What is the impact of duplicate coverage on the demand for health care in Germany?

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17 November 2007

WHAT IS THE IMPACT OF DUPLICATE COVERAGE ON THE DEMAND FOR HEALTH CARE IN GERMANY?

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ABSTRACT. Duplicate coverage involves those individuals who hold public health insurance, and purchase additional private coverage. Using data from the German Institute for Economic Research, we try to investigate the impact of duplicate coverage on the demand for healthcare (measured in number of visits to doctors). Given the simultaneity of the choices to take out additional private health insurance coverage, we estimate a negative binomial model to measure this impact. We also estimate a a Full Information Maximun Loglikelihood (FIML), known as Endogenous Switching Poisson Count Model and we compare these results with the standard maximum log likelihood (ML) estimators of the negative binomial model. The Results show that, there is a positive difference on the level of health services demanded when there is a duplicate coverage. We found also that there is evidence to think that in Germany there is a feedback between duplicate coverage and the demand of health services.

1. INTRODUCTION

The German health system is a two-tier system. While around 86 percent of the population is covered by the public health insurance (also called statutory), about 11 percent is covered by the private health insurance (PHI). The approximately remaining 3 percent is covered by other governmental insurance schemes (such as military and police officers) [2].

Contributions to the (SHI) sector depend on income, while in the (PHI) sector they depend on individual health risks. In general, individuals have the possibility to obtain healthcare for free through the statutory insurance sector, alternatively they can pay for healthcare services or purchase (PHI), in particular, for services that are not completely covered by the public insurance such as psychological and some dental care.

The statutory insurance is compulsory for employees, whose gross annual income does not exceed 42,740 Euro (is called income ceiling limit and changed every year). Tenured civil servants, self-employed and employees whose gross annual income is above the income ceiling limit are allowed to switch to the private insurance sector [4].

Renumeration of physicians shows some difference between the two insurance sectors. Although the fee-for-services are quite the same within both sectors, physicians are allowed to charge up to 3.5 times if an individual holds private insurance policy and the health problem is complicated [13]. This motivates physicians to first serve the privately insured individuals. Individuals seek private coverage for several reasons; 1) overcome the restrictions that are put by the statutory insurance sector such as limited choice of doctors 2) avoid longer waiting times and lists 3)

Date: November 14, 2007.

the perceived quality of both sectors are different. Some individual perceive comfortable waiting rooms and the friendly treatment of medical personal as better quality.

Studying health insurance and the demand for health services is an interesting and challenging issue. Five decades ago, Arrow [1] came up with the problem of *moral hazard*, a phenomenon arises, when an individual does not bear the consequences of his/her actions He stated that, an insurance systems without incentives to providers and users to seek low-cost services were going to increase the expenditure of health services.

A decade later, Grossman[9] studied the demand for health, he found evidence of influence of individual characteristics on the demand for healthcare. Gary Becker reiterated Grossman's conclusion (*health capital*), he found that, more educated individuals invest more in their health capital and for this reason they will demand lower quantity of health services when they become older. Cameron et. al. [3] modeled the interaction between insurance and the demand for health services using a two periods model, they argued that, the insurance choice was determined by the expected level of future healthcare consumption. Vera-Hernandez[18] extended the Cameron's model for investigating just the impact of duplicate coverage, using a Generalized Method of Moments (GMM) he found a positive impact of the duplicate coverage on the demand and endogeneity when he analyzed a sub-sample of household heads.

In Germany, Pohlmeier et. al.[12] introduced a negative binomial distributed hurdle model that, specifies two stages of the decision-making process of demand for healthcare.

They concluded that, while in the first stage, it is the patient who decides whether to visit a physician or not, in the second stage, it is the physician, who determines the number of subsequent visits. Jochmann [11], used a random effects model specified in a semiparametric Bayesian to analyze the demand for health services, they found a positive effect of the additional coverage on the demand of the health services. They did not consider the endogeneity that emerges in the duplicate coverage.

