Papeles de Trabajo

EVALUATING THE REDISTRIBUTIVE IMPACT OF PUBLIC HEALTH EXPENDITURE USING AN INSURANCE VALUE APPROACH

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INDEX

ABSTRACT

This article analyzes the redistributive impact of public health expenditure in Spain following an insurance value approach to impute expenditure outlays on individual and household's budget. We model the intensity of use of different health care services using a discrete choice framework on a nationally representative health care survey and then predict probabilities on the 2006 Spanish EU-SILC sample. This allows us to construct an income extended with public health coverage and to compare it with household disposable income. The results show that public health expenditure in Spain acts progressively on the income distribution and that public health outlays has a good capacity to get families out from poverty.

JEL: H44; H51; I18; I38; J24.

Keywords: health expenditure distribution, health equity, extended income, health insurance.

1. INTRODUCTION

Health is an important source of human capital and in the context of endogenous growth can be considered as an important factor to promote economic (and human) development. In the first collection of articles on human capital, Schultz (1962) discussed about the possibilities of including health as source of human capital, posing the basis for Grossman (1972)'s work on government's investment on health. Ehrlich and Becker (1972) and Ehrlich (2000) presented a theoretical framework for the analysis of optimal insurance and self-protection, considering health as human capital. They found that the existence of a private insurance (or insurance fully-funded by public expenditure) increases the likelihood that larger health endowments (lower mortality risks) raise the demand for life protection, reducing inequality in life expectancy.

More important: public supply of health care insurance is a matter of equity considerations. Given that chances of death and disability are unequally distributed, the provision of public, free and universal health care is equivalent to a subsidy that is not uniform in the population. As a consequence, the social planner may be interested in evaluating the distributional implications of a health care program in order to test his effectiveness in guaranteeing equality in access to treatments between the poor and the better off. This evaluation effort requires the extension of the expenditure incidence analysis to health services, which can be considered as an in-kind transfer and the distributive analysis of an extended income that distribution include public health outlays, as firstly proposed by Aaron and McGuire (1970).

Unlike a pure public good, consumption of health care is rival and easily excludable, approaching with this characteristic private goods. However in fully-funded and publicly produced health care regimes everyone should be covered by health insurance. That insurance equalizes, *ex ante*, public health care access among individuals of different socio-economic conditions. Nevertheless, even in a fully-funded health care regime, as in many European countries, effective distribution of health benefits consumption can be evaluated, for obvious reasons, only *ex post*. Moreover ex post distribution may be not equal among sick or disabled individuals since several factors may limit effective access to health care, for instance health supply rigidities, inefficiencies or poor quality.

Establishing exactly how health expenditure is distributed between different socio-economic groups in the population is a challenging task and some assumptions are needed in order to perform a proper incidence analysis. Several studies analyzed the redistribution impact of health financing; however few attempts appear in the literature to perform an incidence analysis of public health care expenditure and all of these attempts are limited to the study the distribution of health care consumption without considering the dimension of health insurance coverage. In this article we propose a new approach to the imputation of health expenditure outlays on household income, enhancing insurance dimension of public health care programs and taking exploiting a very rich microeconomic dataset (the Spanish National Health Survey-SNHS) for Spain in 2006.

Total public health care expenditure accounted on average for 6.6 per cent of GDP in OECD countries in 2007[1], among European OECD countries the figure goes from 4.6 per cent in Poland to 8.6 per cent for France. In spite of this government commitment in providing free health care access in Europe, health inequality still be a matter of concern in all European countries. Hernández-Quevedo *et al*. (2006), studying health inequality in European countries between 1994 and 2001, found that illness is more concentrated among those on lower incomes in all periods for all countries.

Spanish health care expenditure is just below the OECD average with 6.1 per cent of GDP. As in most European countries, Spanish government uses health care as an instrument to redistribute income among citizens; citizens pay taxes according to their financial capacity and receive health services as they need. Wagstaff and Van Doorslaer (1992) found that the 1980 Spanish health care financing, based on social insurance, was regressive while in a more recent study, De Gaeve and Van Ourti (2003) get back on a cross-country comparison of equity on health financing and evaluated the 1990 Spanish system, now shifted to a direct and indirect tax financing, to be slightly progressive. Costa-

[1] OECD Health Data 2010. The figure does not include Luxemburg, Holand and Portugal for which data are not available for 2007.

Font and Gil (2009) analysed heterogeneity in regional inequalities in health care access and financing in Spain using data from 2001, and found that inequalities in health are mostly driven by income inequalities and regional health care capacity. None of aforementioned studies aim at measuring the benefits that are derived from public spending on health care and thus none of them can analyze its distributive impact. As to the health outcomes, intended as the capacity of the health protection system to achieve an improvement in the health of its citizens, Hernández-Quevedo *et al.* (2006), on 2001 data, found Spain to perform well both in short and in long-run health inequality comparing to other European countries. Vera-Hernandez and Lopez (2008) studied private health care market in Spain and simulated the impact of premium changes on the utilization of outpatient and inpatient services in Catalonia. They found that the abolishment of income tax deduction on private medical insurance premia does not affect public health care demand.

In this article we return on the redistributive impact evaluation of public health expenditure performance in Spain using data from 2006 following an insurance value approach to impute to individual and household's budget benefits from public health services, and analysing the extended income distribution for Spain. The aim of the paper is to study how public health care transfers alter the distribution of income in Spain. Assessing the improvement of health status as a result of health sector subsides is not the scope of this analysis. We found that public health expenditure in Spain acts progressively on income distribution and that public health outlays has a good capacity to get families out from poverty.

The paper is organized as follows. Section II presents a review of methodologies for the imputation of in-kind transfers on household income and describes the insurance value approach adopted in this analysis. Section III outlines the empirical strategy, and presents the econometric model together with a description of the data sources. Section IV exposes the analysis of the redistributive impact of public expenditure in Spain and Section V concludes.

