Voluntary Private Health Care Insurance Among the Over Fifties in Europe: A Comparative Analysis of SHARE Data [*]

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Abstract. Using data from SHARE (Survey of Health, Ageing and Retirement in Europe), we analyze the effect of having a voluntary health insurance policy (VPHI) on out-of-pocket (OOP) health spending for individuals aged 50 or more in a host of European countries. We control for self selection into VPHI policy holding, and find that VPHI policy holders do not have lower OOP's than the rest of the population: in Southern European countries they even spend more. We also find that the main determinants of VPHI are different in each country and this reflects the differences in the underlying health care systems.

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1. Introduction

Health risks are a major determinant of household saving behaviour in old age. In fact, part of the explanation of why elderly consumers do not run down their assets after retirement has do with the revision in conditional probabilities of health-related outlays (Palumbo, 1999). Health insurance policies exist, but the issue arises of whether they are effective in reducing the need for out-of-pocket health spending. In most European countries, major health shocks are covered by the public health system, thus out-of-pocket health spending for people who do not purchase health insurance has to do with private expenditures for health care partially covered (co-payments) or not reimbursed by the public scheme: in particular, specialist and diagnostic outpatient services, drugs, dental care, medical appliances, glasses, alternative medicine, and occasionally the choice of better or faster inpatient care for relatively important interventions.

The issue we address in this paper is the following: how effective are voluntary private health insurance policies in reducing out-of-pocket spending for individuals aged 50 or over across a group of European countries? To answer this question, we need to address the issue of the determinants of the decision to have an insurance policy.

In this paper we use data from a new European survey, SHARE (Survey of Health, Ageing and Retirement in Europe). This Survey collects data on the individual life circumstances of about 28,000 persons aged 50 and over in 11 European countries, ranging from Scandinavia to the Mediterranean. Ageing is one of the greatest social and economic challenges of the 21st century for European societies. Of the world regions, Europe has the highest proportion of people aged 65 or over. The main task of SHARE is to understand ageing and how it affects individuals in the diverse cultural settings of Europe. It is the first European data set to combine extensive cross-national information on socio-economic status, health, and family relationships of the elderly population (Börsch-Supan et al. 2005).

SHARE data show that holding voluntary private health care insurance (VPHI) among 50+ people is highly differentiated among European countries. In some countries, such as France, Belgium and the Netherlands, a high percentage of households (more than 50%) have a VPHI. On the other hand, in countries with a National health service (NHS) – such as Sweden, Italy, Spain and Greece – the percentage of households covered by VPHI is much lower (less than 10.5%)[1].

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[1] In this paper we consider "voluntary supplementary health insurance" as defined in Health Care Section of SHARE questionnaire (HC060 question). The definition given in the SHARE questionnaire is rather broad and encompasses all the three types of VPHI (i.e., complementary, supplementary, and duplicate of primary statutory coverage) according to OECD taxonomy (OECD, 2004).

Therefore, it seems relevant to analyse both the characteristics of VPHI (in terms of covered services and costs) and the main determinants of the different distribution of these policies within the SHARE countries. In particular, for each country, we aim at evaluating the impact of health, demographic and socio-economic variables on the probability to be covered by a supplementary health care insurance.

To this purpose, we firstly estimate a probit model for each country, considering a set of variables that can explain the holding of private health care insurance by 50+ people: physical health status, cognitive abilities, demographic, economic and financial characteristics.

Secondly, we consider the effects of VPHI on health care utilization and out-of-pocket (OOP) expenditures for inpatient care, outpatient care (including dental services), and prescribed drugs. In particular, we study the causal effect of having a VPHI on these OOP expenditures. To this purpose we use a simultaneous-equations model with instrumental variables, adopting a particular identification assumption: past or current occupation have an impact on the probability to subscribe a VPHI, but only current occupation affects OOP spending levels. We further assume that cognitive ability affects the probability to hold a VPHI, not OOP spending.

The paper is organized as follows. In section 2 we consider the institutional features of the health care systems and the role of private health insurance (both compulsory and voluntary) within SHARE countries. In section 3 we analyse the main characteristics of the households who subscribed VPHI policies and the additional coverage provided by them in the SHARE countries. In section 4 the main determinants of having a VPHI policy are evaluated for each country, while the causal relationship between VPHI and OOP spending is investigated in section 5. Section 6 concludes the paper with some comments and suggestions.