Using econometric tools, this study aims to figure out what kind of impact does the duplicate coverage have on the number of visits to doctors.

This paper is divided into seven sections; the second section discusses the relevant features of the German healthcare system in general, and the health insurance in particular. It gives also a short summary of the study data. Section three describes the mathematical framework that stands behind the choice of the econometric models. Section four addresses the econometric models. Section five presents the study variables that are included in the analysis. And finally, the last section is designed for the presentation and discussion of the results.

2. The German health care system

Over the last two decades, the German healthcare system has passed for several reforms. The period between 1977 and 1983, had witnessed reform acts that were aiming to contain spending on health sector [10]. In 1989, a new reform act was implemented, this act aimed among other things at extending the opt-out option. By passing this act, blue-collars whose income is above the income ceiling were eligible to opt out of the statutory insurance sector. A further reform act came

TABLE 1. Population according to the type of health insurance coverage (2000)

Type of health insurance	
SHI	88.35%
PHI	9.35%
Others	2.01%
No coverage	0.23%
No answer	0.06%

Federal statistical office 2003

into force in 1993, the core points of this act were cost-containment and enhancing efficiency. The cost-containment has been emphasized by increasing co-payments and the introduction of fixed budgets. The cost-containment policy was also among the aims of other reform act which passed in 1997, this involved more co-payment in addition to exclusion of some rehabilitative care benefits. In 1999 and 2000, the government released another decree which forced sickness funds (the operating body of the statutory insurance sector) to global budget (to spend what they have collected from the contributions of the insured individuals). However, these reform acts have not contributed to controlling escalating costs of health care.

As a response, the sickness funds were obliged to increase the contribution rates (from 13.6 to 14 percent between 2000 and 2003). Moreover, by 2004 a new reform act has been passed, in which patients have to make co-payment. Patients have to pay 10 Euros each three months for visit to general practitioner and for specialist if they choose to go without a referral from general practitioners.

Regulations and membership of the (SHI) are set up by the Social Code Book (SGB V), which determines the individual groups who are entitled to join the (SHI) and the services package. The total number of the sickness funds was 136 , of which the regional sickness funds (5), the company-based sickness funds (110), guild-sickness funds (9), substitution sickness funds (9), and three other funds. Generally, there is marked difference among these sickness funds; the only slight difference is the contribution rate and the nature of additional health services.

Membership in the (SHI) is either compulsory or voluntary. It is compulsory for employees whose income is below the income ceiling (42.750 Euro per year, called in German Beitragsbemessungsgrenze), unemployed, students, retirees and agriculturists. Family members of insured individuals such as unemployed wives and children are insured for free.

Eligible for the private health insurance coverage are each person who does not fit under the eligibility criteria of the (SHI) sector. Such as self-employed, civil servants and employees whose income is above the income ceiling limit. Like the (SHI) payments for the statutory coverage is also equally divided between employers and employees. Contracting with the private sector is individually determined, that means the more healthcare services you contract, the higher is the premium . Premiums are also dependant on individual's age at entry, and some money of the premium are being saved for later.

The provision of health care services in the private insurance sector functions on reimbursement base. That means, when an individual goes to doctor he gets a bill, he can either send this bill directly his insurance company, or pays the costs directly and getting reimbursed by own insurance company. A private insurance company can decide on the insurance of individuals and the scope of health problems. That means each insurance company when contracts an insurance policy, it can exclude previous health problems from the coverage, and therefore send individuals to medical check up.

3. Health services demand and duplicate coverage demand

In this section we develop a small microeconomic model for to analyze the interaction between the demand for health services and the duplicate coverage. We based the model in the following expression

$$h_{t+1} = H((1-\delta_t)h_t, I_t) \tag{1}$$

that means that the health stock at time $t+1$ depends on the stock at the past period h_t, some natural depreciation δ_t (caused i.e. by the age meaning older less health) and some investment in health (for example sports, good food, preventive and curative medical care), this three elements are carried to the next period using a transformation function H, function that we will recognize as the Health Function Production[9], for now we will suppose that is increasing and strictly concave in its two arguments.