2. PUBLIC HEALTH CARE EXPENDITURE AND EXTENDED INCOME

The idea of measuring the benefits that are derived from public services stems from Aaron and McGuire (1970) who sets out the basic principles to be followed in assessing how in-kind public expenditures benefit individuals. They proposed an approach based on the measurement of individual preferences and on the individuals' willingness to pay for publicly funded services. This type of approach, called "behavioural approach" by Van de Walle (1998), requires knowledge of underlying demand functions of individuals or households and is subjected to biased estimations due to the endogeneity of program placement.

The second approach is based on the actual use of public health services. This approach combines the cost of providing public services with information on their use in order to generate comparable distributions and evaluate the impact of the public program on welfare distribution. Data assembled with the so called benefit incidence analysis may be useful to reveal about how public health care spending are distributed across socio-economic groups. The first work following this approach for health care was that of LeGrand (1978) for the British National Health Service. In his article, unit cost of health care expenditure is attributed to socio-economic groups, using information based on the use of health services. Benefit incidence analysis is a quite established approach in developing countries since the social planner is often concerned about the pro-poorness of its social programs, including public services; Meerman (1979) and Selowsky (1979) estimated the impact of public health expenditure respectively in Malaysia and Colombia and Demery (2003) applied the same methodology to health spending in Ghana. The conventional benefit incidence analysis, however, is not immune to criticisms.

Van de Walle (1998) highlighted that the unit cost of provision may have little relation to the value of the benefits to the individual. This is particularly true for health care subsides; health care benefit is typically a lifelong benefit. The most serious critique of benefit incidence studies is that it simply ignores behavioural responses, and, it is widely recognized that public policies affect individual behaviour, including labour supply, consumption, savings and investment decisions.

In the case of health care, Aaberge and Langørgen (2006) argue that this approach implies that, for a given money income, sick people are better off than others simply because they receive more health-

related services. In addition, many health care interventions are both very costly and concentrated over a limited period of time: as a consequence, re-ranking individuals on the basis of the "final" income (i.e. after allowing for the effect of the public health-care benefits received) may push those people who benefit more from these services into higher income groups, thus dampening the measured effect of health care services in equalising the income distribution. Addressing this problem requires considering both the greater use of health care services by people affected by health problems and their greater health needs. Moreover research on the links between individuals' income and health status suggests that poorer people have, in general, worse health conditions and, as a consequence, greater needs for health care.

In order to overcome the limits of a standard health care incidence analysis, some studies estimate probability of being recipients, as a function of demographic and socioeconomic variables. This approach is adopted firstly by Smeeding *et al*. (1993) in a study aimed to evaluate the impact of noncash income on living standards in seven OECD countries. The authors looked at the differences between cash income and extended income, imputing on household budgets noncash incomes publicly provided; they applied different methodologies to account for the nature of the in-kind transfer. For health care subsides, the imputation is based on a risk-related insurance premium approach; health care is treated as an insurance benefit received by all agents, independently of their actual use health care benefits. Benefits received are estimated by age and sex specific outlays spread over all population. Aaberge and Langørgen (2006) followed the same idea to evaluate how local public in-kind benefits affect the distribution of income in Norway. The allocation method of the health care benefits is based on an insurance value approach, combining the estimated probability of being recipient with potential recipients defined by common characteristics.

The theoretical foundations of an insurance value approach stems from Arrow (1963), who set up the theory of the ideal insurance in medical care. Public health care supply is justified by the idea of insurance against the cost of medical care. Government pays insurance premium to each citizen. Thus if one wants to evaluate distributional impact of public health care, it is necessary to evaluate health care coverage and how much is the risk-related, insurance premium subsidized by the government. Since the insurance premium is risk-related thus can be estimated using the probabilities of the event (need of medical care), on the basis of individual characteristics (age, sex, living standards). We apply this approach to the evaluation of the overall redistributive impact of public health expenditure in Spain. Our analysis focuses on income extended with public health care expenditure. The detailed data available allows us to consider not only the probabilities of use of different health care services, but also the probability of different intensities of use of such services. The main distinguishing characteristic of our model is that use of health services is treated as a discrete choice problem.

Since MacFadden (1976) it is widely recognized that a wide variety of situations in economic literature faces a discrete set of choices. As a consequence, Small and Rosen (1981) derived a discrete choice framework for measuring welfare effects of public programs and, similarly, Van Soest (1995) extended labour supply model in a discrete choice framework. In this article we adopt a similar framework to model the choice of consumption of different intensities of health care services. Thus, in a certain sense, we model the utilization of health services as if it was a consumption choice. Indeed health care consumer face a discrete set of choice; he/she can, for instance, decide to go to the family doctor one, or two or more than two times. It is not possible to visit the doctor one and half times; so health care consumer choose discrete alterative of intensity that maximizes his/her utility depending on his/her health status. This allows to compute probabilities of different intensity of use in order to impute health care insurance premium to each individual and household. In the next Section we describe the dataset use in the analysis and the empirical strategy chosen.

3. DATA AND EMPIRICAL STRATEGY

The empirical analysis relies on two different household surveys in order to recover all the information to estimate, for each individual, the probability of benefiting from public medical care, conditional on a set of personal or household characteristics. The household surveys used, both relatives to 2006, are: the Spanish National Health Survey (SNHS), established from 1987 to record the distribution of

morbidity, of certain health behaviours and detailed information on the use of health services, associated with demographic and territorial characteristics. The economic variables necessary to properly implement a distributional analysis, such as work status, income, taxes, benefits and so on, are drawn from the European Survey of Income and Living Conditions (EU-SILC) for Spain. EU-SILC is rich in information on several household and individual variables, such as work status and characteristics, income, taxes and benefits, family composition, health and education, however, does not collect the required detailed information on the use of public health services, which is fundamental to properly estimate probabilities of intensity of use for each voice of health expenditure. On the other hand, SNHS does not contain information on wages and incomes, but, being a collection of health related variables, it provides exactly the information which is missing in EU-SILC. Thus in this article information from SNHS is used to impute the utilization of healthcare services to each individual in EU-SILC. Health care categories selected for the analysis are: primary health care, outpatient specialized care, inpatients care, pharmaceuticals and the rest of health functions, mainly collective health services.

