12.492	0.0050	0.164	-1.6982	-45.678	-0.0302	-0.530	-1.2082	-33.727	-0.3157	-6.797
Italy	-0.5172	-13.954	0.0016	0.056	-1.0712	-31.405	-0.0322	-0.743	-1.0899	-32.503	0.4136	10.53
Greece	-1.2804	-33.882	-0.4987	-15.648	-1.1401	-32.302	0.3088	6.553	-1.3009	-37.330	0.2969	6.730
Spain	-0.7917	-20.992	-0.0139	-0.474	-1.0204	-29.138	0.2068	4.584	-1.3015	-37.614	0.1856	4.409
Portugal	-0.8913	-23.261	-0.3032	-10.061	-1.182	-33.212	-0.0290	-0.612	-1.3465	-38.163	0.0533	1.163
Intercept	1.5173	19.933	2.0480	29.078	0.8185	11.349	1.5674	12.722	0.2106	2.857	0.1754	1.695
Ln(Alfa)			1.1642	12.949			1.1701	30.267			0.5151	17.474
Log Likelihood	-184,180.33				-125,982.26				-120,120.18			
N. observations	82,574				82,424				82,452			

Note. Omitted country dummies for Germany, UK and Austria

Table 5. The effect of age, income and private insurance in the 1st and 2nd Stages.

		1st Stage									2nd Stage								
		GP			Specialist			Dentist			GP			Specialist			Dentist		
country	system	age	inc	hps	age	inc	hps	age	inc	hps	age	inc	hps	age	inc	hps	age	inc	hps
1. Germany	Bi	CV	ns	--	CV	cc	--	CC	ns	--	CV	CC	--	ns	ns	--	ns	ns	--
2. Denmark	Be	CV	ns	L+	cv	cc	L+	CC	CC	L+	ns	ns	ns	ns	ns	ns	ns	ns	L+
3. Nether.	Bi	cv	ns	--	CV	ns	--	L-	l+	--	CV	ns	--	ns	ns	--	CV	ns	--
4. Belgium	Mix	ns	ns	l+	ns	ns	l+	ns	CC	ns	ns	CV	ns	cv	cv	ns	ns	ns	ns
5. Luxem.	Bi	CV	ns	--	ns	cc	--	ns	CC	--	CV	ns	--	ns	ns	--	ns	ns	--
6. France																			
7. U.K.	Be	CV	ns	ns	CV	cc	L+	cc	L+	L+	ns	ns	L-	CC	cv	l+	ns	cc	ns
8. Ireland	Mix	CV	L+	ns	ns	cc	L+	CC	CC	L+	CC	ns	l-	cc	ns	ns	ns	ns	ns
9. Italy	Mix	ns	ns	l-	ns	CC	L+	ns	CC	L+	CV	cc	L-	ns	ns	ns	ns	ns	ns
10. Greece	Mix	ns	ns	ns	ns	CC	ns	ns	CC	ns	L+	ns	ns	ns	ns	ns	ns	ns	ns
11. Spain	Mix	CV	ns	ns	CV	ns	L+	ns	CC	ns	CV	ns	ns	ns	ns	L+	CV	ns	ns
12. Portugal	Mix	cv	L+	L+	cv	CC	ns	ns	CC	L+	L+	CV	ns	ns	ns	ns	ns	ns	l-
13. Austria	Mix	CV	ns	ns	ns	ns	l+	ns	ns	L+	CV	CC	ns	ns	ns	ns	CC	CC	ns
All MALE	Mix	CV	ns	ns	CV	CC	L+	CC	CC	L+	CV	L-	L-	ns	ns	l+	ns	ns	ns
1. Germany	Bi	CV	L-	--	L-	cc	--	ns	ns	--	ns	ns	--	L-	cc	--	CC	ns	--
2. Denmark	Be	l-	ns	ns	ns	CC	L+	CC	CC	L+	CV	ns	L+	ns	CV	ns	CC	ns	L+
3. Nether.	Bi	ns	ns	--	CV	CC	--	cc	L+	--	ns	l-	--	ns	ns	--	CC	ns	--
4. Belgium	Mix	CV	cc	ns	ns	CC	L+	CC	CC	ns	CV	ns	ns	L-	ns	ns	ns	ns	L+
5. Luxem.	Bi	CV	cc	--	ns	ns	--	cc	ns	--	cv	ns	--	ns	cc	--	ns	ns	--
6. France																			
7. U.K.	Be	ns	ns	ns	ns	ns	l+	CC	l+	L+	CV	ns	ns	cc	ns	L+	ns	ns	ns
8. Ireland	Mix	CV	ns	ns	ns	CC	L+	CC	CC	L+	CV	ns	L-	ns	L+	ns	ns	l+	ns
9. Italy	Mix	ns	ns	l-	ns	CC	L+	CC	CC	L+	CV	CV	ns	CV	ns	ns	ns	ns	ns
10. Greece	Mix	ns	ns	ns	ns	CC	ns	CC	CC	l+	L+	ns	ns	CV	CC	ns	cv	ns	ns
11. Spain	Mix	CV	L-	L-	ns	CC	L+	CC	CC	L+	CV	L-	ns	CV	CC	L+	l-	ns	ns
12. Portugal	Mix	ns	CC	L+	CC	CC	ns	CC	CC	l+	cv	L-	ns	ns	L+	ns	cv	ns	ns
13. Austria	Mix	ns	CC	ns	CC	ns	l+	CC	ns	L+	ns	CC	ns	ns	ns	ns	ns	ns	ns
All FEMALE	Mix	CV	ns	L-	cc	CC	L+	CC	CC	L+	CV	CV	ns	CV	CC	L+	cc	ns	L+

Notes.

1. Bi: Bismark model. Be: Beveridge model. Mix: mixture model.
2. CC: Concave and significant. CV: Convex and significant. L+:Linear positive. L-: Linear negative. ns: non significant.
3. Capital letters denote significance at 5% and small letters denote significance at 10%.

Appendix. Definition of the variables and descriptive statistics.

The variables included in the analysis are grouped in five categories:

1) *personal and household characteristics*:
   * marital status: two dummies, one taking value 1 if the individual is married, and the other equalling 1 if the individual is separated/divorced/widowed
   * a dummy for the individual being head of the household, dated in wave -1.
   * age and its square.
   * education: a dummy for the individual having a third level of education recognised
   * not national: a dummy for individuals not being nationals of the country where they are, dated in wave -1.
   * household size.
   * Household income and its squared, dated in wave -1.
2) *labour force status characteristics*:
   * Dummies controlling for self-employment, unemployment, part-time job and, working in the public sector, dated in wave -1.
   * Occupational dummies: professionals, clerks, services workers, dated in wave -1
   * risk at job, dated in wave -1
3) *health related variables*:
   * a dummy if the individual reports himself as having good health, dated in wave -1.
   * a dummy for individuals having a chronic physical or mental health problem, current (since it was not asked for in the first wave of the survey).
   * a dummy if the individual is hampered in daily activities by any physical or mental health problem, illness or disability, dated in wave -1.
   * a dummy for individual was admitted as in-patient in a hospital during the previous year, dated in wave -1
4) *income variables*:
   * Household income and its squared (in 10^5 PPP units), dated in wave -1.
5) *country variables*:
   * Bismark health system index (1 if yes, 0 otherwise)
   * Beveridge health system index (1 if yes, 0 otherwise)
   * Private insurance system (only for not Bismarkian system)