2. Role of private health care insurance within health care systems of SHARE countries

SHARE countries can be divided into four groups according to the public share of total health care expenditure (see Table 1, that shows some basic features of national health care systems): a) below 60% (Greece and Switzerland); b) ranging from 60% to 73%, which represented the OECD average in 2002 (Austria, the Netherlands, Spain); c) ranging from 73% to 80% (Belgium, France, Germany, Italy); d) above 80% (Denmark and Sweden).

Most SHARE countries have a statutory coverage for more than 90% of the entire population, with the exception of the Netherlands with 72% of public coverage. Private health insurance is used at different levels and for different reasons in individual countries. In some countries it is the primary source of health coverage for at least part of population. In other countries it acts as a complement, a

supplement or a duplicate of primary statutory coverage (OECD, 2004). The presence of private health insurance as primary source of health coverage for a part of population contributes to explain high levels of private insurance expenditure in the Netherlands (17.1%), Switzerland (9.6%) and Germany (8.6%), while the diffusion of mutual and employer-based insurance schemes is the main reason of the high percentage of health expenditure financed by private insurance in France (12.7%). We can distinguish two groups of countries: a) countries where VPHI represents the primary source of health coverage for a more or less wide subset of the population (the Netherlands, Germany, Belgium, Spain and Austria), and b) countries characterised by universal (public or mandatory) basic coverage (Denmark, France, Greece, Italy, Sweden and Switzerland).

a) In the first group of countries private health insurance is a source of primary coverage for that part of the population which is not eligible for universal public cover (in this case private insurance is the principal cover) or is entitled for public coverage but has chosen to opt out (in this case private insurance is a substitute cover). In 2002, in the Netherlands, nearly 28% of the population – those in the upper-income bracket – were excluded from public coverage and could voluntarily rely on private health insurance for principal coverage.[2] In Germany about 9.1% of population are covered by primary private insurance (the self-employed who are excluded from the social security system, employees above an income threshold who opt for private insurance, and public employees for the part of health care expenditures not directly reimbursed by the government)[3]. Finally, in Belgium, Spain and Austria there are small percentages of population (mainly self-employed and civil servants) who are covered by primary private health insurance (respectively 1.0%, 2.7% and 0.1%)[4].

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[2] After recent reforms (the new Health Insurance Act - *Zorgverzekeringswet*), the Dutch health care system would no longer be considered within this group. In fact, as from January 2006, all residents of the Netherlands are obliged to take out a health insurance. The system is operated by private health insurance companies; the insurers are obliged to accept every resident in their area of activity. A system of risk equalisation enables the acceptance obligation and prevents direct or indirect risk selection. The insured pay a nominal premium to the health insurer. Everyone with the same policy will pay the same insurance premium. The Health Insurance Act also provides for an income-related contribution to be paid by the insured. Employers contribute by making a compulsory payment towards the income-related insurance contribution of their employees.

[3] In Germany, employees above an income threshold are allowed to opt out of social health insurance provided by sickness funds and to buy a private health policy. Individuals eligible to opt out can still choose to remain insured with a sickness fund; once they opt out, however, they cannot opt back into social health insurance (OECD, 2004).

[4] In Belgium, self-employed individuals are covered by the social security system only for "major risks" such as hospitalisation, while "minor risks" (ambulatory care, dental care, drugs) can be covered through PHI offered by mutuals or by commercial insurers. About 12% of Belgian population were self-employed in 1999, and about 85% of them bought PHI for minor risks. In Spain the statutory public system does not cover a minority of population (about 1% including particular employment categories such as independent lawyers), 60% of which buys primary private insurance; another part of population, mainly civil servants and their dependents, are covered under a special system by mutual funds within which they can opt to choose care provided by the National Health Service or coverage through private insurance. In Austria, some self-employed individuals (about 0,1% of the population) opt out of the social security system, provided their relevant professional categories purchase primary private insurance for them. (OECD, 2004, pp. 31-33).

