The impact of supplementary private health insurance on the use of specialists in selected European countries

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September 2004, revised August 2005

Abstract

The aim of this paper is to use the European Community Household Panel (ECHP) to estimate the impact of private health insurance coverage on the use of specialist visits in four selected European countries that have systems which allow supplementary coverage: Ireland, Italy, Portugal and the UK. The central questions are whether access to private insurance encourages greater utilisation and whether it contributes to horizontal inequity in the use of specialists. Empirical analysis of this issue is complicated by the fact that the decision to take out voluntary health insurance is an individual choice that is likely to be influenced by risk selection. We compare different estimators to correct for this cause of endogeneity. The empirical results show that the probability of having private insurance increases with income and with better reported health. Private insurance has a positive association with the probability of specialist visits in all countries. The magnitude of the utilisation effect is sensitive to corrections for selection in two of the countries. These findings imply that private insurance contributes to 'pro-rich' horizontal inequity in the use of specialist visits.
JEL Classification: C35; I10; I11; G22
Keywords: health care utilisation; health insurance; equity; selection bias; treatment effects

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1. Introduction

Recently, a number of studies have reported that in many, if not all, European and OECD countries the probability of consulting a medical specialist is positively related to income, after controlling for differences in need for such services. Van Doorslaer, Koolman and Jones (2004) found a significant and substantial degree of pro-rich inequity in the probability of seeing a specialist for all European countries but did not explicitly examine the role and contribution of private insurance options in these countries. Van Doorslaer, Koolman and Puffer (2003) showed that the degree of such pro-rich inequity was reduced when private insurance coverage was controlled for, indicating that private insurance has a pro-rich contribution to inequity. This was confirmed in a study by Van Doorslaer, Masseria *et al* (2004) who estimated significant pro-rich contributions of private insurance coverage when decomposing the degree of inequity in the probability of a specialist visit in France, Ireland, Switzerland and the UK.

From a policy point of view, however, it is of critical importance to know whether, and to what extent, this insurance contribution is due to selection effects or to a direct utilisation effect or both. If the insurance effect were entirely due to self-selection of those more likely to use specialists, then private insurance coverage merely acts as a marker for such propensity and reducing private insurance options will not reduce the pro-rich distribution of care. If, on the other hand, the insurance effect is mostly due to the utilisation effect of increased coverage, then the expansion or reduction of private insurance options *will* have an impact on the degree to which care is distributed by income. Therefore, a central question becomes whether access to private insurance encourages greater utilisation or not. This may be due to:

- A *moral hazard effect;* that the level of utilisation is greater when insurance reduces the out-of-pocket price for health care (Pauly, 1968, Manning et al., 1987, Coulson et al., 1995, Chiappori et al., 1998).
- A *risk reduction effect*; that the desired level of utilisation is greater under the financial certainty created by insurance than under uncertainty (Meza, 1983, Vera-Hernández, 1999).
- An *income transfer effect;* that insurance creates an ex post transfer of income from the healthy to the ill and this may increase utilisation through an income effect on the demand for medical care (Pauly, 1968, Nyman, 1999a, Nyman and Maude-Griffin, 2001).
- Another dimension of the income effect is the *access effect;* that insurance may extend an individual's opportunity set by giving access to health care that would not otherwise be affordable to them. Nyman (1999b) has argued that the pooling effect of insurance provides

access to expensive medical technologies that would not be affordable out-of-pocket. In the context of supplementary private insurance in European systems, private insurance may provide access to a 'quality' of care that is not provided by the public system, for example offering reduced waiting times for elective surgery (see e.g., Jofre-Bonet, 2000).

All of these factors may encourage greater utilisation and they will be referred to collectively as the *insurance effect* on utilisation. We do not attempt to distinguish between the four factors in our empirical analysis of the insurance effect, but the relevance of each factor will depend on the specific health care system under investigation. For example, in a system where private insurance provides supplementary cover alongside a universal public system - that offers a basic package of services that are free at the point of use - the access effect may be the prime reason for increased utilisation among those with private cover (see e.g., Shmueli, 2001). Indeed, a study by Harmon and Nolan (2001) for Ireland finds that the most important reasons quoted by respondents for buying private health insurance were "being sure of getting into hospital quicker when you needed treatment" and "being sure of getting consultant care".

Our aim is to estimate the impact of private health insurance coverage on the use of specialist visits in four European countries that have systems which allow supplementary coverage and that have suitable data for our empirical methods available in the European Community Household Panel (ECHP): Ireland, Italy, Portugal and the UK.[1] This insurance can take the form of providing cover for services that are not available in the public system, including coverage for copayments charged in the public system. Mossialos and Thomson (2002) refer to this as 'complementary' insurance. Alternatively private insurance may supplement the public system by providing access to different services, such as increased amenities and reduced waiting time. Mossialos and Thomson (2002) refer to this as 'supplementary' insurance. As supplementary private insurance covers services that are also funded through the public system, this is sometimes known as 'double coverage' (see e.g., Vera-Hernández, 1999). Table 1 provides a summary of the kind of private insurance available and the estimates of its prevalence in each country. The table makes it clear that possession of private insurance may provide easier access to specialists in all of the countries under investigation. The demand for private insurance is likely to reflect factors that influence the demand for enhanced quality of care, which may include more immediate and responsive treatment.

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[1] There are more European countries with duplicate private insurance coverage but the relevant information contained in the ECHP was often insufficiently specific and/or tailored to national circumstances to enable empirical analysis (e.g. Spain).

Table 1: Coverage of complementary and supplementary private health insurance (sources: Mossialos and Thomson (2002) and Colombo & Tapay (2004))

	Complementary	Supplementary	% pop covered (Mossialos & Thomson, 2002)	% pop covered (Colombo & Tapay, 2004)
Ireland	Copayments for outpatient care	Care in private hospitals, consultants, private beds, some outpatient costs	42	43.8
Italy	Hospital convalescence, outpatient costs	Upgraded hospital accommodation, free choice of doctor, diagnostic services/specialist visits	5	15.6
Portugal		Cash benefits for hospital care, total coverage for other treatments, free choice of doctor or hospital	10	14.8
UK	Dental care, alternative therapies	Upgraded hospital accommodation, cash benefits, private beds, care in private hospitals	11.5	10

Empirical analysis of international differences in the impact of private insurance on use of specialists is complicated by the fact that the decision to take out voluntary health insurance is an individual choice that is likely to be influenced by unobservable individual characteristics, such as the individual's level of 'risk'. This may give rise to *adverse selection* where those with higher risk are more likely to take out private health insurance and to make more use of health care (Van de Ven, 1987, Coulson et al., 1995, Ettner, 1997, Chiappori et al., 1998). It may also create an incentive for *risk selection* (or cream skimming) where private insurers attempt to attract good risks to their policies and to avoid bad risks (Coulson et al., 1995, Ettner, 1997). Shmueli (2001) provides empirical evidence of the offsetting effects of adverse selection and risk selection by insurers on the ownership of supplementary insurance in Israel: sicker individuals are more likely to apply for insurance but also more likely to be rejected, such that there are no health effects in the reduced form for ownership of supplementary insurance.