In Table A1 we present summary statistics by sex and by sex and country

Table A.1. Mean of the variables by sex and country

	male													
	all	st-d	G	NL	D	B	L	UK	IRL	I	GK	SP	P	A
observations.	80359	--	7126	3886	6634	4576	1579	5609	6268	13834	8446	11566	8180	2655
visits to GP: observ.	78238	--	6923	3881	6632	4471	1573	4745	6254	13824	8170	11315	8126	2324
visits to GP: frequency	0.609	0.488	0.737	0.632	0.626	0.786	0.757	0.697	0.575	0.639	0.382	0.551	0.518	0.846
visits to GP: unc. mean	2.394	4.806	3.644	1.936	1.897	3.314	2.539	2.554	2.259	2.648	1.195	2.354	1.888	3.707
visits to SP: observ.	77704	--	6900	3880	6630	4389	1572	4748	6247	13822	8169	11313	8128	1906
visits to SP: frequency	0.293	0.455	0.460	0.236	0.300	0.371	0.436	0.299	0.170	0.255	0.240	0.305	0.223	0.584
visits to SP: uncon. mean	1.070	3.432	2.269	0.679	1.170	1.301	1.496	0.934	0.460	0.777	1.023	1.141	0.714	2.060
visits to DT: obs.	78076	--	6931	3881	6634	4424	1573	4749	6252	13822	8170	11314	8132	2194
visits to DT: frequency	0.460	0.498	0.793	0.825	0.798	0.575	0.702	0.615	0.342	0.332	0.252	0.284	0.203	0.768
visits to DT: unc. mean	1.119	2.156	1.911	1.744	1.718	1.400	1.658	1.401	0.682	0.997	0.729	0.755	0.501	1.768
Age	40.24	13.23	41.70	40.50	40.81	40.22	40.90	41.26	38.86	39.69	41.38	39.19	39.88	40.23
age-squared	1794	1096	1909	1795	1808	1769	1826	1859	1696	1755	1896	1722	1783	1804
head of the house	0.675	0.468	0.719	0.702	0.869	0.569	0.778	0.776	0.629	0.630	0.715	0.648	0.599	0.507
married	0.681	0.466	0.741	0.718	0.781	0.737	0.745	0.696	0.598	0.627	0.707	0.631	0.674	0.696
sep.-divorced.-widowed	0.030	0.171	0.042	0.062	0.035	0.051	0.046	0.065	0.015	0.016	0.018	0.021	0.023	0.031
size of the household	3.642	1.506	3.070	2.790	3.150	3.316	3.380	3.091	4.484	3.801	3.713	4.052	3.968	3.694
not-national	0.976	0.153	0.963	0.973	0.986	0.911	0.674	0.977	0.985	0.997	0.993	0.994	0.995	0.964
educated (college)	0.170	0.376	0.283	0.320	0.210	0.283	0.201	0.261	0.137	0.074	0.182	0.178	0.036	0.063
employed	0.812	0.390	0.849	0.860	0.853	0.811	0.835	0.816	0.820	0.784	0.817	0.739	0.848	0.850
self-employed	0.155	0.362	0.059	0.072	0.056	0.094	0.087	0.142	0.196	0.182	0.321	0.146	0.194	0.109
unemployed	0.086	0.280	0.048	0.081	0.049	0.064	0.014	0.088	0.119	0.109	0.070	0.149	0.054	0.036
part-time	0.022	0.147	0.010	0.023	0.028	0.015	0.013	0.029	0.036	0.022	0.033	0.020	0.013	0.010
professional	0.233	0.423	0.328	0.337	0.420	0.286	0.267	0.318	0.224	0.143	0.210	0.168	0.138	0.224
clerk	0.065	0.246	0.057	0.047	0.061	0.127	0.077	0.071	0.041	0.102	0.049	0.043	0.048	0.056
services employee	0.059	0.236	0.032	0.053	0.049	0.039	0.060	0.054	0.060	0.061	0.061	0.074	0.078	0.067
not supervisory job	0.359	0.480	0.386	0.448	0.429	0.356	0.389	0.243	0.337	0.326	0.311	0.330	0.479	0.354
household income	0.239	0.165	0.272	0.270	0.247	0.307	0.449	0.277	0.290	0.214	0.180	0.204	0.162	0.334
household income sq	0.084	0.245	0.102	0.114	0.079	0.126	0.265	0.108	0.123	0.063	0.048	0.060	0.041	0.148
pub.	0.169	0.375	0.216	0.213	0.183	0.212	0.199	0.162	0.180	0.169	0.159	0.119	0.136	0.188
Good Health	0.763	0.425	0.746	0.859	0.821	0.819	0.763	0.742	0.871	0.696	0.836	0.739	0.652	0.783
Chronic illness	0.164	0.370	0.224	0.241	0.199	0.133	0.190	0.249	0.142	0.096	0.102	0.173	0.172	0.191
Hampered	0.137	0.344	0.186	0.135	0.173	0.124	0.182	0.161	0.115	0.115	0.104	0.108	0.166	0.173
At Hospital	0.069	0.254	0.105	0.067	0.054	0.091	0.115	0.075	0.069	0.067	0.056	0.061	0.042	0.105
risk at job	2.994	2.283	3.389	3.748	3.466	3.214	3.589	2.641	2.713	2.737	2.875	2.566	3.057	3.717
Biskmark health system	0.191	0.393	1.000	0.000	1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Beveridge health system	0.118	0.323	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Private insurance	0.224	0.417	0.000	0.255	0.000	0.758	0.000	0.195	0.425	0.075	0.095	0.576	0.081	0.228