Table 1 : Characteristics of health care systems in SHARE countries

Country	Type of Coverage	% of population covered by		Public expenditure as % of total health care expenditures (2002)	OOP as % of total health care expenditures (2002)	PHI (2) as % of total health care expenditures (2002)	All Other Private Funds (3) as % of total health care expenditures (2002)
		Public/Mandatory Insurance	VPHI (1)				
Sweden	Public Tax Financed	100.0%	1-1.5%	85.3%	n.a.	n.a.	n.a.
Denmark	Public Tax Financed	100.0%	28.0%	82.9%	15.8%	1.2%	0.0%
Germany	Social Insurance	90.9%	9.1% (4)	78.6%	10.3%	8.6%	2.5%
Netherlands	Social Insurance	72.0%	64.0% (4)	62.5%	8.0%	17.1%	12.4%
Belgium	Social Insurance	99.0% (5)	57.5% (6)	75.0%	13.5%	n.a.	n.a.
France	Social Insurance	100.0%	92.0% (7)	76.1%	10.2%	12.7%	1.0%
Switzerland	Private Mandatory Insurance	100.0%	29.7%	57.9%	31.5%	9.6%	1.0%
Austria	Social Insurance	99.9%	31.8%	69.9%	17.5%	7.4%	5.2%
Italy	Public Tax Financed	100.0%	9.6-10.5%	75.4%	20.4%	2.1%	2.1%
Spain	Public Tax Financed	97.3%	10.3%	71.3%	23.7%	4.1%	0.9%
Greece	Public Tax Financed	100.0%	10.0%	51.6%	46.0%	2.4%	0.0%

(1) Voluntary private health insurance (VPHI) includes duplicate, complementary and supplementary VPHI by insurance companies and non profit collective funds (employer-based insurance funds and other group schemes). The percentage includes both the enrolled people and their dependents (other entitled household members).

(2) The percentage includes both primary (principal or substitute) private health insurance and VPHI.

(3) Health expenditure incurred by corporations and private employers providing occupational health services and other unfunded medical benefits to employees plus expenditure by non-profit institutions serving households (excluding social insurance) such as red cross, philanthropic and charitable institutions, religious orders, lay organizations; benefits provided for free by medical care providers plus health expenditure incurred by the rest of the world.

(4) For the Netherlands and Germany the data refers to VPHI policies held by individuals who belong to social health insurance systems. Some of the individuals with primary private health insurance are also covered by VPHIs which are sometimes packaged with primary private insurance policies.

(5) In Belgium compulsory statutory health insurance includes one scheme for salaried workers and one scheme for the self-employed people (about 12% of the population in 1999). The latter excludes coverage of "minor risks" such as outpatient care, most physiotherapy, dental care and minor operations.

(6) For Belgium, data include VPHI policies for hospital care offered by sickness funds as well as PHI policies offered by commercials companies. They exclude policies for hospital care that are compulsorily offered by several sickness funds to their members, that guarantees a limited lump sum (mostly less than 12.4 euros per day) and covered about 67% of the population in 2000.

(7) Including CMU, publicly financed programme providing complementary private health insurance to eligible low income groups (86% without CMU).

Sources: OECD (2006), (2005) and (2004); Mossialos and Thomson (2002); Nomisma-Criep (2003) (for Italy); Holly et al. (2005) (for Switzerland).

b) In the second group of SHARE countries, Sweden, Denmark, Italy, Greece and France are characterised by basic universal coverage provided by a public health care system (a tax-based National Health Service for the first four countries; a social security system for France). In this second group, the Swiss health care system can be considered as a border line case since it guarantees a universal basic coverage by compulsory (and publicly subsidised) private health insurance[5] with flat and non income-related premiums[6].

As pointed out by OECD (2004), voluntary private health insurance (VPHI) can integrate statutory health insurance in three ways: providing "supplementary", "complementary" and "duplicate" coverage[7].

Supplementary VPHI provides full or partial coverage for goods and services that are excluded by statutory health care insurance (some inpatient and outpatient services, dental care, pharmaceuticals, rehabilitation, long-term care, alternative medicine). VPHI is only supplementary in the Netherlands and in Switzerland. For example, in the Netherlands nearly all of the population with social health insurance, and some individuals who buy primary private insurance, purchase supplementary insurance which covers for dental care for adults, private rooms in the hospitals and alternative care.

Complementary VPHI provides full or partial funding for goods and services that are not fully covered by the statutory health care system, by covering all or part of the residual costs not otherwise reimbursed (e.g. co-payments). This type of coverage predominates in France (especially for outpatient services), where complementary insurance reaches almost 92% of the population (anyway, for a lower proportion of the French population, VPHI also has important supplementary coverage features)[8].