In the United States, the RAND Health Insurance Experiment took an experimental approach to deal with the problem of selection, with participants randomised to different insurance plans (Manning et al., 1987). Chiappori et al. (1998) were able to exploit a quasi- or natural experiment in which French insurees faced an exogenous change in levels of copayment. With the ECHP we have to rely on non-experimental data and follow the general approaches for dealing with endogeneity of earlier studies (see e.g., Cameron *et al.*, 1988; Coulson *et al.*, 1995; Holly *et al.*, 1998; Vera-Hernández, 1999; Schellhorn, 2001; and Buchmueller *et al.,* 2004).

The aim is to separate the *insurance effect* from the *selection effect*. The problem of distinguishing adverse selection from moral hazard in observational data is well known and presents a severe challenge, particularly with cross section data (see e.g., Chiappori, 2000; Geoffard, 2006). Our approach is to compare a variety of empirical methods for estimating casual effects in the presence of selection bias and see whether they provide robust estimates under different identifying assumptions. Our empirical strategy exploits the longitudinal data available in the ECHP and estimates the partial effect of ownership of private insurance on the probability of using specialist care by a variety of methods: a standard probit model, propensity score matching (PSM) and a recursive structural model for binary measures of health insurance and specialist visits using full-information maximum likelihood (FIML).

2. Econometric strategies

Our empirical methods are based on binary variables for whether an individual (*i*) has private health insurance during year t (y_{it}^1) and whether they have visited a specialist at least once during the last year (y_{it}^2). To gain statistical power we pooled the waves and computed robust standard errors by clustering on the individual, this allows for the repeated measurements on each individual. We use a standard probit model to provide benchmark estimates of the insurance effect, that do not allow for self-selection. Then we compare estimators based on two different identification strategies: 'selection on observables' and 'selection on unobservables'.

2.1 Simple probit model

Our baseline estimate is given by the partial effect of private health insurance in a simple probit model for at least one visit to the specialist. As well as insurance coverage, the model for any specialist visit conditions on a set of individual characteristics (*x*) including a constant equal to one which are described in more detail in Section 3 below. So,

$$P(y_{it}^2 = 1 \mid y_{it}^1, x_{it}) = \Phi(\gamma y_{it}^1 + \beta' x_{it})$$

where $\Phi(.)$ is the standard normal distribution function. The average partial effect (APE) of insurance on specialist visits (the '*insurance effect*') is computed by taking the sample mean of the partial effect (PE) for each individual observation. The partial effect is,

$$PE_i = \Delta P(y_{it}^2 = 1 | y_{it}^1, x_{it}) / \Delta y_{it}^1 = \Phi(\gamma + \beta' x_{it}) - \Phi(\beta' x_{it})$$

Then the average partial effect (APE) is given by the mean across the sample observations,

$$APE = \frac{1}{nT} \sum_i \sum_t \Delta P(y_{it}^2 = 1 | y_{it}^1, x_{it}) / \Delta y_{it}^1 = \frac{1}{nT} \sum_i \sum_t \{\Phi(\gamma + \beta' x_{it}) - \Phi(\beta' x_{it})\}$$

As well as reporting the average effect, the availability of individual-specific partial effects allows us to explore heterogeneity in the effect across individuals, for example, by displaying a histogram of the effects.

2.2 Propensity score matching (PSM)

Matching addresses the problem that in the observed data confounding factors (matching variables) are non-randomly distributed over the treated and control individuals. Rosenbaum and Rubin (1983) showed that, rather than matching on an entire set of observable characteristics, the dimensions of the problem could be reduced by matching on the basis of their probability of receiving treatment, $P\left(y_{it}^1 = 1 | x_{it}, z_{it}\right)$, known as the *propensity score*. With one-for-one matching of cases and controls those observations that are selected as controls effectively get a weight of one while those that are not get a weight of zero. In practice the estimators do not rely on exact matching and instead weight observations by their proximity, in terms of their propensity score.

We construct the propensity scores using a probit model for private and use predicted probability of treatment,

$$P_{it} = \Phi(\alpha' x_{it} + \varphi' z_{it})$$

We match treated individuals with non-treated individuals inversely weighted for the distance in terms of propensities, $\{\hat{P}_{it} - \hat{P}_{jt}\}$. More precisely, weights are constructed using kernel smoothed distance weighting. The Epanechnikov kernel is used as it is computationally convenient and efficient. All cases were supported by controls. The quality of the matching can be assessed by computing the reduction of the pseudo R-squareds of the private insurance regression before and after matching (Table A2). To evaluate the extent to which matching on propensity scores balances the distribution of the *x*'s between the insured and the uninsured group, we computed the bias reduction due to matching for each of the *x*'s (Table A3).

Following the matching we use the relative weights of the treated and controls to compute the treatment effect (TE) as the weighted mean difference in the probability of at least one specialist visit between the two groups. It should be noted that an important requirement is that the participation model, used to construct the propensity score, should only include variables that are unaffected by participation, or the anticipation of participation (Heckman, LaLonde and Smith, 1999). This suggests that matching variables should be either time invariant characteristics or variables that are measured before participation in the treatment and that are not affected by anticipation of participation.

2.3 The FIML estimator

The approaches described above rely on the notion of selection on observables. In contrast, selection on unobservables, also termed informative, non-random or non-ignorable selection, is familiar in the econometrics literature where the dominant approaches follow the instrumental variables and the sample selection or control function approaches (Heckman, 1976). These approaches typically rely on there being "instruments" (w) that are good predictors of the endogenous treatment and that satisfy an exclusion restriction: that they do not have a direct effect on the outcome of interest.