Unfortunately (1) can be affected at least for two uncertainty factors, the first one the fatality (accidents, diseases, shocks in the individual's health) and the second the effectiveness of treatments, incorporate this factors imply transform (1) in

$$h_{t+1} = H((1-\delta_t)h_t + \epsilon, I_t\mu) \tag{2}$$

Where ϵ and μ are random variables with $E[\epsilon] = 0$ and $E[\mu] = 1$, ϵ represents the uncertainty related to the determinants of health status and μ represents the effectiveness of the medical care[5].

Now instead of considerer a many periods model we analyze the situation only in one period of time[1] subdivided in two moments[2] , at $t = 0$, the individual know his/her current level of health (h_0), but, he doesn't know the level of health through the period and neither the final level of health at the end of the period (h_1).

We assume that the individuals have an compulsory health insurance that covers a limited set of health problems and for covered the other relevant issues they need to buy a duplicate coverage (supplementary insurance coverage [3]). At the very beginning the individual needs to decide about this insurance policy (to buy or not a duplicate coverage). In some point ($\tau = 1$) during the period the individual realizes his/her level of health (pre-treatment level of health h) and decides how much healthcare he/she wants[3], [8](see Figure 1) based in his/her budget constraint and preferences.

The individual wants to maximize a von Neumann Morgenstern utility function $U(c, h_1)$ where c is a composite consumption good and h_1 is the final health status. We assume that U has the standard property that utility is strictly increasing and strictly concave in both arguments ($U_1.U_2 > 0$ and $U_{11}, U_{22} < 0$).

[1] The period begins at $t = 0$ and finishes at $t = 1$

[2] The first moment begins at $\tau = 0$ and ends at $\tau = 1$ and the second moment begins at $\tau = 1$ and ends at $\tau = 2$

[3] Supplemental health insurance is a type of insurance policy designed to cover the gaps that the regular/compulsory health insurance may have.

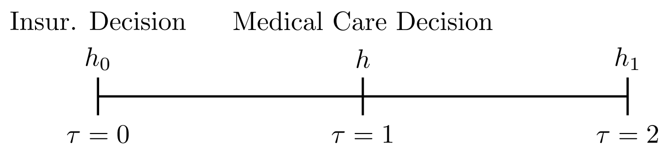

FIGURE 1. Decisions schedule and information

The individual chooses the insurance policy (take a duplicate coverage $dc = 1$ or not take it $dc = 1$), the level of health care v (i.e. visits to the doctor) and the level of c in order to maximize $U(c, h_1)$.

We assume the existence of a co-payment $k > 0$ and a price $p_v > 0$ for each visit and if the individual decides to take a duplicate coverage he pays a premium P, then, if we suppose that the income of the individual is Y, he faces the following budget constrain

$$Y - dcP = c + v\left[(1 - dc)p_v + k\right] \tag{3}$$

Because the individual takes decisions (dc, v) in a sequential form we can solve the problem backwards, that means that given level of pretreatment health$(\bar{h})$ and the insurance policy $(\bar{dc})$ we can find a expression for the demand of health care V[4] and by using this expression we can find the demand for health insurance DC. At time $\tau = 1$.

Then, given a insurance policy $(\bar{dc})$ and a health status $(\bar{h})$ the individual's problem is

$$\max_{V} U\left\{Y - \bar{dc}P - v\left[(1 - \bar{dc})p_v + k\right], \tilde{H}((1 - \delta(\mathbf{A}))\bar{h}, v)\right\} \tag{4}$$

Notice that in (4) instead of h_1 we used $\tilde{H}((1 - \delta(\mathbf{A}))\bar{h}, v)$[5] where $\mathbf{A}$ is a vector of characteristics of the individual (like age, gender and others that determine the deterioration of the health of the individual), because the individual evaluates his own health at $\tau = 1$ we assume that there is not unexpected shocks, that means $epsilon = 0$.