SNHS and EU-SILC for Spain are nationally representative and based on the same sampling method. They come with a set of common variables (region of residence, individual age, gender, marital status, household type and size) that are fully comparable. Appendix A describes carefully variables used in the analysis and gives descriptive statistics from the two samples employed. Finally, drawing the unitary cost of these services from the Spanish Statistics on Health Expenditure (SSHE), it is possible to recover the insurance premium for the healthcare services that each individual would need to pay if public health were not publicly provided for free, and to consider this premium as if it was a monetary benefit that the individual receive from the state and thus compute the redistributive effects of public health expenditure in Spain[2].

To this aim, the use of healthcare services is modelled according to a multinomial logistic probability model. Different individuals in different households, living in different areas, have different probabilities of using healthcare services with different intensities. For instance, old people have higher probabilities of getting ill and thus to go to the family doctor, even more times per month. On the other hand, people living in rural areas probably need to make a larger travel to visit the doctor, so the use of this facility will probably be smaller.

Thanks to the information included in SNHS, it is possible to estimate the probability of the intensity of use of each healthcare service according to a set of personal, family and geographic characteristics that are also available in the EU-SILC data. Thus, once estimated these probabilities in SNHS, it is possible to predict the same probabilities in EU-SILC and then compute the individual premia associated with the "potential" use of health services.

Let define Y as the set of the different health care categories to which it is possible to estimate an intensity of use, such that

$$Y = \left\{ \begin{array}{c} \text{Primary health care} \\ \text{Outpatient specialized care} \\ \text{Inpatient specialized care} \\ \text{Pharmaceuticals} \end{array} \right\}$$

There is a further residual category, mainly composed of collective health services, for which it is not possible to estimate an intensity of use and whose premium is attributed on an uniform basis[3].

Each healthcare service category Y^i has an intensity of use that is categorized as explained in Appendix A. For example, Y^1 –primary health care– can take values 0, 1 or 2 that correspond to no use of the service, one visit and two or more visits in the last four weeks respectively. The multinomial logistic probability modeling allows to estimate the probability to fall in each of these three categories of intensity of use given some characteristic, or explanatory variables[4], X, such that.

[2] We do not need to account for the health taxes/contributions paid since the analysis is performed on net income, thus already accounting for them.

[3] It accounts for roughly a 10 for 100 of public expenditure on health.

[4] The complete list of explanatory variables is given in Appendix A.

$$p_j^i = Prob\left(Y^i = j\right) = \frac{e^{xi\beta j}}{1 + \sum_{j=1}^{J} e^{xi\beta j}}, j = 1,\ldots,J$$

This model can be estimated via Maximum Likelihood for each healthcare service category[5].

Once the estimates are obtained, since the same explanatory variables are present in EU-SILC, it is possible to predict the out-of-sample probabilities of intensity of use of healthcare services $\hat{P}_j^i$ to each individual. Knowing the cost of the specific service i for each intensity j, C_j^i, it is possible to know for each person in EU-SILC her potential insurance premium for each service, or, in other word, the monetary value of the benefit of this service, as

$$B^i = \sum_{j=0}^{J} \hat{P}_j^i \, C_j^i$$

and the total value of the healthcare benefit, as

$$B = \sum_{i=1}^{4} \sum_{J=0}^{J} \hat{P}_j^i \, C_j^i + 0$$

where, 0 is the value of collective healthcare services attributed to each individual. The next section evaluates how public health care coverage (or insurance premium) change household and individual income distribution and in which measure public health helps poor households to get out of poverty.

4. THE DISTRIBUTIONAL IMPACT OF PUBLIC EXPENDITURE ON HEALTH IN SPAIN

Tables 1-4 present estimations of the probabilities of use of health care services on the SNHS individual sample, modelled according to a multinomial logistic probability model. Numbers in second and fourth columns are partial effects, that is the percentage change in the probability of a choice (outcome) due to a unitary increase in the explanatory variable.

Table 1

NUMBER OF VISITS TO THE FAMILY DOCTOR (MULTINOMIAL LOGIT REGRESSION-PARTIAL EFFECTS)

	Intensity 2		Intensity 3	
	dy/dx	se	dy/dx	se
Male	-0.046***	0.004	-0.016***	0.003
Age	-0.018***	0.000	-0.005***	0.001
Age^2	0.000***	0.000	0.0001***	0.000
Age^3	0.000***	0.000	0.000***	0.000
Child under 1	0.138***	0.019	0.066***	0.013
Northen Area	-0.027***	0.006	-0.008**	0.003
Central Area	-0.016**	0.007	-0.004	0.004
Mediterranean Area	-0.036***	0.007	-0.001	0.004
Madrid Area	-0.018*	0.011	0.004	0.006
High population density	-0.021***	0.005	-0.008***	0.003
Medium population density	-0.011*	0.006	0.003	0.003
Has university degree	-0.079***	0.007	-0.017***	0.004
Married	0.012**	0.005	0.007**	0.003
Observations	36349			
Pseudo R2	0.055			

*** p<0.01, ** p<0.05, * p<0.1.

[5] The values of *j* corresponding to 0 are used as a baseline for the estimation.