	female													
	all	st-d	G	NL	D	B	L	UK	IRL	I	GK	SP	P	A
observations.	83851	--	7226	4037	7430	4966	1628	5978	6212	14076	8962	11936	8695	2705
visits to GP: observ.	82574	--	7090	4031	7426	4874	1617	5522	6199	14063	8891	11775	8852	2434
visits to GP: frequency	0.720	0.449	0.784	0.793	0.756	0.839	0.807	0.831	0.737	0.757	0.470	0.661	0.667	0.887
visits to GP: unc. mean	3.529	5.817	4.457	3.287	3.149	4.368	3.155	4.217	3.617	3.851	1.676	3.681	3.172	4.611
visits to SP: observ.	82424	--	7083	4033	7426	4818	1617	5522	6194	14058	8891	11775	8659	2348
visits to SP: frequency	0.444	0.497	0.706	0.308	0.385	0.604	0.769	0.358	0.230	0.412	0.380	0.461	0.393	0.836
visits to SP: uncon. mean	1.718	4.130	3.618	1.040	1.903	2.282	2.712	1.146	0.771	1.296	1.501	1.792	1.349	2.911
visits to DT: obs.	82452	--	7110	4034	7430	4818	1618	5526	6201	14058	8891	11779	8664	2323
visits to DT: frequency	0.522	0.500	0.857	0.874	0.844	0.650	0.789	0.723	0.397	0.385	0.301	0.341	0.268	0.817
visits to DT: unc. mean	1.384	2.539	2.348	1.977	1.905	1.703	1.922	1.706	0.855	1.284	0.915	1.012	0.722	2.110
Age	40.47	13.14	41.83	40.52	40.24	40.21	39.91	40.91	39.48	39.88	40.90	39.82	41.47	40.75
age-squared	1810	1093	1910	1800	1764	1774	1743	1831	1735	1767	1856	1773	1908	1835
head of the house	0.192	0.394	0.285	0.428	0.199	0.148	0.195	0.255	0.142	0.126	0.144	0.143	0.177	0.384
married	0.705	0.456	0.764	0.739	0.776	0.721	0.749	0.713	0.655	0.667	0.728	0.656	0.691	0.712
sep.-divorced.-widowed	0.081	0.274	0.087	0.110	0.078	0.114	0.080	0.124	0.066	0.054	0.075	0.071	0.091	0.099
size of the household	3.556	1.492	2.983	2.809	3.054	3.259	3.340	3.056	4.468	3.732	3.612	3.962	3.801	3.588
not-national	0.976	0.153	0.966	0.975	0.988	0.930	0.648	0.974	0.982	0.997	0.987	0.993	0.996	0.955
educated (college)	0.140	0.347	0.122	0.323	0.153	0.295	0.110	0.211	0.117	0.059	0.171	0.156	0.041	0.065
employed	0.530	0.499	0.596	0.763	0.511	0.600	0.524	0.629	0.465	0.485	0.456	0.425	0.593	0.611
self-employed	0.054	0.226	0.025	0.027	0.020	0.045	0.027	0.048	0.025	0.066	0.083	0.051	0.104	0.076
unemployed	0.083	0.275	0.059	0.111	0.148	0.101	0.014	0.024	0.039	0.090	0.085	0.116	0.064	0.034
part-time	0.094	0.292	0.143	0.124	0.183	0.120	0.122	0.177	0.088	0.059	0.051	0.048	0.053	0.099
professional	0.160	0.366	0.261	0.275	0.242	0.245	0.153	0.223	0.140	0.098	0.110	0.103	0.113	0.129
clerk	0.097	0.297	0.127	0.150	0.120	0.144	0.138	0.169	0.090	0.096	0.057	0.046	0.060	0.121
services employee	0.092	0.289	0.105	0.157	0.126	0.066	0.080	0.129	0.099	0.058	0.063	0.073	0.109	0.123
not supervisory job	0.281	0.450	0.376	0.480	0.324	0.358	0.320	0.238	0.248	0.238	0.190	0.196	0.347	0.309
household income	0.227	0.162	0.256	0.256	0.235	0.291	0.440	0.258	0.277	0.206	0.170	0.196	0.153	0.315
household income sq	0.078	0.210	0.092	0.093	0.075	0.118	0.263	0.097	0.112	0.060	0.043	0.057	0.039	0.133
pub.	0.145	0.352	0.200	0.361	0.153	0.206	0.150	0.198	0.123	0.122	0.082	0.079	0.128	0.142
Good Health	0.719	0.450	0.728	0.827	0.767	0.759	0.710	0.743	0.850	0.640	0.812	0.689	0.542	0.774
Chronic illness	0.172	0.377	0.217	0.281	0.222	0.127	0.180	0.276	0.151	0.089	0.108	0.178	0.204	0.165
Hampered	0.154	0.361	0.176	0.179	0.203	0.148	0.173	0.184	0.125	0.126	0.115	0.130	0.201	0.145
At Hospital	0.085	0.280	0.124	0.109	0.089	0.107	0.138	0.112	0.101	0.075	0.056	0.067	0.045	0.140
risk at job	1.873	2.346	2.300	3.224	1.981	2.298	2.306	2.231	1.537	1.553	1.473	1.250	2.030	2.604
Biskmark health system	0.194	0.396	1.000	0.000	1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Beveridge health system	0.119	0.324	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Private insurance	0.217	0.412	0.000	0.340	0.000	0.761	0.000	0.177	0.434	0.050	0.071	0.572	0.070	0.196

Figure 1. Histograms of visits to the GP, SP and DENTIST by country and sex.