using the solution $V(Y, h, dc, \mathbf{A})$ at the moment $\tau = 0$, we find the following expected utilities corresponding to the choices $dc = 1$ and $dc = 0$

$$\dot{U} = \int U\left\{Y - P - kV, H((1 - \delta(\mathbf{A}))h_0 + \epsilon, V)\right\} F_\epsilon(\epsilon|\mathbf{Z})\, d\epsilon \tag{5}$$

$$\ddot{U} = \int U\left\{Y - (p_v + k)V, H((1 - \delta(\mathbf{A}))h_0 + \epsilon, V)\right\} F_\epsilon(\epsilon|\mathbf{Z})\, d\epsilon \tag{6}$$

where we had assume that

$$h_1 = H((1 - \delta(\mathbf{A}))h_0 + \epsilon, V) \tag{7}$$

[4]We use V for denotate the demand of health care and v for the quantity of health care, the same for DC and dc

[5]$\tilde{H}$ acts in this case as a transformation of the health level at $\tau = 1$ to the time $\tau = 2$

We also assume that ϵ is a random variable with cumulated distribution $F(\epsilon|\mathbf{Z})$ where $\mathbf{Z}$ is a vector of variables that determines the likelihood of occurrence of health shocks (fatalities)[18].

Because dc take only two values, the choice of DC is make it in base to a simple comparison between the expected utilities in the two cases, then $DC(Y, h_0, \mathbf{A}, \mathbf{Z}) = 1$ if $\dot{U} \geq \ddot{U}$ and 0 if it not the case.

4. Econometric methods

In this section we analyze maximum log likelihood (ML) methods for to study the impact of the insurance policy DC (duplicate coverage)on the demand of health care V (measured as number of visits to the doctor). Because $V = 1, 2, 3, \cdots$ we can use methods of count variables, then at first time we describe the basic ideas behind the method for a single equation and afterward we extend this method for deal with the endogeneity of DC. .

Now we will assume that we have a sample of size N and we assign an index $i = 1, \ldots, N$ for to represent the data of the individual i, now let V_i the dependent count variable (in our case the number of visits), a difference of linear model in count models we are interested in the probability that the count (V_i) assumes a given value $n = 1, 2, 3, \cdots$ this probability is $f(V_i|\Psi, \mathbf{x}_{1i}, DC_i)$ (probability density function p.d.f.), $\mathbf{x}_{1i}$ it is a vector of explanatory variables and DC_i it is the duplicate coverage index variable.

The ML procedure find the set of parameters $\hat{\Psi}$ that maximizes

$$\ell(\Psi) = \sum_{i=1}^{N} \ln f(V_i = n|\Psi)$$

different kind of densities give different kind of models. The Poisson model is based on the assumption that V_i has a Poisson distribution

$$f\left(V_i|\Psi_P, \mathbf{x}_{1i}, DC_i\right) = \frac{\exp(-\lambda_i)\lambda_i^{V_i}}{V_i!} \tag{8}$$

where $\lambda_i = \exp(\theta DC_i + \mathbf{x}_{1i}'\beta)$, and $\Psi = (\delta, \beta)$ is the set of parameters.

A more general model that the Poisson model is the Negative Binomial model (NB) that results of assume that V_i is distributed under a Negative Binomial distribution

$$f(V_i|\Psi, \mathbf{x}_i, DC_i) = \frac{\Gamma(\alpha^{-1} + V_i)}{\Gamma(\alpha^{-1})\Gamma(1 + V_i)} \left(\frac{\alpha^{-1}}{\alpha^{-1} + \lambda_i}\right)^{\alpha - 1} \left(\frac{\lambda_i}{\alpha^{-1} + \lambda_i}\right)^{V_i} \tag{9}$$

where $\lambda_i = \exp(\theta DC_i + \mathbf{x}_{1i}'\beta)$ and $\Psi = (\alpha, \delta, \beta)$ is the set of parameters parameters of this model.