Here we adopt a structural approach with full information maximum likelihood estimation, based on FIML estimates of a recursive bivariate probit model. The first issue in specifying a structural model for insurance and specialist visits is how to specify a coherent econometric model that allows for the potential endogeneity of insurance. A similar question is addressed by Windmeijer and Santos Silva (1997), who use data from the 1991 British Health and Lifestyle Survey to investigate nonlinear simultaneous equations models for GP visits in which self-assessed health is treated as an endogenous binary regressor. They adopt Blundell and Smith's (1993) framework, and compare type I and type II specifications. In the type II model, recorded health status is assumed to influence GP visits. In the type I model it is the latent health index that influences the number of visits. The coherency conditions for the type II model imply that the model is only logically consistent when it is specified as a recursive system. In other words, the type II specification can only be coherent when the endogeneity of self-assessed health stems from unobservable heterogeneity bias rather than classical simultaneous equations bias.

In our application a type II specification makes more sense than a type I specification: we want to identify the impact of *actually having* private insurance on specialist visits rather than the impact of the propensity to have insurance. For this reason we adopt a recursive model in which insurance coverage during the year is assumed to influence the probability of a specialist visit during the subsequent year. This exploits the longitudinal data available in the ECHP. The chronology of events means that the use of specialist visits cannot have a direct feedback effect on the decision to take out insurance in the previous year, thus ruling out simultaneity bias. Insurance may still be an endogenous regressor due to unobservable heterogeneity, such as an individual's level of risk or risk aversion, that has a direct influence on both their decision to take out insurance and their use of health care in the subsequent wave. This unobservable heterogeneity can be captured by using a bivariate probit specification.

The bivariate probit model applies to a pair of binary dependent variables and allows for correlation between the corresponding error terms. In our application, the use of specialist visits is modelled as a recursive bivariate probit model (see e.g., Maddala, 1983 p.123; Holly et al., 1998; Waters, 1999; Greene, 2000 p.852; Buchmueller et al., 2004). The model consists of two latent variable equations for insurance and specialist visits:

$$y_{it}^{*1} = \alpha' x_{it} + \eta' w_{it} + \varepsilon_{it}^{1}$$

$$y_{it}^{*2} = \gamma y_{it}^{1} + \beta' x_{it} + \varepsilon_{it}^{2}$$

where,

$$(\varepsilon^1,\varepsilon^2) \sim N(0,\Omega)$$

and,

$$y^j = 1 \quad \text{iff } y^{*j} > 0$$
$$= 0 \quad \text{otherwise}$$

Our identification strategy relies on the fact that we are modelling sequential decisions. Estimation of the model by FIML, taking account of the joint distribution of ε^1 and ε^2 deals with the endogeneity of y^1 (see Holly et al., 1998, Greene, 2000 p.852). The log-likelihood for the model is,

$$\log L = \sum_{i=1}^{n}\sum_{t=1}^{T} \Phi\{d_{it}^{1}(\alpha' x_{it} + \eta' w_{it}), d_{it}^{2}(\gamma y_{it}^{1} + \beta' x_{it}), d_{it}^{1} d_{it}^{2}\rho\}$$

where $\Phi[.]$ is the bivariate normal CDF, $d^j = 2y^j - 1$ and ρ is the coefficient of correlation between ε^1 and ε^2. The asymptotic t-ratio for the estimate of ρ provides a test for exogeneity.

The partial effects of insurance in this model can be computed from the marginal distribution for specialist visits, using the same formula as the univariate probit, but with the parameter estimates from the bivariate probit model.

Wilde (2000) shows that, given the full rank of the regressor matrix, it is only necessary to have varying exogenous regressors to avoid identification problems in this recursive bivariate probit model and exclusion restrictions are not required. However it is common practice to impose exclusion restrictions to improve identification. We add lagged information for each household on whether at least one individual's employer provides free or subsidized health care or medical insurance to the model for insurance coverage. According to Mossialos and Thomson (2002), group contracts now account for almost all voluntary health insurance policies in Portugal, well over two-thirds in Ireland and Italy and more than 50% of voluntary health insurance subscriptions in the UK. Previous studies have included the price of insurance as a predictor of choice of insurance (see e.g., Cameron and Trivedi, 1991, p.18). Price cannot be measured directly in our data but institutional differences in access to private insurance, in particular whether the respondent's employer offers access to insurance, provide a proxy for the cost of acquiring insurance.[2]

3. Data and variable definitions

The data used in this paper are taken from the the *European Community Household Panel User Database* (ECHP-UDB). The ECHP was designed and coordinated by Eurostat, the European Statistical Office and is a standardised multi-purpose annual longitudinal survey carried out at the level of the European Union (see e.g., Peracchi, 2002). The survey is based on a standardised questionnaire that involves annual interviewing of a representative panel of households and individuals of 16 years and older in each of the participating EU member states. It covers a wide range of topics including demographics, income, social transfers, health, housing, education and employment. The first wave was conducted in 1994, Austria was added to the second wave in 1995, and Finland to the third in 1996. The analysis presented in this paper is based on information for Ireland, Italy, Portugal, Spain and the UK for the first four waves, 1994-97, when insurance data are available.

2 Vera-Hernández (1999) uses measures of social class and occupation as instruments for insurance choice. In his analysis of Swiss data Schellhorn (2001) uses measures of the availability of supplementary insurance cover and of differences in premium levels between cantons as instruments. Buchmueller et al. (2004) use an indicator for public employees along with measures of labour market and occupational status.

Our binary indicator of private insurance coverage is based on question PH013 which asks whether the respondent is covered by private medical insurance. Our measure equals 0 if they are not insured and 1 if they covered in their own name or through another family member at both the beginning and the end of the year in question.[3] Our binary indicator of specialist visits is based on question PH009 which asks for the number of times the person has consulted a specialist over the past 12 months[4].

We have followed previous studies of the demand for health insurance (e.g., Propper, 1989; Cameron and Trivedi, 1991; Rhine and Ng, 1998; Shmueli, 2001) and health care (e.g., Cameron et al., 1988; Pohlmeier and Ulrich, 1995; Hakkinen et al., 1996; Gerdtham, 1997; Vera-Hernández, 1999; Harmon and Nolan, 2001; Schellhorn, 2001; Buchmueller *et al.,* 2004; Rodríguez and Stoyanova, 2004) in selecting a set of explanatory variables from the information available in the ECHP. The variables that are common to both the insurance and the specialist visits equation include the logarithm of equivalised household income, indicators of the respondent's education, gender, age, activity, marital and health status. Health status is measured by self-assessed health, on a 5-point categorical scale from very bad to very good, and by whether and to what degree the respondent is hampered in their daily activities by a physical or mental health problem, illness or disability.