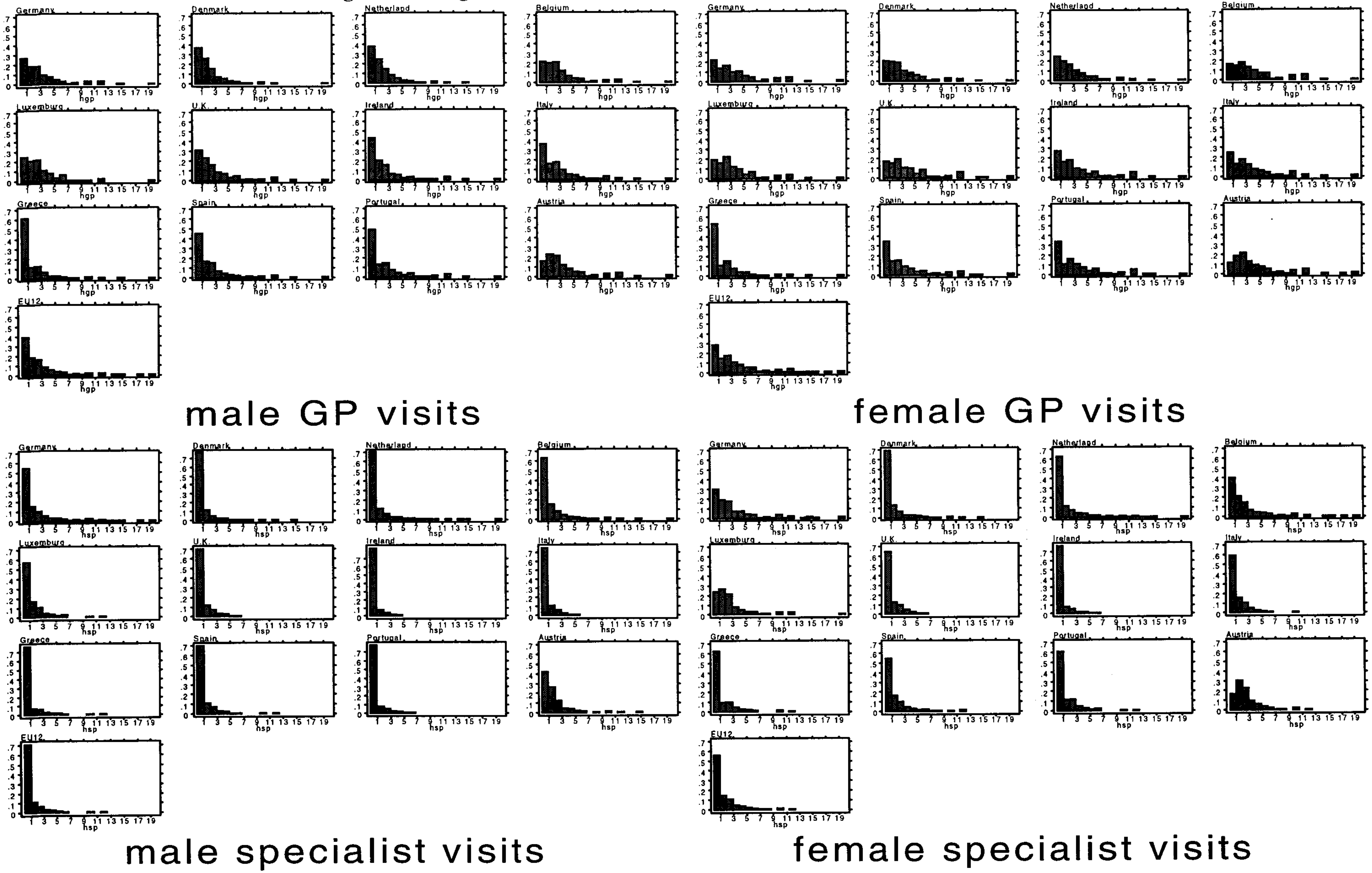
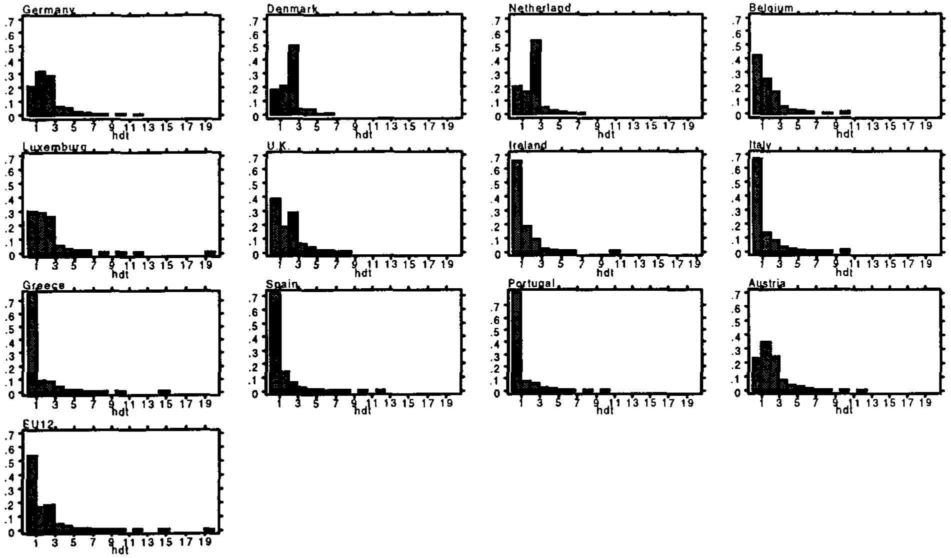
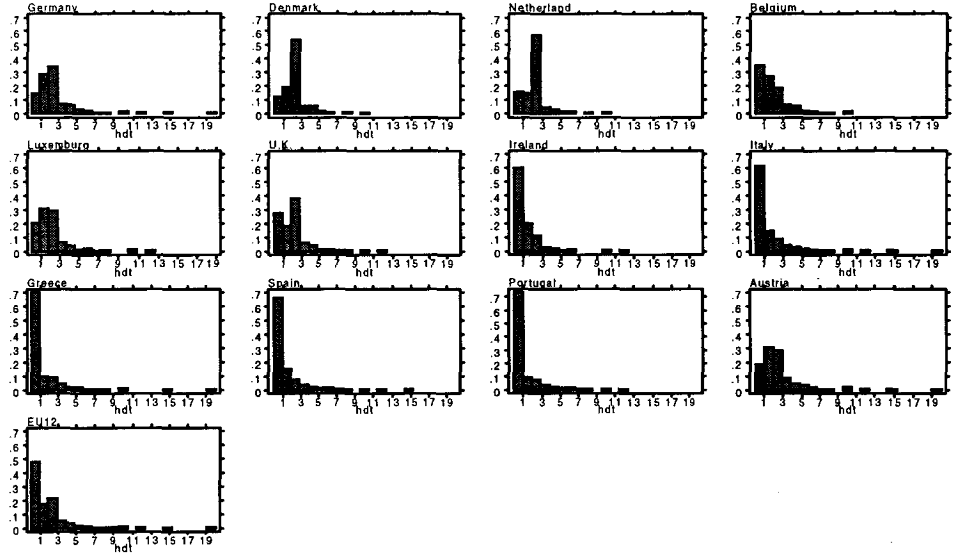


Figure 1. (cont.). Histograms of visits to the GP, SP and DENTIST by country and sex.



male dentist visits



female dentist visits

Figure 2. Age and income effect on the decision to visit the GP, SP or the DENTIST by country and sex.