Notice that in both models the conditional mean specified is

$$E(V_i|\Psi, \mathbf{x}_{1i}, DC_i) = \exp(\theta dc_i + \mathbf{x}_{1i}'\beta) \tag{10}$$

Under suitable assumptions this models can be estimated using the ML method, but as consequence of the theoretical analysis in the previous section there is the possibility of endogeneity between the number of visits (V_i) and the duplicate coverage index variable (DC_i), if this is the case ML estimators are no more reliable and we need to use methods of simultaneous equations. At date there are a good quantity of methods for to deal with the problem of endogeneity, a good survey of this methods can be found in Schellhorn [15], Romeu et al. [14] and Terza et al. [17].

An natural solution for our case is the extension of the basic count model to a count model with a endogenous switching (ES)[16] that implies to analyze the p.d.f. $f(V_i|\Gamma_v, \mathbf{x}_{1i}, DC_i, \zeta_{1i})$ where Γ_v is a set of parameters and the variable DC_i is the bivariate switching variable, such that

$$DC_i = \begin{cases} 1 & \text{if } \mathbf{x}'_{2i}\gamma + \zeta_{2i} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{11}$$

where ζ_{1i} and ζ_{2i} are variables jointly normal distributed with mean zero and covariance matrix

$$\Sigma = \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}$$

Under this assumptions

$$\begin{aligned} f(V_i, DC_i|\Gamma, \mathbf{x}_{1i}, \mathbf{x}_{2i}) = \int_{-\infty}^{\infty} & f(V_i|\Gamma_v, \mathbf{x}_{1i}, DC_i, \zeta_{1i}) \times \\ & \times \left[DC_i\Phi^*(\zeta_{1i}) + (1 - DC_i)(1 - \Phi^*(\zeta_{1i}))\right] f_{\zeta_{1i}}(\zeta_{1i}|\Gamma, DC_i, \mathbf{x}_{1i}, \mathbf{x}_{2i})\, d\zeta_{1i} \end{aligned} \tag{12}$$

where

$$\Phi^* = \Phi\left(\frac{\mathbf{x}'_{2i}\gamma + (\rho/\sigma)\zeta_{1i}}{\sqrt{1-\rho^2}}\right)$$

and $f_{\zeta_{1i}}(\zeta_{1i}|\Gamma, DC_i, \mathbf{x}_{1i}, \mathbf{x}_{2i})$ is normal with mean zero and variance σ^2, now if we use the change of variable $\xi_i = \zeta_{1i}/(\sigma\sqrt{2})$

we obtain that

$$\begin{aligned} f(V_i, DC_i|\Gamma, \mathbf{x}_{1i}, \mathbf{x}_{2i}) = \frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} & f(V_i|\Gamma_v, \mathbf{x}_{1i}, DC_i, \xi_i\sigma\sqrt{2}) \times \\ & \times \left[DC_i\Phi_i^*(\xi_i\sigma\sqrt{2}) + (1 - DC_i)(1 - \Phi^*(\xi_i\sigma\sqrt{2})\right] \exp(-\xi_i^2)\, d\xi_i \end{aligned} \tag{13}$$

Where $\Gamma = \Gamma_v \cup \{\gamma, \sigma, \rho\}$ is the set of parameters and like in the basic count model different specifications of $f(V_i|\Gamma_v, \mathbf{x}_{1i}, DC_i, \xi_i\sigma\sqrt{2})$ derivate in different types of models i.e. we can specify a Poisson distribution or a Negative Binomial distribution, Γ can be estimated using the Full Information Maximum Log likelihood method (FIML) maximizing the following log likelihood function

$$\ell(\Gamma) = \sum_{i=1}^{N} \ln f(V_i, DC_i|\Gamma, \mathbf{x}_{1i}, \mathbf{x}_{2i})$$

In the case of Poisson we have that

$$f\left(V_i|\Gamma_v, \mathbf{x}_{1i}, DC_i, \xi_i\sigma\sqrt{2}\right) = \frac{\exp(-\lambda_i + \xi_i\sigma\sqrt{2})(\lambda_i + \xi_i\sigma\sqrt{2})^{V_i}}{V_i!} \tag{14}$$

where as before $\lambda_i = \exp(\theta DC_i + \mathbf{x}'_{1i}\beta)$ and $\Gamma_v = (\delta, \beta, \sigma)$ is the set of parameters.