The probability to visit the doctor in Spain (Table 1) at least once is significantly influenced by all the explanatory variables included in the model, even if the magnitude of the impact is often small. The most relevant variable is, as expected, being child younger than one year. Being a young child increases the probability of visiting the doctors once in the last weeks by 13.8 per cent and of visiting the doctors 2 or more times by 6.6 per cent. Education at tertiary level reduces by 7.9 per cent (1.7 per cent) the probability of doing one (two) visit to the family doctor. More educated people are more likely to be young so visiting less the doctor, self-care themselves and assume an healthy behaviours in order to prevent use of health services. Women are more likely to visit the doctor both once or more times in the last month. All the regional dummies present a negative sign since living in areas different from the South (reference category) reduces the probability of making use of the family doctor. On the contrary regional dummies are not significant in determining specialized visits and days in the hospital.

Table 2

NUMBER OF VISITS TO OUTPATIENT SPECIALIZED CARE SYSTEM (MULTINOMIAL LOGIT REGRESSION-PARTIAL EFFECTS)

	Intensity 2		Intensity 3	
	dy/dx	se	dy/dx	se
Male	-0.025***	0.003	-0.004**	0.001
Age	-0.003***	0.001	-0.001***	0.000
Age^2	0.000***	0.000	0.000***	0.000
Age^3	0.000***	0.000	0.000***	0.000
Child under 1	0.006	0.013	0.002	0.006
Northen Area	0.008*	0.005	-0.001	0.002
Central Area	0.001	0.005	-0.001***	0.000
Mediterranean Area	0.006	0.005	0.007***	0.003
Madrid Area	-0.004	0.007	0.006	0.004
High population density	0.002	0.004	0.003*	0.002
Medium population density	0.001	0.004	0.002	0.002
Has university degree	-0.021***	0.005	-0.004*	0.002
Married	0.013***	0.004	0.005***	0.002
Observations	36081			
Pseudo R2	0.0202			

*** p<0.01, ** p<0.05, * p<0.1.

Most relevant factors influencing specialized visits (Table 2) are gender (being male reduces the probability of 2 per cent) and education (higher education reduces the probability of 2 per cent). As to the days spent in hospital during the last year (Table 3), expected probability is 5 per cent higher for young children and 2 per cent higher for married individuals. All other factors have not explicative power.

Table 3

NUMBER OF DAYS IN HOSPITAL (MULTINOMIAL LOGIT REGRESSION-PARTIAL EFFECTS)

	Intensity 2		Intensity 3	
	dy/dx	se	dy/dx	se
Male	-0.014***	0.003	0.005***	0.001
Age	0.001**	0.001	0.000*	0.000
Age^2	0.000**	0.000	0.000	0.000
Age^3	0.000***	0.000	0.000	0.000
Child under 1	0.055***	0.016	0.053**	0.022

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	Intensity 2		Intensity 3	
	dy/dx	se	dy/dx	se
Northen Area	0.002	0.004	0.002	0.002
Central Area	-0.006	0.004	0.000	0.002
Mediterranean Area	0.004	0.004	0.002	0.002
Madrid Area	-0.001	0.006	0.002	0.002
High population density	0.003	0.003	0.001	0.001
Medium population density	-0.001	0.004	0.001	0.001
Has university degree	0.001	0.004	-0.007***	0.001
Married	0.023***	0.003	-0.001	0.000
Observations	36441			
Pseudo R2	0.029			

*** p<0.01, ** p<0.05, * p<0.1.

Prescribed medicines are more likely to be consumed with low intensity by child under one again (11 per cent of increase in probability) and by female individuals with intensity “5” (more than 4 prescriptions in the last four weeks). Also regional dummies become statistically significant in explaining intensity “5” of medicines consumed. Again living in the South raises the probability of using several drugs prescribed by the public health system.

Table 4

NUMBER OF PRESCRIBED MEDICINES (MULTINOMIAL LOGIT REGRESSION-PARTIAL EFFECTS)

	Intensity 2		Intensity 3		Intensity 4		Intensity 5	
	dy/dx	se	dy/dx	se	dy/dx	se	dy/dx	se
Male	-0.020***	0.005	-0.034***	0.004	-0.028***	0.003	-0.048***	0.003
Age	0.004***	0.001	-0.008***	0.001	-0.005***	0.001	-0.007***	0.001
Age^2	0.000***	0.000	0.000***	0.000	0.000***	0.000	0.000***	0.000
Age^3	0.000***	0.000	0.000***	0.000	0.000***	0.000	0.000***	0.000
Child under 1	0.119**	0.021	0.031*	0.017	0.008***	0.011	-0.041***	0.009
Northen Area	0.013*	0.008	-0.009	0.006	0.034***	0.004	-0.059***	0.003
Central Area	-0.008	0.008	-0.016**	0.006	0.035***	0.004	-0.066***	0.003
Mediterranean Area	0.002	0.008	-0.009	0.006	-0.030***	0.004	-0.064***	0.003
Madrid Area	-0.016	0.011	-0.034***	0.008	-0.031***	0.005	-0.046***	0.003
High population density	0.004	0.006	0.005	0.005	0.000***	0.004	0.010***	0.003
Medium population density	0.000	0.007	0.001	0.006	0.001***	0.004	0.015***	0.004
Has university degree	0.008	0.008	-0.027***	0.006	-0.017***	0.005	-0.037***	0.004
Married	0.021***	0.006	0.004	0.005	-0.004***	0.003	-0.009***	0.003
Observations	36441							
Pseudo R2	0.121							

*** p<0.01, ** p<0.05, * p<0.1.

Predicted probabilities of multinomial logistic regressions are imputed in the EU-SILC sample. Distributions of individuals by age classes and gender is very similar in the two samples, showing that imputation process has yielded robust results and has captured coverage[6].

[6] Tables are available upon request.