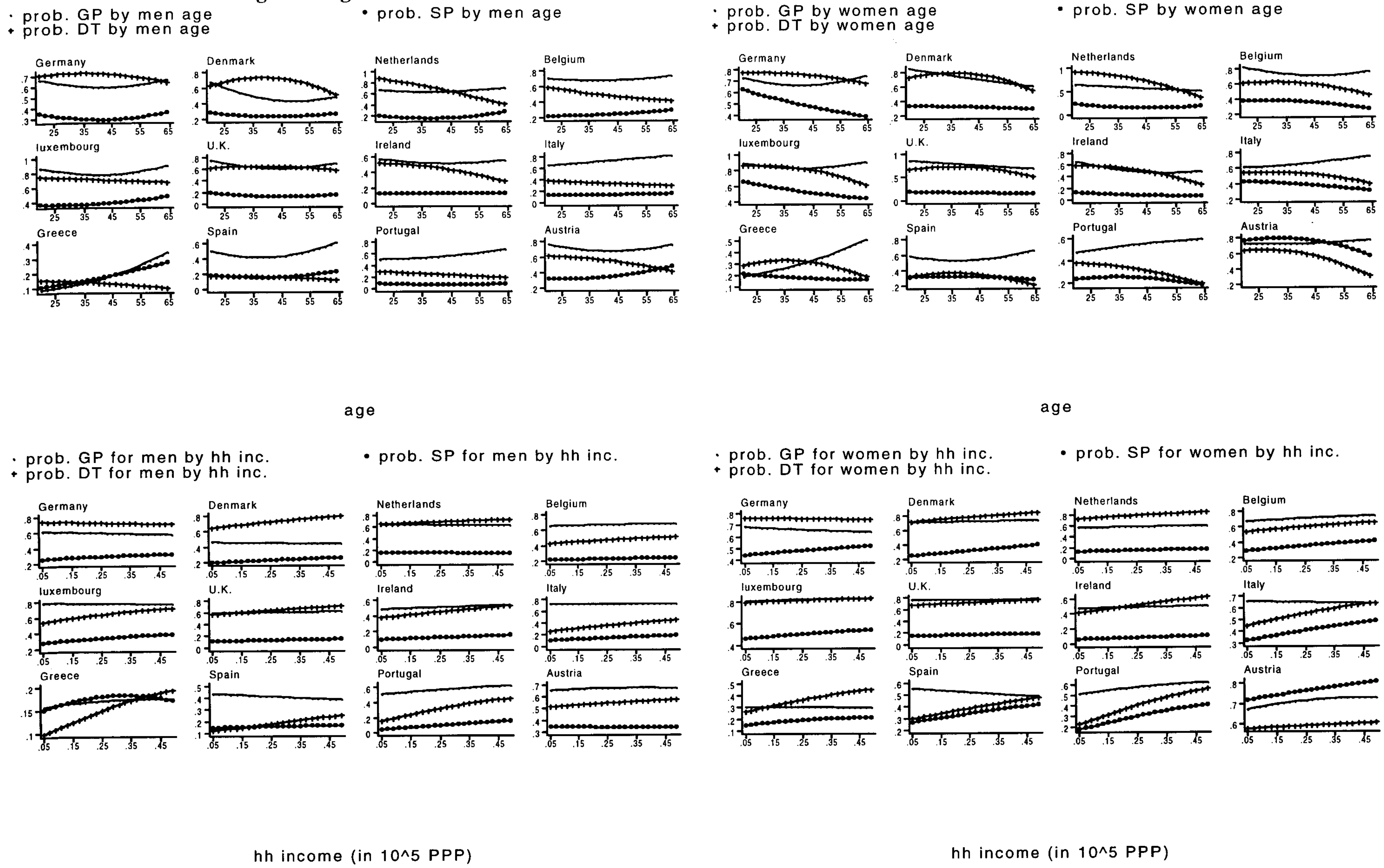
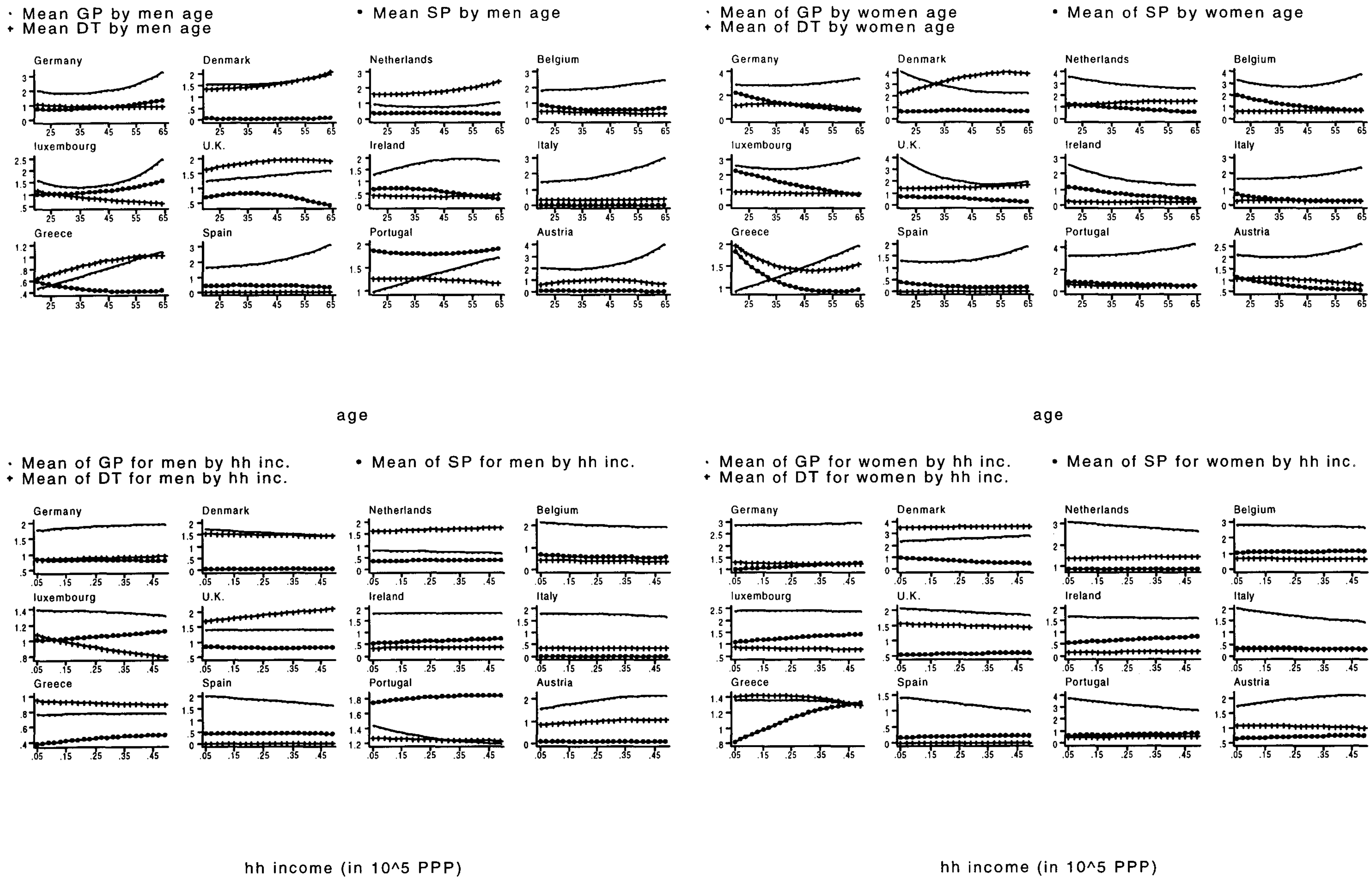


Figure 3. Age and income effect on the number of visit the GP, SP or the DENTIST by country and sex.



WORKING PAPERS 2000

Business Economics Series

00-01 (01) Alejandro Balbás and Mª José Muñoz
"Measuring Arbitrage Profits in Imperfect Markets"

00-02 (02) Juan A. Lafuente
"Intraday Return and Volatility Relationships Between the Ibex 35 Stock Index and Stock Index Futures Markets"

00-03 (03) Ashish Arora, Andrea Fosfuri and Alfonso Gambardella
"Markets for Technology and Their Implications for Corporate Strategy"

00-04 (04) Jaime Bonache Pérez and José Pla Barber
"When are International Managers a Cost Effective Solution? An Exploratory Study in a Sample of Spanish MNCs"

00-05 (05) Juan Angel Lafuente
"Optimal Hedging Under Departures from the Cost-of-Carry Valuation: Evidence from the Spanish Stock Index Futures Markets"

00-23 (06) Fabrizio Cesaroni
"Technological User-Supplier Relationships in the Chemical Industry"

00-34 (07) Charles J. Corbett and Jose A. Alfaro
"The Value of SKU Rationalization: The Pooling Effect Under Suboptimal Inventory Policies"

00-35 (08) Ainhoa Zarraga
"A Test of the Mixture of Distributions Model"

00-41 (09) Jaime Rivera Camino
"The Green Marketing in Europe: An Exploratory Approach"

00-46 (10) José Alfaro and Josep A. Tribó
"Managerial Turnover and Inventory Fluctuations"

00-51 (11) Roberto Pascual, Alvaro Escribano and Mikel Tapia
"BLM: A bidimensional approach to measure liquidity"

00-52 (12) Miguel A. Martínez, Gonzalo Rubio and Mikel Tapia
"Understanding liquidity: A closer look at the limited order book"

00-53 (13) Alejandro Balbás and Susana López
"Envelopes for the Term Structure of Interest Rates"

Economics Series

00-06 (01) Alfonso Alba Ramírez and María Tugores
"Training and Transitions out of Employment in Spain"

00-15 (02) Alfonso Alba, Gema Álvarez and Raquel Carrasco
"The Effect of Female Participation on Fertility in Spain: How does it Change as the Birth Comes Closer?"