In the case of a NB distribution we have that

$$f\left(V_i|\Gamma_v, \mathbf{x}_{1i}, DC_i, \xi_i\sigma\sqrt{2}\right) = \frac{\Gamma(\alpha^{-1}+V_i)}{\Gamma(\alpha^{-1})\Gamma(1+V_i)} \times \times \left(\frac{\alpha^{-1}}{\alpha^{-1}+\lambda_i+\xi_i\sigma\sqrt{2}}\right)^{\alpha-1}\left(\frac{\lambda_i}{\alpha^{-1}+\lambda_i+\xi_i\sigma\sqrt{2}}\right)^{V_i} \quad (15)$$

where as before $\lambda_i = \exp(\theta DC_i + \mathbf{x}'_{1i}\beta)$ and $\Gamma_v = (\alpha, \delta, \beta, \sigma)$ is the set of parameters.

5. The Study Data

As we have seen in the mathematical framework, we need data about six groups of variables the; endogenous variables (health care demand and duplicate coverage), individual characteristics ($\mathbf{A}$), income (Y), pre-treatment health status (h), previous health status (h_0), the likelihood occurrence of health shocks (Occupation and others).

We use a sub-sample of people, who are older than 16 years, this sub-sample is estimated to be 10,327 observations All variables used in our study are listed in Table 2.

For measuring the demand of healthcare, we use the number of doctor visits in the last 3 months (VISITS), unfortunately with the data available, it is not possinble to classify whether these visits had been made to general practitioner or to specialist. We create a dummy variable for the duplicate coverage; 1 if individual has duplicate coverage and 0 if not

For estimating income, we use the household monthly net income (INC) measured in Euros. Given the reality that, the level of income in the West Germany is higher than the Eastern Germany, and the income of household has to be distributed over the household members. We include the geographic regions (REGION); (West Germany) and the number of members in the household

For measuring the health status, we use the self-reported health status (HEA) in 2005 (how individual would evaluate their health status on an ordinal scale) and the existence of disability (DISAB) for the same year. In the case of the previous health status we use self-reported health status (HEA0) for 2004 and two additional variables that we expect to be related to the overall health status; the first one is the physical condition of the individual (PHYS) and the second one is the mental health status (PRESSED)[6].

For the ndividual characteristics we include 3 variables; the gender of the individual (GENDER), the age (AGE, AGE2=AGE^2) and for the education level we used the education level with respect to High School (EDUHS). Finally we use four variables to analyze the impact of the risk; first we use only two occupational categories (Blue collars and White collars), we use too a variable to identify the head of the household (PRI), another one for the level of education of the head (EDUHSPRI) and one variable that represents the level of physical activity (PHYS).

[6]Unfortunately PRESSED and PHYS are only available in the new module of health that introduced by the (SOEP) in 2002 and has been revised and put into a two year replication period