Once B is computed for each Spanish individual and aggregated at household level, it is possible to compare welfare distribution of disposable income (after considering for taxes and cash transfers) with an income extended with health insurance premium computed with the methodologies described in previous section. Firstly household extended income is computed and a redistributive analysis using extended income as measure of living standard is performed. In order to compare different households and calculate poverty incidence and level of inequality, the household disposable income has been equivalized using the modified OECD scale[7]. Then we study how individual health care transfer is distributed along the lifecycle in Spain focusing on gender differences and how health care coverage differs among job status and education level. Finally the analysis shifts to the differences between Spanish people and immigrant in health care coverage.

Table 5

POVERTY AND INEQUALITY IMPACT

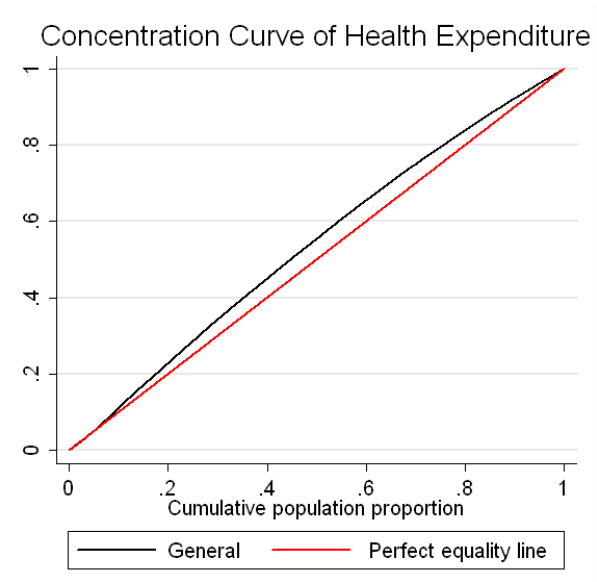
	Disposable income (before health subsidy)	Disposable income (after health subsidy)
Headcount ratio %a	18.209	8.121
Poverty gap ratio %a	5.592	2.370
Gini coefficient	0.319	0.279
Theil index (GE(a), a = 1)	0.175	0.133

The first instrument used to assess poverty reduction capacity of public expenditure on health care in Spain, is the comparison between headcount ratios for the disposable and extended income.

Table 5 gives the picture of poverty and inequality among Spanish households before and after the imputation of health expenditure. This comparison suggests that health expenditure reduces poverty incidence of 10 percentage points, meaning that health coverage is clearly a pro-poor instrument. Poverty intensity is also reduced by 3 percentage points if health expenditure is included in the household income computation. The poverty reduction capacity of public health expenditure is consistent with the considerable reduction in income inequality (The Gini coefficient of disposable income with health expenditure is 0.28 while, without provision of public health care insurance, it would be 0.32).

Figure 1

CONCENTRATION CURVE FOR PUBLIC HEALTH CARE COVERAGE



[7] The modified OECD scale is calculated using the following formula: HH size = 1+0.5*(number of members older than 13 years -1)+0.3*(number of household members –number of members older than 13).

When the overall progressivity of health care expenditure is assessed, the positive picture is confirmed: indeed the concentration index of health expenditure is negative (-0.053), as well as the Kakwani Index (-0.38), suggesting that the health subsidies received through the use of health services in Spain is a progressive instrument. The redistributive power of health expenditure is confirmed also by Figure 1, which shows health expenditure concentration curve lying above the perfect equality line (red line).

Table 6

EQUIVALENT DISPOSABLE INCOME WITH PUBLIC HEALTH COVERAGE BY GROSS INCOME DECILES

Equivalent Gross Income Deciles	Average disposable income	Average disposable income with health	Share of subsidy on total disposable income (%)
Decile 1 (0 – 5 113 Euros)	4060	5766	42%
Decile 2 (5 120 – 6 870 Euros)	6070	7900	30%
Decile 3 (6 872 - 8 550 Euros)	7414	9193	24%
Decile 4 (8 555 - 10 360 Euros)	8829	10481	19%
Decile 5 (10 361 – 12 333 Euros)	10405	11997	15%
Decile 6 (12 333 – 14 548 Euros)	12061	13559	12%
Decile 7 (14 550 – 17 322 Euros)	13896	15334	10%
Decile 8 (17 323 – 20 994 Euros)	16260	17575	8%
Decile 9 (21 000 – 27 242 Euros)	19814	21057	6%
Decile 10 (27 243 – 21 2880 Euros)	29962	31120	4%

Comparing redistribution before and after health transfers (Table 6), the monetary amount of health care provided by the public sector is a considerable amount of household budget for households at the bottom of the income distribution, while it is relatively scarce for the better off.

Indeed, if the equivalent household transfer is regressed on equivalent gross income by means of local polynomial regression, Figure 2 shows that health outlays are well targeted to the poor families, who receive a relevant amount of equivalent subsidy (from 1 706 to 1 830 Euros for the first three deciles, as shown in Table 7) while from forth to ninth deciles the subsidy is decreasing.

Figure 2

SEMI-PARAMETRIC REGRESSION OF HEALTH CARE COVERAGE ON EQUIVALENT GROSS INCOME

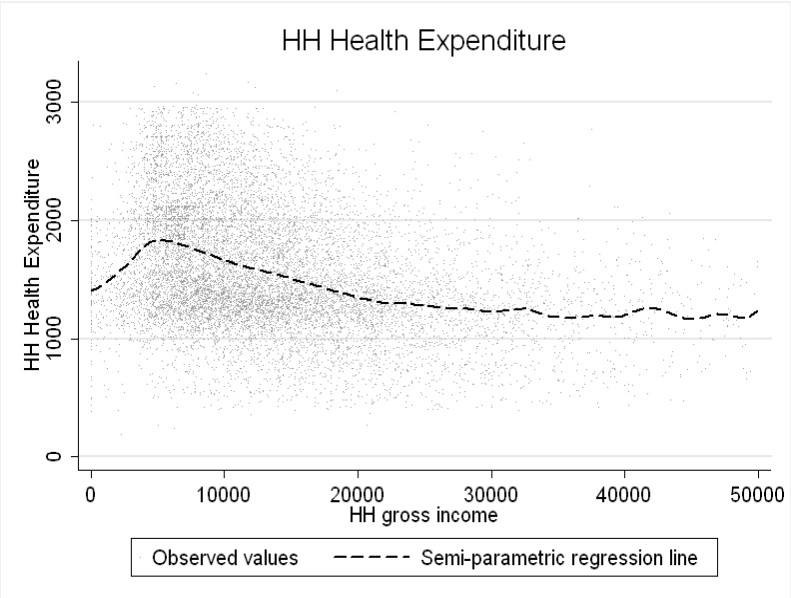


Table 7

PUBLIC HEALTH TRANSFER BY EXPENDITURE COMPONENTS AND INCOME DECILES (EUROS)

