Double coverage and demand for health care: Evidence from Quantile Regression

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Motivation

What happens to the demand for health care when people have additional layers of health insurance?

[MORAL HAZARD problematic]

Current works on the topic mostly address:

- Selection issues – those who want to contract more health insurance are sicker or more risk averse

- Mean effects

Our empirical strategy is based on the use of a dataset without selection problems to analyse the impact at different levels of the outcome distribution (number of doctor visits) without restricting the way explanatory variables affect different parts of the distribution

Motivation

- Portuguese data

  "complementary" aim: Study of the impact of the public and private employer-provided protection schemes on top of the statutory National Health Service (NHS) on the utilisation of doctor visits

  By focusing on the Portuguese subsystems, we exclude any adverse selection effects (even without instrumental variables)

  Explores the Portuguese Health Survey of 2005/2006, a cross sectional health dataset that provides a wide range of information at an individual level concerning socioeconomic conditions and health status indicators

- Econometric framework

  Quantile regression techniques became recently available for count data (proposed by Machado and Santos Silva (2005))

Outline of the presentation

1. Motivation

2. Overview of the Portuguese health care system

3. Data and variables

4. Methodology

5. Results

6. Concluding remarks

Portuguese health care system

Layers of health care coverage:

- National Health Service (NHS)
- Employer-provided public and private schemes (subsystems)
- Private voluntary insurance

People covered solely by the NHS face constraints in the access to public providers (in particular some services are excluded from the public network) and difficulties due to time costs and geographical barriers. As a consequence, the consumption of private services is very common and individuals support its full cost

People covered by subsystems benefit from a more comprehensive protection plan (both supplementary and complementary to NHS)

Dataset

The last Portuguese Health Survey (2005/2006):

- Provides a wide range of information at an individual level

- A total of 19950 households were selected and each individual of the household was face-to-face interviewed.

The sample used in the paper comprises 35308 observations after:

- Defining the "relevant population"

- Eliminating "incomplete observations" (listwise deletion)

Variables

Two double coverage variables allow to distinguish 3 mutually exclusive groups of observations:

- NHS – for individuals solely covered by the statutory health care system (81.5% of the sample)

- Pubsub – for individuals with NHS plus a public subsystem (15.8% of the sample)

- Privsub – for individuals with NHS plus a private subsystem (2.7% of the sample)

According to Barros et al. (2008), the particular features of the Portuguese subsystems makes these variables exogenous
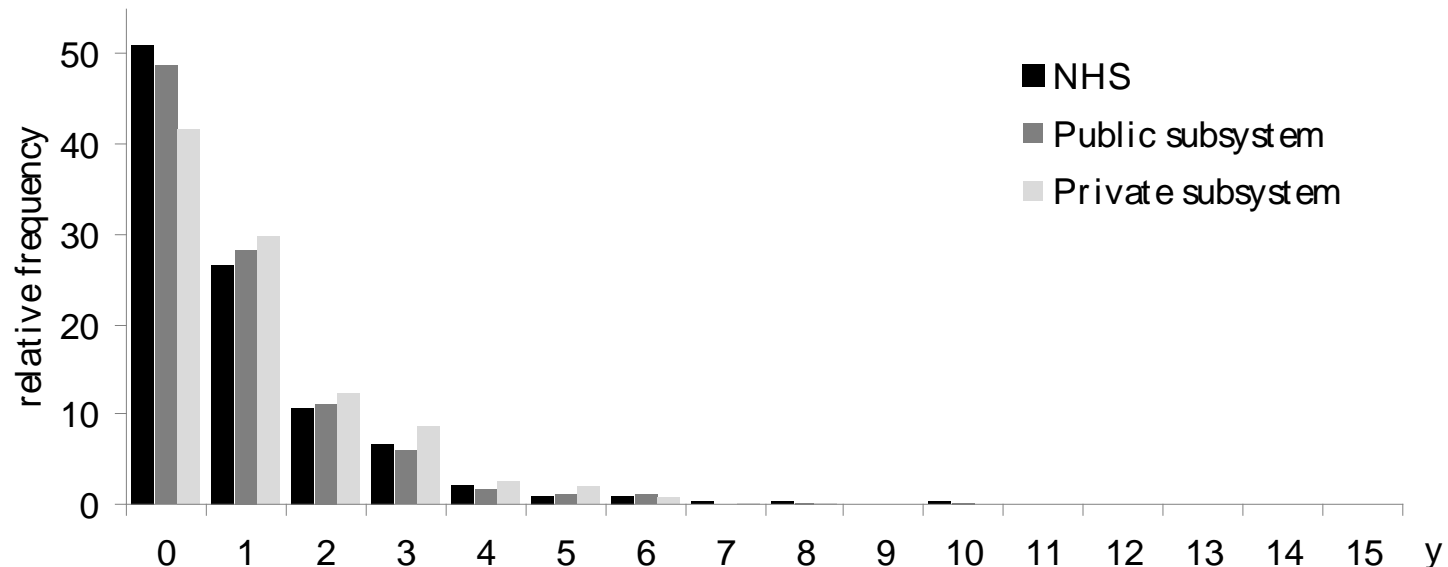
Two effects can bias moral hazard impact:

- Better treatment may decrease the future consumption of healthcare
- Joint effect of moral hazard from patients and supply-induced demand from providers

Variables

The dependent variable is the "total number of doctors visits in the three months prior to the interview"

- Count variable (y=0,1,2,3,···,30) with a large proportion of zeros and a long right tail

Variables

The covariates were selected taking into account the availability of data, Grossman's health capital model of demand for health care and the results of similar empirical studies (Cameron, Trivedi, Milne and Piggott 1988, Pohlmeier and Ulrich 1995, Vera-Hernández 1999, Deb and Trivedi 2002, and Lourenço 2007)

- Health status indicators (details about current medical conditions, presence of chronic diseases or pains, stress proxy, lifestyles with impact on health)

- Demographic and socioeconomic background (age, gender, marital status, education, occupational status, income)

- Region of residence and seasonal dummies

Exploratory analysis of the data

There are important sample differences, suggesting that for a appropriate comparison across levels of coverage a more complete account for them was required

- Public employees seem to be healthier, in particular when one takes into account physical limitations and the existence of chronic diseases

- NHS group has relatively less years of education and less income

- Public subsystems beneficiaries are younger, have a greater proportion of students and singles and a smaller share of retirees

- Private subsystem group has less women and a smaller household size

	y	age	female	educ	income	diabetes
NHS	1.01	42	0.52	8.1	496.7	0.077
pubsub	1.01	39	0.54	11.9	858.5	0.054
privsub	1.19	43	0.42	11.6	913.7	0.074

Methodology

In the "count econometrics world":

- There are several specific strategies to deal with discreteness and non-negativity

- Usually features other than location depend on the covariates

The literature has been focused on parametric specifications (e.g. Poisson, Negbin, Hurdle, Zero-Inflated, Latent Class models)

[Traditional models]

But, how about non-parametric or semiparametric models?

Empirical specification

- The impact of the additional layers of coverage was measured through the estimated coefficients (β_1, β_2) of the conditional

$$Q_{y_i^*}(\alpha|x) = \alpha + \exp\left[\beta_0(\alpha) + \beta_1(\alpha)pubsub_i + \beta_2(\alpha)privsub_i + \boldsymbol{\gamma}(\alpha)\mathbf{z}_i\right]$$

by assuming ignorability of the treatment conditional on a set of covariates (z_i) and the same distribution of unobservable determinants of health care use; and by ensuring that the groups have a common support in all regressors

- We were particularly interested on the explanation of heavy use of health care and given that the marginal quantiles are zero above the median, we focused on conditional quantiles on the upper tail of the distribution (where the effect of the covariates changes more rapidly)

[tables for $\alpha = 0.25$, 0.50, 0.60, 0.70, 0.80, 0.90]

Results for double coverage variables

For the double coverage dummy variables:

- Positive effect;

- The effect of private subsystems is higher than the one for public subsystems

- The estimated semi-elasticities show that both public and private subsystems have an increasing effect until the 0.60y*–0.70y* quantiles and a decreasing effect thereafter

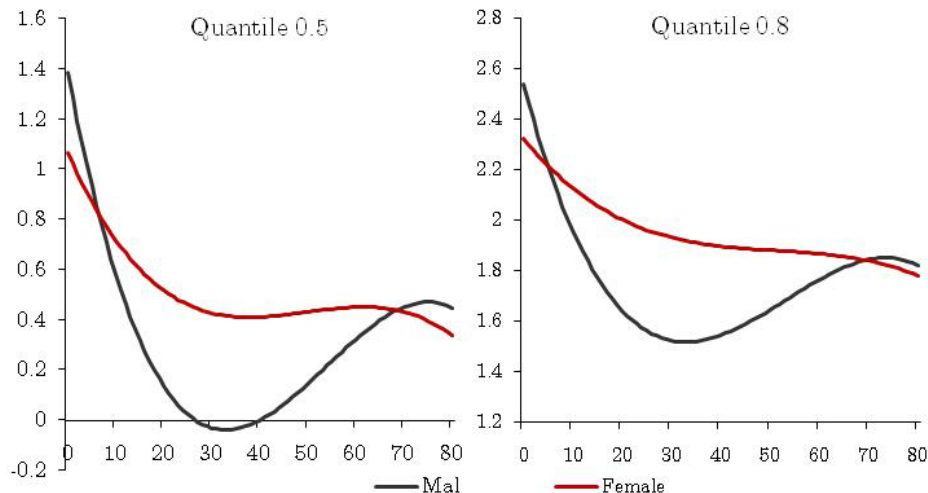| α	0.25	0.50	0.60	0.70	0.80	0.90
Coefficients						
pubsub	0.078	0.088	0.095	0.096	0.073	0.055
SE	0.032	0.029	0.028	0.028	0.024	0.025
privsub	0.200	0.229	0.247	0.232	0.185	0.148
SE	0.070	0.055	0.053	0.051	0.046	0.053
Marginal effects						
pubsub	0.012	0.025	0.034	0.046	0.055	0.065
privsub	0.032	0.071	0.094	0.118	0.148	0.184
Semi-elasticities						
pubsub	0.030	0.033	0.036	0.040	0.036	0.032
privsub	0.081	0.091	0.101	0.103	0.097	0.090

Note: the marginal effects and the semi-elasticities are computed for the "median" individual.