00-17 (03) Andrei M. Gomberg, Francisco Marhuenda and Ignacio Ortuño-Ortín
"Equilibrium in a Model of Endogeneous Political Party Formation"

00-18 (04) Francisco Marhuenda and Felipe Pérez Martí
"On Altruism, Efficiency and Public Goods"

00-19 (05) Francisco Marhuenda
"Behavioral Heterogeneity Revisited: Further Examples"

00-20 (06) Mikel Pérez-Nievas
"Interim Efficient Allocation Mechanisms"

00-21 (07) Mikel Pérez-Nievas
"Interim Efficient Mechanisms for Public Decision Making in a Discrete Framework"

00-22 (08) Antonio Nicolò and Andrés Perea
"A Non-Welfarist Solution for Two-Person Bargaining Situations"

00-24 (09) Iñigo Herguera, Praveen Kujal and Emmanuel Petrakis
"Trade Policies, Time Consistency, Quality Reversals and Exist in Vertically Differentiated Industries"

00-26 (10) Vitorocco Peragine
"Responsibility and Compensation in a Simple Experiment"

00-27 (11) Sebastiano Bavetta and Vitorocco Peragine
"Measuring Autonomy Freedom"

00-29 (12) Ricardo Mora and Georges Siotis
"External Factors in Emerging Market Recoveries: An Empirical Investigation"

00-31 (13) José Alcalde and Antonio Romero-Medina
"Coalition Formation and Stability"

00-32 (14) Vitorocco Peragine
"Opportunity Egalitarianism and Income Inequality"

00-33 (15) Vitorocco Peragine
"Opportunity, Responsibility and the Ranking of Income Distributions"

00-43 (16) Ricardo Mora and Javier Ruiz-Castillo
"Gender Segregation: From Birth to Occupation"

00-44 (17) J. Roemer, R. Aaberge, U. Colombino, J. Fritzell, S. Jenkins, I. Marx, M. Page, E. Pommer, J. Ruiz-Castillo, M.J. San Segundo, T. Tranaes, G. Wagner and I. Zubiri
"To What Extent Do Fiscal Regimes Equalize Opportunities for Income Acquisition Among Citizens?"

00-47 (18) Alvaro Escribano and Roberto Pascual
"Dynamic Asymmetries in Bid-Ask Responses to Innovations in the Trading Process"

00-48 (19) Mª Angeles de Frutos and C. Manzano
"Risk aversion, Transparency, and Market performance"

00-54 (20) José Luis Ferreira
"Strategic interaction between futures and spot markets"

00-55 (21) Bernarda Zamora
"Rationality in the Allocation of Private and Public Goods"

00-56 (22) Javier Ruiz-Castillo
"The Measurement of Structural and Exchange Income Mobility"

00-57 (23) Javier Ruiz-Castillo
"The Measurement of Income Mobility and Inequality of Oportunity"

00-63 (24) Ricardo Mora and Javier Ruiz-Castillo
"Additively Decomposable Segregation Indexes. The Case of Gender Segregation by Occupations in Spain"

00-67 (25) Sergi Jiménez Martín, José Mª Labeaga Azcona and Maite Martínez-Granado
"An Empirical Analysis of the Demand for Health Using the European Community Household Panel"

Statistics and Econometrics Series

00-07 (01) Andrés M. Alonso, Daniel Peña and Juan Romo
"Forecasting Time Series with Sieve Bootstrap"

00-08 (02) Martín González and Jesús Gonzalo
"A Threshold Unit Root Model (TUR) for Interest Rates"

00-09 (03) Juan J. Dolado, Jesús Gonzalo and Laura Mayoral
"Long Range Dependence in Spanish Political Opinion Poll Series"

00-10 (04) Rosa Elvira Lillo and Miguel Martín
"Identifiability of Differentiable Bayes Estimators of the Uniform Scale Parameter"

00-11 (05) Rosa Elvira Lillo
"Note on Characterization Problem of Nagaraja and Nevzorov"

00-12 (06) Rosa Elvira Lillo and Miguel Martín
"Characterizations Involving Conditional Expectations Based on a Functional Derivative Approach"

00-13 (07) Félix Belzunce, Rosa Elvira Lillo, José María Ruiz and Moshe Shaked
"Stochastic Comparisions of Nonhomogeneous Processes"

00-14 (08) Rosa Elvira Lillo, Asok K. Nanda and Moshe Shaked
"Preservation of Some Stochastic Orders by Order Statistics"

00-16 (09) Wolfgang Haerdle, Stefan Sperlich and Vladimir Spokoiny
"Structural Tests in Additive Regression"

00-25 (10) Adolfo Hernández and Santiago Velilla
"Dimension Reduction in Discriminant Analysis using Transformations"

00-28 (11) Onésimo Hernández-Lerma and Rosario Romera
"Pareto Optimality in Multiobjective Markov Control Processes"

00-30 (13) Daniel Peña
"An Interview to George Box"

00-36 (14) Javier M. Moguerza and Francisco J. Prieto
"An Augmented Lagrangian Interior-Point Method Using Directions of Negative Curvature"

00-37 (15) Francesc Marmol and Carlos Velasco
"Trend Stationarity Versus Long Range Dependence In Time Series Analysis"

00-38 (16) Felipe M. Aparicio, Alvaro Escribano and Ana García
"Synchronicity Between Macroeconomic Time Series: An Exploratory Analysis"

00-39 (17) Felipe M. Aparicio Acosta
"Nonparametric Testing of Common Stochastic Trends in Pairs of Univariate Time Series Using Induced-Order Statistics"

00-40 (18) Felipe M. Aparicio, Alvaro Escribano and Ana García
"A Robust Nonparametric Test for Dominant Low-Frequency Behavior in Time Series"

00-42 (19) Andrés M. Alonso, Daniel Peña and Juan Romo
"Resampling Time Series by Missing Values Techniques"

00-45 (20) M. Esteban-Bravo, P. Gourdel, and F. J. Prieto
"Existence and Computation of an Arrow-Debreu Equilibrium"

00-49 (21) Daniel Peña and Pilar Poncela
"Forecasting with Nonstationary Dynamic Factor Models"

00-50 (22) Daniel Peña and Julio Rodriguez
"A Descriptive Measure of Multivariate Dependency"

00-58 (23) Miguel A. Arranz and Alvaro Escribano
"A note on COMFAC restriction in ECM testing under co-breaks"

00-59 (24) Felipe Aparicio, Miguel A. Arranz and Alvaro Escribano
"A model–free cointegration approach for pairs of I (d) variables"

00-60 (25) M. Esteban-Bravo
"Existence and computation of a Cournot-Walras equilibrium"

00-61 (26) M. Esteban-Bravo
"Existence and computation of GEI equilibrium"

00-62 (27) Alberto Maydeu-Olivares and Adolfo Hernández Estrada
"Some remarks on estimating a covariance structure model from a sample correlation matrix"

00-64 (28) Regina Kaiser Remiro and Agustín Maravall
"Notes on time series analysis, ARIMA models and signal extraction"

00-65 (29) Regina Kaiser Remiro and Agustín Maravall
"An application of TRAMO-SEATS: Changes in seasonality and current trend-cycle assesment"

00-66 (30) Jesús Gonzalo and Jean-Yves Pitarakis
"Estimation and Model Selection Based Inference in Single and Multiple Threshold Models"

DOCUMENTOS DE TRABAJO 2000

Series de Economía

00-01 (01) Antonio García Romero
"El efecto de la estancia postdoctoral en la productividad científica"

Series de Economía de la Empresa

00-08 (01) Jaime Rivera Camino
"La identidad e implementación del Marketing Medioambiental"

00-09 (02) Jaime Rivera Camino
"El Marketing Medioambiental en España: Un enfoque empírico exploratorio"