Equivalent Gross Income Deciles	Total	Drugs	Family doctor	Hospital	Specialized visits
Decile 1 (0 – 5 113 Euros)	1706	427	310	614	354
Decile 2 (5 120 – 6 870 Euros)	1830	473	327	672	357
Decile 3 (6 872 - 8 550 Euros)	1778	443	321	653	360
Decile 4 (8 555 - 10 360 Euros)	1651	391	305	596	358
Decile 5 (10 361 – 12 333 Euros)	1592	370	294	574	353
Decile 6 (12 333 – 14 548 Euros)	1498	340	278	537	341
Decile 7 (14 550 – 17 322 Euros)	1437	321	267	515	333
Decile 8 (17 323 – 20 994 Euros)	1315	287	245	467	313
Decile 9 (21 000 – 27 242 Euros)	1242	266	235	439	300
Decile 10 (27 243 – 21 2880 Euros)	1158	248	220	402	286

Table 8 analyzes the amount of subsidies by number of household members. The amount increases with a decreasing rate, as expected, but not in a smooth way. In fact, in passing from 4 members to 5 the subsidy increase is quite large, almost as large as the jump from 1 to 2 members. This could be explained by the fact that large families are likely to have elderly parents living in the household or many children. This applies to all components of health expenditure.

Table 8

PUBLIC HEALTH CARE TRANSFER BY EXPENDITURE COMPONENTS AND HOUSEHOLD SIZE (EUROS)

Number of household members	Total	Drugs	Family doctor	Hospital	Specialized visits
1	1391	376	240	519	255
2	2554	624	443	952	534
3	2919	658	552	1031	677
4	3283	701	647	1131	802
5	4308	969	820	1507	1010
6	5241	1182	1016	1848	1194
7 or more	5880	1216	1230	2042	1390

The imputation of health expenditure is conducted at the individual level, so it can be useful to analyze redistributive results by individual characteristics. The typical individual decomposition analysis looks at the age and gender of the individuals. Table 5 shows that young children receive higher amounts of all health expenditure categories respect children, adolescents and young adults (6-13, 13-18 and 18-30 years respectively). However as age increases the expenditure shows a sharp increase in all of its components, especially for hospitalization. Similar information can be drawn from Figure 3, which represents a semi-parametric regression of health expenditure over age by gender.

Figure 3

SEMI-PARAMETRIC REGRESSION OF HEALTH CARE COVERAGE ON AGE, BY GENDER

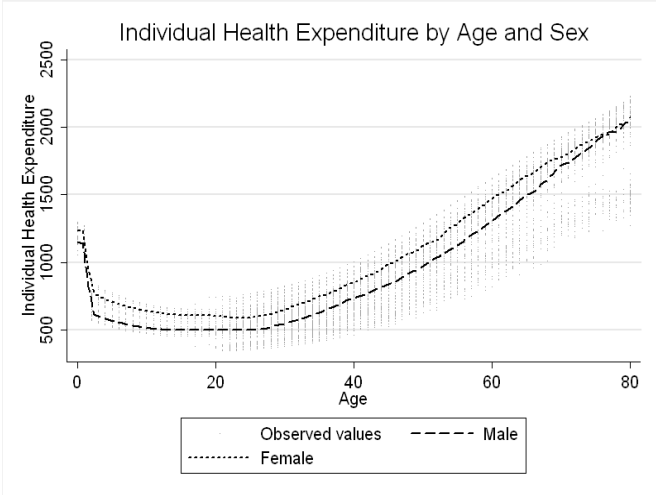


Table 9

PUBLIC HEALTH CARE TRANSFER BY EXPENDITURE COMPONENTS AND AGE CLASSES (EUROS)

Age Class	Total	Drugs	Family doctor	Hospital	Specialized visits
1 (0, 6]	758	141	240	207	169
2 (6, 13]	580	112	150	172	145
3 (13, 18]	553	103	121	190	138
4 (18, 30]	559	104	102	210	142
5 (30, 50]	817	170	139	293	213
6 (50, 65]	1308	329	235	434	308
7 (65,)	1874	498	317	729	328

Health expenditure is high for babies, then is constantly small up to about 30 years and then constantly increases with age. Female children and adults receive a higher amount of health treatment all along the age span, except for the very elderly (above 70 years).