Our income measure is the log of disposable household income per equivalent adult, using the modified OECD equivalence scale. This scale gives a weight of 1.0 to the first adult, 0.5 to the second and each subsequent person aged 14 and over, and 0.3 to each child aged under 4 in the household. Total household income includes all the net monetary income received by the household members during the reference year. It includes income from work (employment and self-employment), private income (from investments and property and private transfers to the household), pensions and other direct social transfers received. In the income measure available in the ECHP-UDB, no account has been taken of indirect social transfers (e.g. reimbursement of medical expenses), receipts in kind and imputed rent from owner-occupied accommodation. Education is measured by the highest level of general or higher education completed and is available at three levels: recognised third level education (ISCED 5-7), second stage of secondary

[3] There was an important change in the wording of this question between wave 1 in 1994 – Are you medically insured, either in your own name or through another family member? – and wave 2 in 1995 – Are you (also) covered by private medical insurance, whether in your own name or through another family member? [0]

[4] Information is available in the ECHP on the total number of visits to a specialist during the year. Our binary measure can be thought of as the first part of a 'two-part' model of utilisation. Van Doorslaer *et al.* (2004) estimate reduced form versions of a two-part model for specialist visits, that do not include a measure

level of education (ISCED 3) and less than second stage of secondary education (ISCED 0-2). The ECHP coding is based on the pre-1997 ISCED.

Table 2 presents sample sizes and descriptive statistics for some of the key variables. The 'eligible sample' size includes all eligible cases. The 'analysis sample' is the selection of the eligible cases without missing values for any of the variables used in any of the models. The means for current insurance coverage, and coverage throughout the past year - show that the proportion of people with private insurance coverage is fairly stable over the waves. The difference between current coverage and coverage over the whole year shows that - in Italy and Portugal– substantial proportions of respondents are reported as switching during the year. The highest penetration of private insurance is in Ireland and the lowest is in Italy. The prevalence of at least one specialist visit during the year is fairly similar on average, with Ireland lower (21% on average) than the other countries (31-37%). The final column shows that the prevalence of employer provided health benefits to at least one household member, is higher — often much higher — than the prevalence of actual individual PI cover reported in all countries except Ireland.

Table 2: Descriptive statistics for key variables

			Sample proportion with:			
	Eligible Sample	**Analysis Sample**	**Specialist visit last year**	**Private cover now**	**Private cover now and last year**	**Employer provided health benefits**
Ireland	14355	7714	0.21	0.48	0.44	0.23
Italy	34330	19016	0.37	0.06	0.03	0.20
Portugal	23327	13445	0.34	0.10	0.04	0.19
UK	6940	3332	0.31	0.22	0.17	0.36

4. Results

Before considering the regression results, some diagnostic tests are reported in the Appendix. Table A1 shows the pseudo R-squareds for the model we use to estimate the propensity scores before and after matching (the weighted model). Even though the pseudo R-squareds reduce dramatically when the cases are IP-weighted, the LR-based chi-squared test shows that the combination of variables remains significant in all countries but the UK. This imbalance can be studied in more detail by looking at the bias (unbalance) between the treated and the non-treated in the distribution of the covariates (definitions given in Table A2). Table A3 shows that the percentage bias reduction

of private insurance. They find that most of the pro-rich inequity in the use of specialists is attributable to the is often substantial, but varies considerably between the covariates and is frequently not close to 100%. As a result, residual confounding may remain an issue.

The results for the *insurance effect* on utilization are presented as the average partial effect (APE) of private insurance coverage on the probability of a specialist visit, in Table 3. We also present the histograms of individual PE's in Figure 1 to provide an indication of the individual heterogeneity in these effects and the shifts in their distributions across different estimators. We compare simple binary probit models for the probability of a specialist visit with propensity score matching weighted estimates and FIML estimates of the bivariate probit model.

Insurance choice

All countries show a positive income effect on the probability of having private insurance and these estimates are highly statistically significant (see Tables A5 and A6)[5]. This finding has implications for equity in the use of health care. In the health economics literature horizontal inequity in the use of health care has typically been measured by concentration indices (see e.g., Wagstaff and van Doorslaer, 2000, van Doorslaer, Koolman and Jones, 2004). Wagstaff *et al.* (2002) present methods for decomposing concentration indices to give the contribution of explanatory factors, such as health insurance. The contribution of a factor depends on the product of the elasticity of health care with respect to the factor and the concentration index for the factor itself. In turn, the sign of this concentration index depends on the covariance between the factor and an individual's relative rank in the distribution of income. So, a positive elasticity of specialist visits with respect to insurance, coupled with a positive covariance between insurance and income rank, will imply that insurance contributes to 'pro-rich' inequity in the use of specialist visits.

Previous studies have tended to find only limited evidence of a relationship between observed health status and choice of supplemental private insurance and not to find support for the existence of adverse selection (Cameron et al., 1988, Cameron and Trivedi, 1991, Ettner, 1997, Hurd and McGarry, 1997, Vera-Hernández, 1999). This is borne out in our results. There are statistically significant effects of self-assessed health in Ireland and of being hampered by health problems for Italy, Portugal and Spain. But the striking thing about the estimated effects is that we find that, in general, those in poorer health are *less* likely to have insurance. This contradicts the notion of adverse selection effects, with respect to health indicators that are observed in the survey, which would suggest the opposite finding. Of course the existence of adverse selection would rely on

probability of contact rather than the number of visits.

these indicators of health being known to the respondent but not their insurer. The result may reflect the fact that selection of good risks by insurers (probably through employment) more than offsets adverse selection (Shmueli, 2001). Employer-offered health benefits, has a statistically significant positive effect on private insurance for all countries. When it was included in the specialist equation, it was never significant (not shown).