00-10 (03) Jaime Rivera Camino
"Los Sistemas de Gestión Medioambiental: Una investigación exploratoria sobre su implementación"

00-11 (04) Jaime Rivera Camino
"La implementación de la Orientación al Mercado: Un estudio exploratorio"

00-12 (05) Jaime Rivera Camino, Oscar González y Víctor Molero
"La implementación de la Orientación al Mercado: Un estudio exploratorio"

Series de Estadística y Econometría

00-02 (01) José Ramón Cancelo y Antoni Espasa
"Análisis cuantitativo de los precios de la vivienda: Principales resultados e implicaciones sobre el funcionamiento del mercado de la vivienda en España"

00-06 (02) Felipe M. Aparicio Acosta
"Universidad y sociedad en los albores del 2000"

00-07 (03) Nuria Hernández, Cándido Pañeda y Esther Ruiz
"Relaciones dinámicas en el mercado internacional de carne de vacuno"

Series de Historia Económica e Instituciones

00-03 (01) M. Mar Cebrián
"Contratos de transferencia de tecnología y crecimiento de la Economía Española: 1959-1972"

00-04 (02) Juan Carmona
"Información y crédito en el campo español entre 1850 y 1930. ¿Por qué los bancos rurales y las cooperativas no consiguieron extirpar la práctica de la usura?"

00-05 (03) Fernando Carlos Ramos Palencia
"El consumo familiar de bienes duraderos y semiduraderos en la Castilla Pre-industrial: Palencia, 1750-1850"

WORKING PAPERS 1999

Business Economics Series

99-01 (01) Jaime Ortega
"Power in the firm and managerial career concerns"

99-06 (02) Sandro Brusco
"Short-termism as optimal experimentation policy"

99-07 (03) A. Balbás, I.R. Longarela y J. Lucia
"How Does Financial Theory Apply to Catastrophe-Linked Derivatives? An Empirical Test of Several Pricing Models"

99-17 (04) Ashish Arora, Andrea Fosfuri and Alfonso Gambardella
"Markets for technology (why do we see them, why don´t we see more of them, and why we should care"

99-18 (05) María José Álvarez and Jaime Rivera
"An integrated typology of green manufacturing profiles"

99-30 (06) Sandro Brusco and Giuseppe Lopomo
"Collusion via Signalling in Open Ascending Auctions with Multiple Objects and Complementarities"

99-33 (07) Margarita Samartín
"Costly Financial Crises"

99-35 (08) Ángel Pardo, Alejandro Balbás and Vicente Meneu
"On the effectiveness of several market integration measures. An empirical analysis"

99-39 (09) Ester Martínez-Ros and Josep A. Tribó
"R&D and Debt Financing"

99-40 (10) Carolina Manzano
"Integratin versus segmentation in a dealer market"

99-41 (11) Elizabeth F. Cabrera and Ángel Cabrera
"The State of Strategic Human Resource Measurement in Spanish Banks"

99-46 (12) Ángel Cabrera, Elizabeth F. Cabrera and Sebastian Barajas
"Organizational culture as a determinant of technology assimilation"

99-47 (13) Elizabeth F. Cabrera and Ángel Cabrera
"Rethinking utility analysis: A strategic focus"

99-61 (14) Carlos Larrinaga , Francisco Carrasco, Carmen Correa, Francisco Javier Caro and José María Páez.
"The Role of Environmental Accounting in Organizational Change: An Exploration of Spanish Companies"

99-64 (15) Roberto Pascual, Álvaro Escribano and Mikel Tapia
"How Does Liquidity Behave? A Multidimensional Analysis of Nyse Stocks"

99-67 (16) A. Jorde Padilla and Alejandro Requejo
"Conflicts of interest, employment decisions, and debt restructuring: Evidence from Spanish firms in financial distress"

99-70 (17) Maria José Álvarez-Gil, Clara Cardone-Riportella, Nora Lado-Cousté and Margarita Samartín Sáenz
"Financial Service Firm`s Entry-Mode Choice, Network Linkages and Cultural Diversity: Spanish Companies in Latin America"

99-81 (18) Andrea Fosfuri and Ashish Arora
"Exploring the internalization rationale for international investment: Wholly owned subsidiary versus technology licensing in the worldwide chemical industry"

Economics Series

99-56 (21) JJ. Dolado, F. Felgueroso and JF. Jimeno
"The Causes of Youth Labour Market Problems in Spain: Crowding Out, Institutions, or Technology Shifts?"

99-57 (22) M. Balmaseda, JJ. Dolado, and JD. López-Salido
"The Dynamic Effects of Shocks to Labour Markets: Evidence from OECD Countries"

99-59 (23) Victoria Osuna
"Job Flow Dynamics in Segmented Labor Markets: Evaluating the Effects of a Reduction in Firing Costs in Spain"

99-62 (24) Marco Celentani and José Ignacio Conde
"The political economy of international private insurance and fiscal policy"

99-63 (25) Thesia I. Garner, Javier Ruiz-Castillo and Mercedes Sastre
"The influence of demographics and household specific price indices on expenditure based inequality and welfare: A comparison of spain and the United States"

99-66 (26) Praveen Kujal and Celia Costa Cabral
"The role of commitment and the choice of trade policy instruments"

99-71 (27) Berthold Herrendorf, Ákos Valentinyi and Robert Waldmann
"Ruling out Multiplicity and Indeterminacy: The Role of Heterogeneity"

99-76 (28) Ezra Einy, Diego Moreno and Benyamin Shitovitz
"Information Advantage in Cournot Oligopoly"

99-80 (29) J.J. Dolado, F. Felgueroso and J.F. Jimeno
"Youth Labour Markets in Spain: Education, Training and Crowding-Out"

99-82 (30) Sergi Jiménez Martín, José M. Labeaga and Maite Martínez Granado
"Health Status and Retirement Decisions for Older European Couples"

99-86 (31) Salvador Barberà and Andrés Perea
"Supporting Others and the Evolution of Influence"

Economic History and Institutions Series

99-15 (01) James Simpson
"Cooperation and cooperatives in southern European wine production: the nature of succesful institutional innovation 1880-1950"

99-26 (02) Joan R. Rosés
"Explaining the early industrialisation: a view from Catalonia (1830-1861)"

99-28 (03) James Simpson
"The Agrarian Crisis in the Late Nineteenth Century Spain: a Reconsideration"

Statistics and Econometrics Series

99-03 (01) Stefan Profit and Stefan Sperlich
"Non-Uniformity of Job-Matching in a Transition Economy A Nonparametric Analysis for the Czech republic"

99-10 (02) Regina Kaiser and Agustín Maravall
"Short-Term and Long-Term Trends, Seasonal Adjustment, and the Business Cycle"

99-12 (03) Francesc Marmol, Alvaro Escribano and Felipe M. Aparicio
"A New Instrumental Variable Approach for Estimation and Testing in Cointegrating Regressions"

99-19 (04) Rosario Romera
"Distributional aspects in partial least squares regression"

99-23 (05) Walter Krämer and Francesc Mármol
"Ols-Based Asymptotic Inference in Linear Regression Models With Trending Regressors and Ar(p)-Disturbances"

99-24 (06) Walter Krämer and Francesc Mármol
"The Power of Residual-Based Tests for Cointegration When Residuals Are Fractionally Integrated"