Figure 4

SEMI-PARAMETRIC REGRESSION OF HEALTH CARE COVERAGE ON AGE, BY EXPENDITURE COMPONENTS AND GENDER

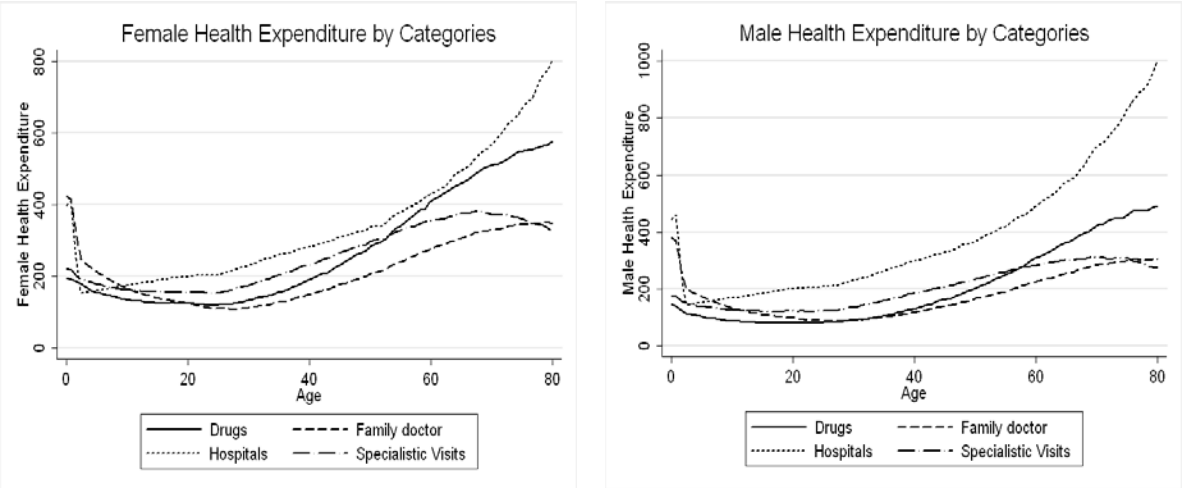
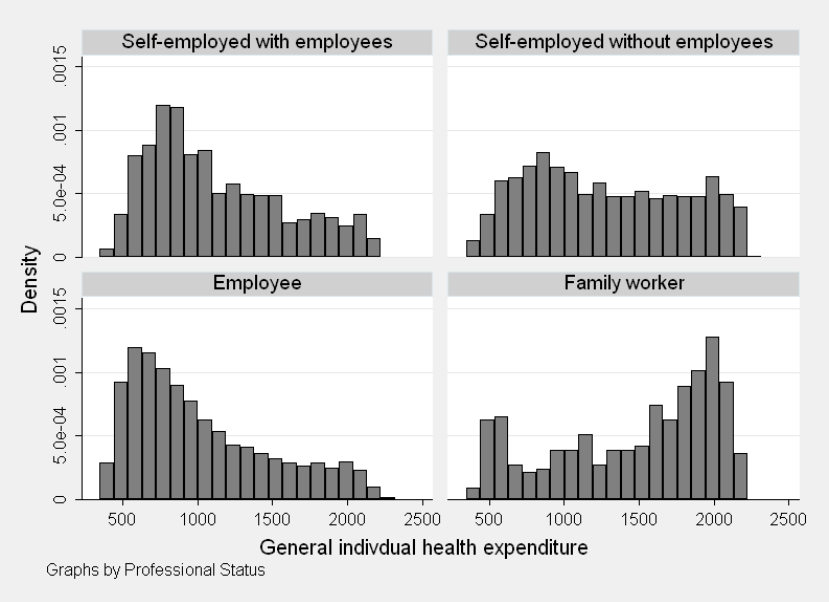


Figure 4 clearly shows that the two components that contribute more to the health expenditures for babies are hospitalization and family doctors, which seem sensible since most births happen in hospitals and the first months of life of a baby need a special attention and a usually large number of visits to the paediatrician. The difference between males and females is mainly due to drugs and specialist visits (Figure 4), but all of the health expenditure components are larger for women. On the other side, the main responsible for the higher health expenditure of elderly people are hospitalization and drugs, with a sharper increase in the use of drugs by women and higher hospitalization expenses for elderly men. This is in line with the worsening of health conditions with age and the fact that women have a longer life expectancy than men.

Figure 5

DISTRIBUTION OF HEALTH CARE COVERAGE BY PROFESSIONAL STATUS



An analysis by type of workers (Figure 5) reveals that the categories that are more likely to generate health expenditure are small self-employed (artisans, dealers, and so on) and domestic workers. These category are more likely to work substantially more hours per week that the others, may do quite a heavy type of work (especially artisans and domestic workers), and are potentially more affected by work injuries, since there is less regulation and/or no incentive to respect the regulation (since they work for themselves). As a matter of facts, this is not a surprising result. The density of the distribution of health coverage by professional status highlights also an important difference between small self-employed and domestic workers. The firsts show an equal distribution of health expenditure, in the sense that the number of people receiving much is more or less equal to the number of people receiving a little amount. On the contrary, among domestic workers there are a lot of people with a large amount of health expenditure.

Table 10

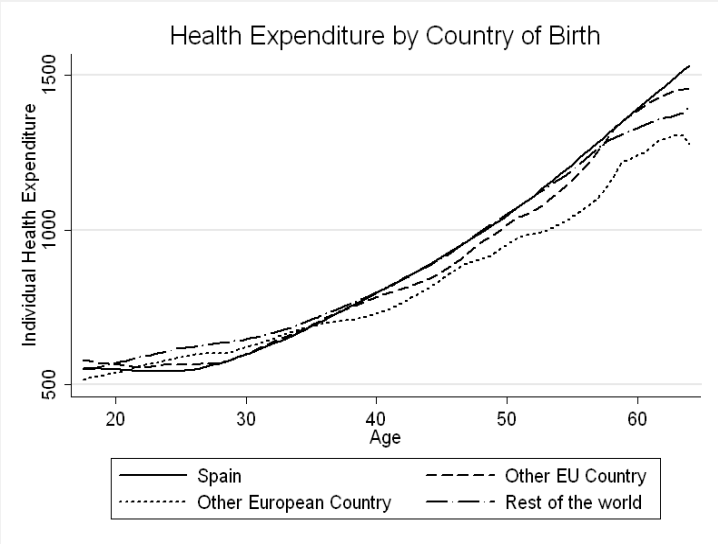
PUBLIC HEALTH CARE TRANSFER BY EXPENDITURE COMPONENTS AND LEVEL OF EDUCATION (EUROS)

	Total	Drugs	Family doctor	Hospital	Specialized visits
Primary	1233	323	227	405	276
Lower secondary	685	142	133	239	170
Secondary	586	112	118	208	147
Post-secondary no tertiary	605	124	112	214	153
First stage of tertiary	570	111	105	207	146

The education group with more health expenditure is by far the less educated (see Table 10). Health expenditure is double for this group respect to the others, however the source of this difference may be found in the age structure of the groups. In fact, the elderly are much more likely to have a lower educational level than young people. Moreover, lower educational levels usually imply heavier type of works that are more harmful for health. A combination of both these factors can explain such a strong difference.