Specialist visits

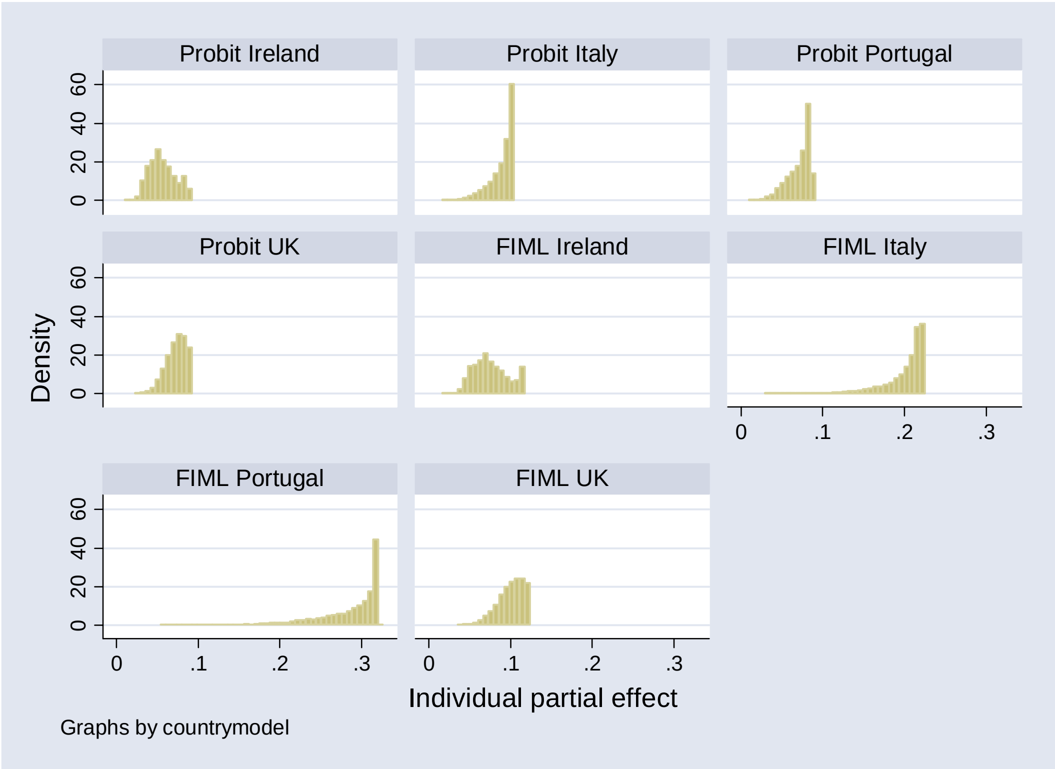
The full results for the specialist visits equations are given in Tables A4 and A5 in the Appendix. Table 3 provides a summary or the estimated average partial effect (APE) of insurance on the probability of using a specialist. The first column of Table 3 shows the (pooled) binary probit estimates of the partial effect of insurance on the probability of a specialist visit, which do not allow for the endogeneity of insurance. For ease of comparison, bootstrapped standard errors of the APEs were generated for all methods using identical bootstrap procedures. These procedures incorporate the entire estimation procedure, i.e. both the private insurance equation and the specialist visit equation when applicable. The bootstrapping itself entails 50 random draws with replacement (resamples) from the sample, where each resample has a size equal to the sample. The APE was computed for each of the resamples, and the distribution of the 50 APEs was used to compute standard deviation. These standard deviations were then used to construct t-values. All countries show a significantly positive partial association between the ownership of private insurance and the probability of a specialist visit. The probability of visiting a specialist among those who report to have had private insurance cover both at the beginning and the end of last year is, on average, about 7% higher than among those without cover, with estimates ranging from 0.05 in Ireland to 0.09 in Italy.

Table 3 Estimates of the average partial effect (APE) of insurance on the probability of visiting a specialist *(t-values in parentheses based on bootstrapped standard errors)*

	Probit	FIML	PSM
	0.056	0.076	0.068
Ireland	(5.17)	(2.51)	(5.71)
	0.090	0.199	0.124
Italy	(4.06)	(1.80)	(4.38)
	0.072	0.283	0.041
Portugal	(3.26)	(2.92)	(1.67)
	0.073	0.100	0.058
UK	(3.38)	(1.54)	(2.18)

[5] The full results for all of the equations and each country are presented in the Appendix. This paragraph refers in particular to the insurance equation in the FIML estimates.

Figure 1 Histograms of individual partial effects (PE's) of insurance on the probability of visiting a specialist for probit and FIML estimates



When comparing propensity score matching to the default probit results, we see that Ireland and Italy show stronger insurance effects and Portugal and the UK smaller effects. The FIML estimates, however, show a very different picture. For all countries, it provides a higher estimate of insurance than the probit. These estimates suggest that, because of positive selection, the unadjusted insurance effect *under*estimates the utilisation effect occurring as a result of private insurance coverage. This positive selection (on unobservables) could be the result of occupational choice or – what is more likely – be a consequence of cream-skimming by insurers through the employment-tied group insurance purchases. While, on average, the insured are lower risk, once they are insured they do seem to exploit their additional coverage through increased use of specialist care. The increase in the insurance effect is more important in Italy and Portugal, where it doubles or triples the probit effect, than in the UK and Ireland, where it is only about 50% higher.

As a result, the pro-rich contribution of private insurance to income-related inequality in specialist use in these countries is understated when no account is taken of endogeneity. The FIML estimates for Ireland and, in particular, the UK are much closer to the probit estimates, suggesting that selection bias is less prevalent there. As a result, the pro-rich contribution of the private insurance effect does not differ very much form the contribution of the utilisation effect.

5. Conclusion

In this paper we have used the European Community Household Panel (ECHP) to estimate the impact of private health insurance coverage on the use of specialist visits in four European countries that allow for supplementary private insurance coverage: Ireland, Italy, Portugal and the UK. The evidence suggests that the probability of having private insurance increases with income and, to some extent, with better health. For all countries there is a positive insurance effect on the use of specialists. The fact that the probability of having private insurance increases with income, coupled with the fact that having private insurance increases the probability of seeing a specialist means that private insurance contributes to 'pro-rich' inequality in the use of specialists.

For policy purposes, however, it is of relevance to know to what extent this insurance effect is a result of selection, and to what extent it represents a genuine utilisation effect of additional cover. If it is entirely driven by selection, changing the options and rules for private insurance coverage will not alter the degree to which the use of specialists is related to income. If, on the other hand, the insurance effect is mostly a direct effect on utilisation, then expansion or reduction of PI coverage (through tax or other incentives) will have a substantial effect on the distribution of specialist care by income.