Table 2. Summary of variables

Dependent	
DC	0 without and 1 if duplicated coverage.
VISITS	number of visits in the last 3 months.
Income	
INC	Income categories, the dummy variables are: 0-1000 (1, omitted), 1000-1500 (2), 1500-2000 (3), 2000-3000 (4), 3000-4000 (5), 4000,... (6).
WG	1 for West Germany and 0 for East Germany.
NHH	Number of members in the Household
Health	
HEA	Health Status (2005), the dummy variables are: (hea1, omitted) Very good,(hea2) Good, (hea3) Satisfactory, (hea4) Poor or bad.
DISAB	0 without and 1 if there is present disability.
Individual Characteristics	
GENDER	1 for females and 0 for males.
AGE	years divided by 100.
EDUHS	Education With Respect to High School , the dummy variables are: (1, omitted) Less than H S, (2) High School, (3) More than H S
Risk likelihood	
PRI	1 for head of household and 0 i.a.c.
EDUHSPRI	Education level of the head , the dummy variables are: (1, omitted) Less than H S, (2) High School, (3) More than H S
OCCUP	Occupation, the dummy variables are: Blue collars , White collars , Others(omitted).
SPORT	Frequency of sport or exercise (Almost never or never 1 Several times a year 2,At least once a month 3, At least once a week 4)
Previous Health Status	
HEA0	Health Status (2004), the dummy variables are: (hea1, omitted) Very good,(hea2) Good, (hea3) Satisfactory, (hea4) Poor or bad.
PRESSED	Pressed for time in the last 4 Weeks (Always 1, Often 2, Sometimes 3, Almost Never 4, Never 5)
PHYS	Strong Physical Pain in the last 4 Weeks (Always 1, Often 2, Sometimes 3, Almost Never 4, Never 5)

6. Results

In this section we present the results of the study. Our analytical strategy is to estimate different types pf models and compare them. First we estimate a Poisson and a Negative Binomial models to explain the number of visits to the doctor in last three months (V), in both cases we use as explanatory variables; the duplicate coverage (DC), income variables (INC2-6, WG, NHH), health variables (HEA2-4, DISAB, PRESSED, PHYS) and (GENDER, AGE, AGE2, AGE_SQR, EDUHS2, EDUHS3).

We also estimate a Probit model to explain the Duplicate Coverage index (DC) depending on income variables (INC2-6, WG, NHH), previous health variables (HEA02-04, PRESSED, PHYS), variables of individual characteristics (GENDER, AGE, AGE2, AGE_SQR, EDUHS2, EDUHS3) and variables related to the likelihood occurrence of health shocks (PRI, EDUHSPRI2-3, BLUE_CO, WHITE_CO, SPORT). Finally, we estimate Endogenous Switching model using a Poisson distribution taking in account the same variables as were used in the count and Probit models.

The Table 3 presents the whole results of the used models; Poisson, Negative Binomial model (NB) and the ES, additionally we present an auxiliary probit regression , which used to compare the impact on DC in different scenarios the first one (probit) without considering the correlation between the duplicate coverage (DC) and the number of visit to the doctor (VISITS) and the second scenario under the ES model.

A general view at table (3) shows that, only for some specific cases, the results are quite similar in terms of significance and in the major of the cases in the sign and value of the parameters. The first aspect; we observe a **positive impact of the duplicate coverage** (DC) on the demand for visit to doctor (VISITS), in the three models we notice significance, but under ES. this effect becomes greater, the second important aspect, is the significance of $\rho = -.615$, which means; there is feedback between the duplicate coverage and the demand, means the **DC is endogenous**.

Analyzing the impact of the personal characteristics; GENDER, reflects a positive impact on VISITS and on DC also, in the case of AGE we only notice an **U** impact on VISITS. The level of education of the individual has no effect on VISITS. A positive effect has been found in the level of educaction on the (DC), this can be explained by the tendency that, more educated look for more health services quality (such as shorter waiting times and some luxury hospital services).

The Income variables show an expected effect. In the case of INC, the effect has no notorious **U** impact on VISITS, this is harmoneous with the reality that richer people have access to best health services have a better disposition to improve their health easier. On other side, INC has an expected impact on DC, that means higher income more insurance purchase, The variables WG and NHH in the ES. model provides an intuitive result, meaning that, WG has a positive effect on the DC but not on the VISITS, while NHH has an effect on both.