Figure 6

SEMI-PARAMETRIC REGRESSION OF HEALTH CARE COVERAGE ON AGE BY COUNTRY OF BIRTH



Finally figure 6 looks at the country of birth of the individuals. The larger amount of health expenditure is associated with the Spanish, followed by other EU citizens. The rest of the word and Eastern European (non EU) countries, have slightly lower health expenditures. Decomposing the difference by age group, it seems that young non-EU citizens have slightly higher expenditures respect to their Spanish coetaneous, while the elderly, especially from the rest of the world, seem to receive less.

5. CONCLUDING REMARKS

Public health care is an important component of government expenditure in European countries and, since illness is more concentrated among the poor and they are more likely to ask for a public medical care it has an important role in reducing inequality in living standards. This study represents the first attempt to give a broad estimate of distributional impact of the whole public health care system in Spain, treating health expenditure as a private insurance and health transfers as insurance premium fostered by the government.

The study exploits a reach survey on health care services utilization in Spain in order to impute the value of health care coverage to EU-SILC household survey for Spain in 2006.

Once computed the extended income and individual health care transfers, the study analyzes how public health care acts against poverty/inequality and the differences in distribution of the in-kind transfer among socio-economic groups, by age and gender.

Public health care expenditure in Spain acts progressively on income distribution and has a good capacity to get out families from poverty. In fact the amount of in-kind subsidy received by the household on average is considerable and its adequacy is good. Health care subsidy accounts for 42 for 100 of household disposable income for the families in the first decile. Provision of public health care reduces substantially poverty incidence and poverty severity in Spain, granting a more equal distribution of living standards.

Among expenditure categories, public subsidized medicine is the category with more redistributive power while subsidies for specialized visits are more proportionally distributed. Health expenditure benefits large families, especially families with more than two children and families with all members retired.

Among individuals, the higher amount of subsidy is devoted to children under six years old and adults older than 50 years old. In-kind transfers from public health sector generally increase with age and are higher for women throughout all the life cycle. Age impacts in particular expenditure for medicines and hospitals, while the benefits from family doctor have a flatter distribution respect to age increase. Females are more likely to be subsidized for drugs consumption. Retired people and domestic workers receive also a considerable amount of benefits while among paid workers small self-employed are those who benefit more from public health care expenditure. Young immigrants from non European countries receive a larger amount of benefits respect to Spanish coetaneous while from 35 years old those born in Spain are more granted.

APPENDIX A: Samples and main variables

The endogenous variables in our empirical models (intensity of utilization of primary health care, outpatient specialized care, inpatients care and pharmaceuticals) have been determined following the standard classifications of the Spanish Information System. So that data on services utilization and health expenditure are available for these expenditure components in SNHS.

Intensity of utilization for primary health care and outpatient specialized care have been measure by the number of visits during the last four weeks. For inpatients care, we measure use intensity through the number of days in hospital during the last year. Finally, use of medicines intensity has been valued by the number of medicines prescribed during the last four weeks. After analyzing the distributions of these variables, we decided to categorize them as follows: (i) primary health care and outpatient specialized care variables into three levels as it is shown in Tables A.1 and A.2; (ii) for inpatients care, use intensity is grouped into three categories, presented in Table A.3; iii) use of medicines intensity has been grouped into five levels (see Table A.4).

Table A.1

DISTRIBUTION OF NUMBER OF VISITS TO THE FAMILY DOCTOR IN THE FOUR WEEKS

Intensity	Number of visits	Adults	Children
1	0	19103	6011
2	1	8062	2471
3	≥2	2313	640

Table A.2

DISTRIBUTION OF NUMBER OF VISITS TO THE OUTPATIENT SPECIALIZED CARE SYSTEM IN THE LAST FOUR WEEKS

Intensity	Number of visits	Adults	Children
1	0	24266	8098
2	1	4021	784
3	≥2	880	142

Table A.3

DISTRIBUTION OF THE NUMBER OF DAYS IN HOSPITAL IN THE LAST YEAR

Intensity	Number of days in hospital	Adults	Children
1	0	26447	8617
2	0-12	2425	452
3	≥13	591	46

Table A.4

DISTRIBUTION OF THE NUMBER OF MEDICINES PRESCRIBED DURING THE LAST FOUR WEEKS

Intensity	Number of medicines prescribed	Adults	Children
1	0	13972	5830
2	1	6 635	1822
3	2	4226	812
4	3	2344	367
5	≥4	2301	291

The explanatory variables included in the multinomial logistic regression models to estimate intensities of use for different health care expenditure components are: gender in order to capture differences in health care demand between males and females; age, squared age and cubic age are included in order to capture non linear relation between health care utilization and moving forward along the lifecycle; a dummy for child aged under one to capture intensity of health care utilization for young children; regional dummies for north, central, capital city, Mediterranean and southern area; population density is a categorical variable with three categories (low, medium and high density), it should capture different territorial needs and demand, as well as the urban/rural gap; education is included as dummy variable taking “1” for those individuals with university degree; lastly in the final specification is included a dummy for married persons (“1” if the person is married).

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