The answer to this important question depends on the econometric strategy adopted. The probit and PSM estimators, which are not systematically different and give, for all countries, somewhat similar answers. When adopting the alternative strategy, i.e. to try and control for selection on unobservables using the FIML approach, a very different picture emerges. The utilisation effect turns out to be substantially *larger* than the (partial) effect in the probit equation in all of the countries, but the increase appears larger in the two mediterranean countries (Italy and Portugal) than Ireland and the UK. These results would suggest the utilisation effect is even somewhat larger than the insurance effect in the UK and Ireland, and much larger even in Italy and Portugal. These findings suggest that expansion or reduction of private insurance will, through its effects on utilisation, have an important effect on the degree to which specialist care gets distributed by income. The results also appear consistent with the observation that private insurance is often obtained as a (group) fringe benefit in certain employment contracts. While, for insurers, this results in a fair degree of – deliberate or undeliberate – cream-skimming, our analysis does show that, once insured, the beneficiaries are more likely to consult a medical specialist than they would have done in the absence of such coverage. As a result, our findings suggest that the presence of supplementary private coverage has consequences for the degree of horizontal inequity in the use specialist visits. Private insurance is not simply a marker of a higher propensity to consume specialist care but induces additional use over and above what would be used in the absence of such cover.

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Appendix: Diagnostic and regression results by country

TABLE A1: SUMMARY PSM BALANCING TEST

	Pseudo R2	Chis2	p>chi2
Ireland	0.251	2658.8	0.000
	0.007	75.9	0.000
Italy	0.138	645.5	0.000
	0.031	805.3	0.000
Portugal	0.123	503.8	0.000
	0.027	497.9	0.000
UK	0.127	386.6	0.000
	0.002	8.3	0.998

TABLE A2: DEFINITIONS OF VARIABLES

Variable name	Definition
specialist	1 if visited a specialist, 0 otherwise
private insurance	1 if privately insured, 0 otherwise
age2635	1 if age between 26 and 36, 0 otherwise
age3645	1 if age between 36 and 46, 0 otherwise
age4655	1 if age between 46 and 56, 0 otherwise
age5665	1 if age between 56 and 66, 0 otherwise
age66plus	1 if age older than 66, 0 otherwise
male	1 if male, 0 if female
sahgood	1 if self assessed health is good, 0 otherwise
sahfair	1 if self assessed health is fair, 0 otherwise
sahbad	1 if self assessed health is bad, 0 otherwise
sahvbad	1 if self assessed health is very bad, 0 otherwise
hampsome	1 if hampered to some extend, 0 otherwise
hampsev	1 if severely hampered, 0 otherwise
selfemploy	1 if self employed, 0 otherwise
student	1 if student, 0 otherwise
unemployed	1 if unemployed or inactive, 0 otherwise
retired	1 if retired, 0 otherwise
housework	1 if housekeeping, 0 otherwise
separated	1 if separated, 0 otherwise
divorced	1 if divorced, 0 otherwise
widowed	1 if widowed, 0 otherwise
never married	1 if never married, 0 otherwise
ln(eqhhinc)	log modified OECD equivalised household income
secondary educ	1 if second stage of secondary education, 0 otherwise
tertiary educ	1 if tertiary education, 0 otherwise
IV	1 if employer provided health care benefits to household member, 0 otherwise
variablenameL	value of variable of preceding year

TABLE A3: PSM BALANCING TEST

		Ireland		Italy		Portugal		UK	
		% bias	% bias reduction	% bias	% bias reduction	% bias	% bias reduction	% bias	% bias reduction
age2635	Unmatched	-7		3.4		7.8		-8.4	
	Matched	-2.1	70.4	3	11.7	3.6	53.6	0.1	98.8
age3645	Unmatched	20.6		29.8		25.4		12.3	
	Matched	2.6	87.3	10	66.6	7.5	70.6	-2.2	82
age4655	Unmatched	21.4		1.1		-0.9		12.4	
	Matched	0.9	95.9	1.8	-65.9	-1.4	-44.8	2.3	81.9
age5665	Unmatched	4.2		0.2		-16.7		5.5	
	Matched	3.6	13.5	-1.4	-627.1	-5.9	64.8	1.5	73
age66plus	Unmatched	-13.4		-8.5		-30.7		-8.5	
	Matched	4.4	67.2	-2.7	68	-11.9	61.3	1.3	85
male	Unmatched	-6.3		28.9		21		7.9	
	Matched	-10.2	-63	10.8	62.6	8.3	60.8	-0.2	97.5
sahgood	Unmatched	-3.3		8.4		14.8		3.7	
	Matched	0.3	92.3	1.9	77.6	5.4	63.4	-0.7	80.7
sahfair	Unmatched	-13.7		-8		1		-16.8	
	Matched	-0.5	96.7	-2.7	65.9	0.5	51.5	-0.1	99.7
sahbad	Unmatched	-14.1		-13.7		-23.7		-15.5	
	Matched	-1.2	91.4	-5.6	59.2	-8.8	62.9	0.1	99.1
sahvbad	Unmatched	-5.1		-2.7		-7.1		NA	
	Matched	1.7	66.1	-0.9	67.6	-2.4	65.6	NA	NA
hampsome	Unmatched	-11		-5		-6.8		-6.1	
	Matched	0.4	96	-2.1	58.7	-1.3	80.3	1.1	82.4
hampsev	Unmatched	-10.2		-4.8		-15.6		-14.8	
	Matched	-0.7	93	-2	58	-6.3	59.6	-0.3	97.7
selfemploy	Unmatched	6		53.3		-12.4		-3	
	Matched	-8.9	-48.4	14.2	73.3	-4	68.2	0.2	93
student	Unmatched	0.6		-24.3		2.7		-17.1	
	Matched	-4.8	-764.3	-9.3	61.7	2.9	-8.9	-1.1	93.5
unemployed	Unmatched	-35.3		-30.1		-27.2		-19.3	
	Matched	-1	97.2	-12.9	57.1	-10.5	61.2	-0.2	98.7
retired	Unmatched	-1.1		-8.7		-28.8		-6.9	
	Matched	4.8	-352.2	-1.7	80.9	-11.2	61.1	-1.6	77.5
housework	Unmatched	-11.1		-33.3		-31.1		-2.6	
	Matched	9.7	12.8	-12.6	62.3	-12.8	59	4	-53.3
separated	Unmatched	-6.7		5.2		2.3		-12.1	
	Matched	2.1	68.2	1.2	77.6	2.3	1.9	-0.5	95.7
divorced	Unmatched	-5.2		6		5.6		-11.7	
	Matched	0.3	93.5	0.8	86.5	-0.2	96.5	-1.5	86.8
widowed	Unmatched	-14.3		-9		-26.7		-17.1	
	Matched	-0.2	98.8	-3.2	64.5	-10.4	61.1	-0.9	95
never married	Unmatched	-41.2		-32.1		-14.3		-21	
	Matched	-10.3	74.9	-13	59.6	-4.7	67.4	-6.3	70
ln(eqhhinc)	Unmatched	83.6		79.2		76.3		70.8	
	Matched	-0.4	99.5	30.1	62	23.5	69.1	0.8	98.9
secondary educ	Unmatched	21.5		30.9		19.7		2.8	
	Matched	-1.7	92.2	14.4	53.4	10.6	46.4	0.6	76.8
tertiary educ	Unmatched	56.7		33		55.6		39.1	
	Matched	0.9	98.4	8.5	74.2	4.8	91.5	0.9	97.6