99-27 (07) Víctor Aguirregabiria (University of Chicago) and César Alonso Borrego (Universidad Carlos III de Madrid)
"Labour Contracts and Flexibility: Evidence from a Labor Market Reform in Spain"

99-29 (08) Juan J. Dolado, Jesus Gonzalo and Laura Mayoral
"A Fractional Dickey-Fuller Test"

99-31 (09) Lorenzo Pascual, Juan Romo and Esther Ruiz
"Effects of Parameter Estimation on Prediction Densities: A Bootstrap Approach"

99-37 (10) Miguel A. Delgado and José M. Vidal
"On Universal Unbiasedness of Delta Estimators"

99-38 (11) Miguel A. Delgado and Javier Hidalgo
"Bootstrap goodness-of-fit tests for FARIMA models"

99-42 (12) Antonio J. Conejo, F. Javier Nogales and Francisco J. Prieto
"A New Decomposition Method Applied to Optimization Problems Arising in Power Systems: Local and Global Behaviour"

99-45 (13) Miguel A. Delgado y José M. Vidal
"Global rates of convergence for the bias of singular integral estimators and their shifted versions"

99-48 (14) Jesús Gonzalo and Raquel Montesinos
"Stochastic Threshold Unit Root Models"

99-49 (15) Regina Kaiser and Agustín Maravall
"Seasonal Outliers in Time Series"

99-50 (16) Jesús Gonzalo and Tae-Hwy Lee
"Permanent and Transitory Components of GDP and Stock Prices: Further Analysis"

99-52 (17) Politis, D.N., Romano, J.P., and Wolf, M.
"On the Asymptotic Theory of Subsampling"

99-53 (18) Politis, D.N., Romano, J.P., and Wolf, M.
"Subsampling, symmetrization, and robust interpolation"

99-54 (19) Miguel A. Delgado, José C. Fariñas y Sonia Ruano
"Firm´s productivity and the export market: a nonparametric approach"

99-58 (20) Juan José Dolado, Jesus Gonzalo and Frances Mármol
"A Primer on Cointegration"

99-60 (21) Sonia Hernández and Victor J. Yohai
"Locally and globally robust estimators in regression"

99-65 (22) Francesc Marmol
"How Spurious Features Arise in Case of Cointegration"

99-68 (23) Juan José Dolado and Francesc Marmol
"Asymptotic Inference for Nonstationary Fractionally Integrated Processes"

99-69 (24) Miguel Ángel Delgado and Inmaculada Fiteni
"Bootstrap test for parameter instability"

99-72 (25) Santiago Velilla
"Variable Deletion, Confidence Regions and Bootstrapping in Linear Regression"

99-73 (26) J. A. Gil, D. Peña and J. Rodríguez
"Trends in statistical research productivity by journal publications over the period 1985-1997"

99-74 (27) J. A. Gil, D. Peña and J. Rodríguez
"Statistical research in Europe: 1985 - 1997"

99-75 (28) Daniel Peña and Javier Prieto
"The kurtosis coefficient and the linear discriminant function"

99-77 (29) Ana Pérez and Esther Ruiz
"Finite Sample Properties of a QML Estimator of Stochastic Volatility Models with Long Memory"

99-78 (30) Uwe Hassler
"Nonsense Regressions Due to Time-Varying Means"

99-79 (31) Uwe Hassler
"Cointegration Testing in Single Error-Correction Equations in the Presence of Linear Time Trends"

99-83 (32) Juan M. Rodríguez-Póo, stefan Sperlich and Ana I. Fernández
"Semiparametric Three Step Estimation Methods in Labor Supply Models"

99-84 (33) Ulrike Gra hoff, Joachim Schwalbach and Stefan Sperlich
"Executive Pay and Corporate Financial Performance: An Explorative Data Analysis"

99-85 (34) Stefan Sperlich, Dag Tjostheim and Lijian Yang
"Nonparametric Estimation and Testing of Interaction in Additive Models"

99-87 (35) Onésimo Hernández-Lerma and Rosario Romera
"Limiting Discounted-Cost Control of Partially Observable Stochastic Systems"

99-88 (36) Joseph P. Roman and Michael Wolf
"Subsampling Intervals in Autoregressive Models with Linear Time Trend"

99-89 (37) Laura Mayoral Santamaria
"A New Minimum Distance Estimation Procedure for ARFIMA Processes"

DOCUMENTOS DE TRABAJO 1999

Series de Economía

99-02 (01) José Luis Ferreira e Iñigo Herguera
"Relación entre los mercados spot y de futuros en un contexto oligopolístico"

99-03 (02) José Luis Ferreira e Iñigo Herguera
"Régimen institucional del mercado spot y del mercado de futuros en distintos países"

99-10 (03) Diego Moreno
"Competencia vía funciones de oferta en el mercado español de producción de energía eléctrica"

99-11 (04) Diego Moreno
"Relaciones de propiedad cruzadas en mercados oligopolísticos"

99-12 (05) Ramón María-Dolores
"Variaciones en el Tipo de Intervención del Banco de España: Un Enfoque Alternativo"

99-17 (06) J.J. Dolado, F. Felgueroso y J.F. Jimeno
"Los Problemas del Mercado de Trabajo Juvenil en España: Empleo, Formación y Salarios Mínimos"

Series de Economía de la Empresa

99-04 (01) María José Álvarez Gil, Jerónimo de Burgos Jiménez y José Joaquín Céspedes Lorente
"¿Hay hoteles verdes en España? Un análisis exploratorio"

99-05 (02) Ignacio Hernando y Josep A. Tribó
"Relación entre contratos laborales y financieros: Un estudio teórico y empírico para el caso español"

99-08 (03) Carlos Larrinaga
"El Estado de Valor Añadido y la Naturaleza Social de la Contabilidad"

99-09 (04) Carlos Larrinaga
"Perspectivas Alternativas de Investigación en Contabilidad: Una revisión"

99-14 (05) Mª José Álvarez Gil, Jerónimo de Burgos Jiménez y José Joaquín Céspedes Lorente
"Estrategia medioambiental, contexto organizativo y rendimiento: Los establecimientos hoteleros españoles"

99-16 (06) Mª José Álvarez Gil, Fernando Gutiérrez y Domi Romero
"Prioridades competitivas y sistemas de información en la empresa manufacturera española del siglo XVIII: análisis de un caso"

99-18 (07) Clara Cardone y Leonardo Cazorla
"Estrategias de entrada de la banca española en América Latina: Análisis teórico y Empírico"

99-19 (08) María Jesús Nieto y Josep A. Tribó
"Determinantes de la emisión de deuda negociable en las empresas españolas"

Series de Estadística y Econometría

99-15 (01) Felipe Miguel Aparicio Acosta
"La Enseñanza de Estadística en Ingeniería de Telecomunicaciones"

Series de Historia Económica e Instituciones

99-01 (01) Xavier Cuadras-Morató, Angel S. Fernández Castro y Joan R. Rosés
"La influencia de la productividad en la consolidación de los grupos regionales de la banca privada española, 1900-1914"

99-06 (02) Pedro Fraile
"El pesimismo económico en la España contemporánea"

99-07 (03) Pedro Fraile
"Nacionalismo y corporativismo en la Economía de la España contemporánea"

99-13 (04) James Simpson y Juan Carmona
"¿Son los contratos agrarios un factor determinante del crecimiento económico? El ejemplo de la aparcería en los siglos XIX-XX"