Other results

And how about other variables?

- Health status variables as a whole have a positive effect that is higher in the upper tail of the outcome distribution

- The impact of the socioeconomic variables seem to be similar across quantiles.

Looking, in particular, for the impact of the *gender* and *age*
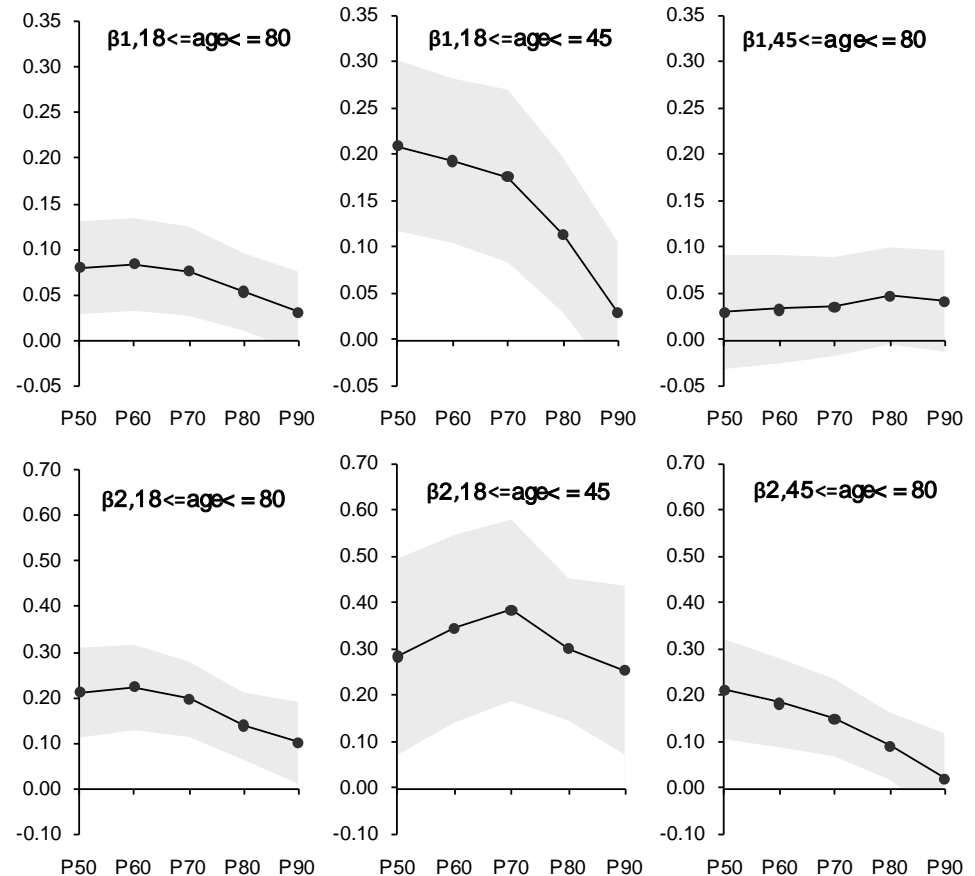

- Men tend to consume less, while women's behaviour is smoother over the life cycle

- The impact of age is relatively less pronounced in explaining high levels of visits to a doctor

Results for different age groups

It is potentially interesting to see if the double coverage is higher or lower among recent generations:

- The effect of both public and private subsystems is higher for the younger generations and this, globally, occurs in the whole distribution

- One possible explanation is the fact that if individuals covered by subsystems enjoy better health care, they may accumulate health advantages over the life

Concluding remarks

This work has some caveats, not yet solved by the literature on the impact of additional health coverage.

- In particular, even without directly facing the adverse selection problem, the usage of observational data to estimate causal effects creates some problems, aggravated because the evaluation is made through dummy variables in a regression.

- Moreover, the economic interpretation can be dubious. Although the impacts of double coverage are often associated with moral hazard behaviour, some authors criticize such direct association, arguing with the existence of other important effects. We took this into account with the analysis by age cohorts.

Concluding remarks

This work is a step further on the health insurance research:

- We differ from traditional count data models by investigating the effects of covariates on the shape of the distribution without imposing restrictive assumptions; this brings extra information

- The estimation of a positive effect of the double coverage corroborates the findings from traditional parametric models. Nevertheless, quantile regression provides us a more graphical description. So, it can be a valuable tool to complement the parametric models. Still, interpreting the "quantile for counts" is not easy.

Concluding remarks

When applied to the Portuguese case, the results indicated that:

- the consumption of doctor visits is higher in both private and public groups in all levels of usage (especially high in the private subsystems case)

- double coverage provided by the Portuguese subsystems is relatively more relevant for the first levels of usage since for more frequent users the consumption behaviour depends less on the health insurance plan