TABLE A4: SPECIALIST CONTACT PROBIT REGRESSION COEFFICIENTS

	Ireland		**Italy**		**Portugal**		**UK**	
	coefficient	t-value	coefficient	t-value	coefficient	t-value	coefficient	t-value
private insurance	0.218	5.40	0.257	4.31	-0.034	-0.77	0.222	3.43
age2635	-0.051	-0.75	-0.087	-2.25	0.000	-0.01	-0.204	-2.02
age3645	-0.187	-2.44	-0.151	-3.38	-0.067	-1.35	-0.286	-2.65
age4655	-0.157	-1.98	-0.137	-2.98	-0.080	-1.54	-0.270	-2.39
age5665	-0.241	-2.72	-0.147	-2.76	-0.166	-2.99	-0.155	-1.23
age66plus	-0.441	-3.68	-0.253	-3.44	-0.175	-2.84	-0.220	-1.15
male	-0.245	-6.01	-0.456	-20.77	-0.346	-14.82	-0.237	-4.66
sahgood	0.327	8.50	0.308	11.17	0.463	17.92	0.239	4.30
sahfair	0.944	15.70	0.596	18.44	1.055	29.07	0.662	9.13
sahbad	1.267	9.58	1.286	20.45	1.276	21.48	0.872	5.35
sahvbad	1.309	5.19	1.251	6.65	1.366	14.79	NA	NA
hampsome	0.616	9.77	0.508	9.93	0.653	15.38	0.523	6.88
hampsev	0.352	2.95	0.466	5.12	0.615	10.21	1.110	6.61
selfemploy	-0.021	-0.32	-0.054	-1.37	-0.080	-2.58	-0.165	-1.61
student	-0.092	-0.84	0.082	1.79	-0.169	-2.03	0.171	0.89
unemployed	0.017	0.22	-0.032	-0.78	0.023	0.52	0.061	0.47
retired	0.313	3.17	0.097	2.16	0.238	5.81	-0.016	-0.12
housework	-0.052	-0.94	-0.002	-0.05	0.041	1.18	0.005	0.06
separated	-0.136	-0.97	-0.140	-1.54	-0.188	-1.33	-0.449	-1.86
divorced	-0.642	-1.01	0.083	0.71	0.044	0.55	0.072	0.75
widowed	-0.310	-2.98	-0.133	-2.11	-0.202	-5.43	-0.448	-2.57
never married	-0.220	-3.91	-0.318	-9.84	-0.483	-13.60	-0.200	-2.55
ln(eqhhinc)	0.133	4.22	0.176	10.76	0.151	10.53	0.189	4.36
secondary educ	0.034	0.84	0.173	7.82	0.085	3.13	0.053	0.94
tertiary educ	0.117	2.09	0.213	5.46	0.091	2.73	0.156	2.36
_cons	-2.053	-7.91	-1.992	-13.03	-2.565	-13.11	-2.207	-6.02