For analyzing the impact of the current health status, we use the variable (HEA), its on VISITS is the expected, meaning that, less health leads more VISITS, we include too two more variables; PRESSED and PHY, we assume that, these variables

TABLE 3. Health care estimations (n= 10,327)

MODEL	NB2 VISITS	POIS VISITS	ES VISITS	ES DC	PROBIT DC
DC	0.112*	0.116*	0.739*		
GENDER	0.078*	0.072*	0.077*	0.086*	0.094*
AGE	-1.008*	-0.801*	-0.946*	0.088	0.204
AGE_SQR	0.954*	0.749*	1.008*	-0.408	-0.497
EDUHS2	-0.015	-0.015	-0.037	0.342*	0.347*
EDUHS3	0.002	-0.002	-0.025	0.377*	0.370*
INC2	0.087*	0.103*	0.068*	0.238*	0.242*
INC3	0.093*	0.101*	0.077*	0.357*	0.403*
INC4	0.071	0.076	0.038	0.609*	0.632*
INC5	0.037	0.048	-0.015	0.760*	0.782*
INC6	-0.012	-0.009	-0.136*	1.058*	1.081*
WG	0.083*	0.093*	0.026	0.357	0.410*
NHH	0.001	0.000	0.024*	-0.128*	-0.130*
HEA2	0.122*	0.117*	0.127*		
HEA3	0.383*	0.381*	0.375*		
HEA4	0.913*	0.911*	0.881*		
DISAB	0.247*	0.243*	0.268*		
PRESSED	-0.015	-0.018	-0.007	-0.063*	-0.060*
PHYS	-0.050*	-0.049*	-0.050*	0.013	0.013
HEA02				-0.075	-0.047
HEA03				-0.053	-0.020
HEA04				0.030	0.027
PRI				0.121*	0.110*
EDUHSPRI2				0.060	0.106
EDUHSPRI3				0.148	0.211*
BLUE_CO				-0.168*	-0.121*
WHITE_CO				-0.069	-0.040
SPORT				0.121*	0.110*
CONS	1.053*	1.010*	0.801*	-2.127*	-2.297*
ALPHA	0.290*				
SIGMA			0.587*		
RHO			-0.615*		

* *significant at 5%*

are related to the kind of services that the duplicate insurance covers [7]. Results show that PRESSED has no impact on the number of visits.

We see that the previous general level of health (HEA0, PHYS) doesn't have any impact on the duplicate coverage, the reason is quite simple, if we suppose that, the health status is really bad you expect to go a lot to doctors, therefore, purchasing health insurance will be a good choice.

[7] Unfortunately these variables are only available for 2002, 2004, and 2006. So, we use the values of 2004 for PRESSED and PHYS

Generally, many of health problems are covered by the compulsory system, so, it is expected that HEA0 doesn't have any impact on DC, but this is not the case with PRESSED that is more related with the type of diseases that DC covers.

Finally, we discuss the impact of the likelihood of health shocks on DC, like in the case of the variables of the initial health status it is important take into account that, DC does not cover every kind of diseases, instead DC covers only small problems that are not covered by the compulsory system. PRI shows positive impact, because the head in the majority of the cases takes the decision of purchasing additional insurance. On other side, the negative impact of BLUE_CO is explained by the fact that duplicate coverage in Germany cover services like glasses and Blue collars are less exposed to such needs. The positive effect of SPORTS could be explained by the prediction that; intesive exercises lead to more health damage, which needs speciliazed healthcare, or that; DC might cover sport programms.

7. Discussion

Using count data models, the determinants of the demand for medical services as measured by the number of visits to physicians (general practitioners and specialists) in one quarter are estimated, the results show that the duplicate coverage have a positive impact in the demand for healths services, the acquisition of a duplicate coverage increase the number of visits. Our empirical results emphasize the importance of health status and the duplicate coverage insurance as determinants of health-care demand, and the higher importance of the income variables over the choice of duplicate coverage policies.

On the basis of the a count data model estimated using the FIML methodology we found enough evidence for reject the hypothesis of exogeneity in the choice of duplicate coverage respect to the use of health services.

Possible improves to this work can get it in two ways: i) by improving the quality of the variables representing the previous health (h_0) and ii) by implementing a ES model using a negative binomial distributions instead of the Poisson distribution that is used in this work.

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