TABLE A5: FIML REGRESSION COEFFICIENTS

	Ireland		Italy		Portugal		UK	
	coefficient	t-value	coefficient	t-value	coefficient	t-value	coefficient	t-value
specialist								
private insurance	0.294	2.18	0.561	1.76	0.826	2.97	0.303	1.68
age2635	-0.049	-0.67	-0.087	-2.09	0.034	0.71	-0.204	-2.00
age3645	-0.197	-2.34	-0.154	-3.18	0.047	0.90	-0.290	-2.65
age4655	-0.169	-1.95	-0.137	-2.74	0.032	0.58	-0.274	-2.40
age5665	-0.248	-2.61	-0.147	-2.56	-0.073	-1.16	-0.157	-1.24
age66plus	-0.442	-3.19	-0.252	-3.05	-0.145	-1.77	-0.222	-1.10
male	-0.242	-5.44	-0.459	-19.00	-0.476	-16.68	-0.238	-4.65
sahgood	0.328	8.39	0.308	10.90	0.380	4.86	0.239	4.31
sahfair	0.946	14.79	0.595	17.50	0.743	9.06	0.663	9.16
sahbad	1.269	9.38	1.286	19.60	1.006	10.71	0.874	5.40
sahvbad	1.311	5.39	1.249	6.61	1.227	9.46		
hampsome	0.617	8.99	0.507	9.41	0.411	8.69	0.523	6.79
hampsev	0.353	2.80	0.465	4.86	0.462	6.98	1.113	6.84
selfemploy	-0.024	-0.34	-0.073	-1.60	-0.023	-0.50	-0.163	-1.60
student	-0.110	-0.96	0.081	1.65	0.021	0.33	0.167	0.87
unemployed	0.020	0.26	-0.033	-0.77	0.057	1.17	0.061	0.50
retired	0.310	2.73	0.099	2.02	0.167	2.71	-0.015	-0.11
housework	-0.050	-0.83	-0.002	-0.05	-0.011	-0.21	0.002	0.03
separated	-0.119	-0.76	-0.139	-1.51	-0.098	-0.81	-0.442	-1.89
divorced	-0.623	-1.34	0.077	0.57	-0.031	-0.30	0.081	0.86
widowed	-0.297	-2.28	-0.132	-1.81	-0.225	-3.54	-0.438	-2.33
never married	-0.207	-3.18	-0.313	-8.80	-0.201	-4.84	-0.194	-2.41
ln(eqhhinc)	0.117	2.78	0.170	9.01	0.272	11.53	0.179	3.72
secondary educ	0.019	0.37	0.168	6.69	0.228	5.14	0.049	0.85
tertiary educ	0.089	1.17	0.203	4.51	0.336	4.70	0.148	2.17
_cons	-1.946	-5.98	-1.938	-11.14	-4.410	-13.89	-2.134	-5.31
private insurance								
age2635	-0.111	-1.27	0.150	1.19	-0.253	-2.89	0.223	1.48
age3645	0.454	4.59	0.299	2.20	-0.134	-1.45	0.498	3.27
age4655	0.624	6.09	0.173	1.23	-0.330	-3.11	0.506	3.20
age5665	0.429	3.83	0.217	1.39	-0.436	-3.64	0.518	2.98
age66plus	0.150	1.01	0.171	0.83	-0.723	-3.40	0.592	2.25
male	-0.106	-2.07	0.165	2.86	0.153	2.83	0.026	0.42
sahgoodL	-0.057	-1.43	-0.097	-1.52	0.147	1.41	0.001	0.02
sahfairL	-0.149	-2.04	-0.044	-0.55	0.141	1.20	-0.208	-2.05
sahbadL	-0.354	-2.12	-0.458	-2.31	0.003	0.02	-0.423	-1.57
sahvbadL	-0.370	-1.21	-0.099	-0.29	-0.288	-0.82		
hampsomeL	-0.009	-0.11	0.203	1.76	0.235	2.21	0.003	0.03
hampsevL	0.015	0.09	0.112	0.49	0.285	1.90	-0.182	-0.70
selfemployL	0.276	3.43	0.796	11.47	-0.177	-1.66	0.101	0.80
studentL	1.160	10.44	0.004	0.02	0.002	0.01	0.464	1.88
unemployedL	-0.587	-5.08	-0.183	-1.33	-0.294	-2.49	-0.465	-1.37
retiredL	0.145	1.19	-0.202	-1.57	-0.280	-1.65	0.169	0.86
houseworkL	-0.070	-1.06	-0.124	-1.17	-0.440	-2.80	0.175	1.68
separatedL	-0.858	-5.29	-0.137	-0.70	0.018	0.08	-0.554	-1.93
divorcedL	-0.728	-1.51	0.210	0.94	-0.005	-0.03	-0.588	-4.70
widowedL	-0.613	-4.42	-0.028	-0.14	-0.275	-1.47	-0.865	-2.80

never marriedL	-0.588	-8.17	-0.180	-2.30	-0.339	-4.34	-0.295	-3.07
ln(eqhhinc)L	0.842	20.38	0.464	9.28	0.336	7.85	0.561	10.43
secondary educL	0.629	12.80	0.310	5.23	0.090	1.19	0.248	3.34
tertiary educL	1.075	14.99	0.367	4.12	0.446	4.85	0.385	4.80
IV	0.437	9.62	0.320	6.54	0.594	11.12	0.945	16.08
_cons	-7.571	-21.85	-6.674	-14.11	-6.292	-11.20	-6.760	-14.60
	rho(e1,e2)	Prob>chi2	rho(e1,e2)	Prob>chi2	rho(e1,e2)	Prob>chi2	rho(e1,e2)	Prob>chi2
	-0.048	0.56	-0.144	0.33	-0.298	0.03	-0.052	0.63

TABLE A6: PRIVATE INSURANCE PROBIT REGRESSION COEFFICIENTS

	Ireland		Italy		Portugal		UK	
	coefficient	t-value	coefficient	t-value	coefficient	t-value	coefficient	t-value
age2635	-0.123	-1.88	0.168	1.64	-0.212	-2.58	0.017	0.12
age3645	0.446	6.14	0.351	3.21	-0.070	-0.81	0.247	1.77
age4655	0.594	7.86	0.224	1.97	-0.304	-3.23	0.206	1.42
age5665	0.397	4.72	0.241	1.89	-0.466	-4.11	0.144	0.91
age66plus	0.082	0.70	0.165	0.93	-0.710	-3.75	0.194	0.80
male	-0.085	-2.16	0.170	3.66	0.192	4.03	0.054	0.92
sahgood	-0.107	-2.95	-0.078	-1.42	0.268	2.03	-0.011	-0.18
sahfair	-0.247	-3.90	-0.155	-2.30	0.409	2.95	-0.201	-2.21
sahbad	-0.513	-3.35	-0.324	-2.12	0.312	1.79	-0.281	-1.19
sahvbad	-0.309	-1.00	-0.059	-0.13	0.565	2.16		
hampsome	0.070	1.00	0.111	0.97	0.079	0.85	-0.018	-0.19
hampsev	0.176	1.29	0.146	0.69	0.075	0.49	-0.179	-0.78
selfemploy	0.100	1.69	0.691	12.04	-0.234	-2.70	-0.139	-1.23
student	1.162	12.49	0.070	0.56	0.071	0.67	-0.656	-1.50
unemployed	-0.555	-6.06	-0.110	-0.88	-0.434	-3.57	-0.416	-2.08
retired	0.091	0.91	-0.051	-0.50	-0.366	-2.54	-0.133	-0.84
housework	-0.088	-1.63	-0.079	-0.89	-0.372	-2.91	0.112	1.09
separated	-0.934	-6.39	-0.193	-1.13	0.010	0.05	-0.892	-2.47
divorced	-1.873	-2.62	0.017	0.09	-0.055	-0.37	-0.557	-4.55
widowed	-0.598	-5.83	-0.154	-0.95	-0.450	-2.21	-0.997	-3.42
never married	-0.612	-11.47	-0.204	-3.15	-0.293	-4.11	-0.411	-4.50
ln(eqhhinc)	0.831	26.47	0.501	13.11	0.410	10.52	0.658	12.80
secondary educ	0.596	15.85	0.307	6.29	0.110	1.67	0.287	4.13
tertiary educ	1.047	19.50	0.346	5.09	0.529	6.66	0.346	4.61
_cons	-7.362	-27.96	-6.970	-18.96	-7.348	-13.60	-6.881	-15.29