Duplicate VPHI offers cover for goods and services already included under statutory health insurance. It increases consumer choice (where privately funded providers operate in parallel to the

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[5] In this respect, it is similar to the new Dutch health care system, see note 2 above.

[6] In Switzerland the mandatory private basic insurance is mostly provided by not-for profit sickness funds and it is heavily regulated: enrolment is open, premiums are community rated at the level of each insurer, the benefit package is standardised, and the insured can freely move across private insurers. The private insurers can also provide supplementary VPHI, like sickness funds in the Netherlands, through affiliated insurers.

[7] In the case of employment group insurance plans (mainly offered in France, Italy, Austria, Greece and Sweden), sometimes membership is the default option. Even in this case we use the term VPHI.

[8] France has used cost-sharing as a means of controlling health care expenditure; nevertheless, instead to control moral hazard, this strategy has encouraged the growth of complementary PHI and now most French people purchase this type of PHI to reduce financial burden of co-payments. Under this respect, France represents an outlier since in other European countries the increase in cost-sharing have not made much impact on the size of the market for voluntary PHI (Mossialos and Thomson, 2002). This result depends on the wide diffusion of non profit mutual and employer-based insurance schemes (*mutuelles* and *institutions de prévoyance*). Moreover, since 2000 the publicly financed programme CMU (*Couverture Maladie Universelle*) provides low income individuals with complementary PHI coverage. These individuals now account for 6% of population covered by complementary PHI. CMU has partly reduced a former pro-rich bias in the distribution of access to health care (Van Doorslaer, Masseria et al., 2004).

public delivery system) and access to different health services, e.g. guaranteeing improved quality of care and faster access to treatment. Duplicate VPHI develops when the level of satisfaction with publicly funded services is rather low (consumers desire to obtain better and faster care).

In many SHARE countries we find different combinations of the three types of VPHI. In Austria, Belgium, Denmark, Germany and Sweden VPHI is both supplementary and complementary. In Greece and Spain it both duplicates and supplement national health insurance. In Italy, VPHI can duplicate, supplement, or complement NHS coverage (with duplicate coverage mostly provided for by profit insurance companies and complementary and supplementary coverage provided for by employer-based, professional and mutual aid funds).

3. Characteristics of voluntary health care insurance in the SHARE countries

3.1. Data

The data we use are derived from the first wave of SHARE, and were collected in 2004. For the purposes of our analysis, we consider data at the household level. The eligible reference person (the "head") is selected within each household (N = 19568). Within couples, the head is chosen as the elder, or the female when the two partners have the same age.

Table 2 shows some characteristics of VPHI at the household level. In the SHARE sample, 7012 households report holding at least one VPHI (30.57% of total weighted population) and 77.63% of insured households have more than one VPHI policy. Table 2 also reports mean and median total yearly premiums paid by households for VPHI. The higher median values of total premiums are in France and Germany (but in the latter case the total amount refers both to primary PHI and to supplementary VPHI). It is worth noting that in all countries insured households have median income higher than non-insured ones.

Table 3 shows demographic and educational characteristics of the heads of insured households with at least a VPHI policy. For all countries but Germany, a very large share of insured heads are less than 60 years old (in Germany, the higher percentage of insured is between 60 and 69 years old). The prevalence of VPHI among the 50+'s varies widely across countries but, considering the entire SHARE sample, the insured heads are more concentrated among persons younger than 60: 36.42% against the SHARE average of 32.58% (last two rows of table 3)[9]. In all countries most heads lives

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[9] As pointed out by OECD, 2004, the distribution of population coverage across different age groups is not homogenous, most likely as a consequence of differences in public sector coverage, regulation, varied employer offerings of health

with a partner and this percentage is higher for the insured: 64% against 58.96% on average. In many countries a high percentage of insured heads has higher educational levels (ISCED 3 or more); however, in the Netherlands, France and Spain we find very high percentages (over 50%) of insured people at lower educational levels. Considering the SHARE sample as a whole, the insured heads exhibit higher educational levels (ISCED 3 or more): 54.30% against 47.77% on average.

Table 4 reports some characteristics of physical health of heads. Comparing the statistics of insured people with those of the entire SHARE sample (last rows), it is evident that persons with a VPHI are usually characterized by good or very good self-reported health, fewer chronic diseases and physical limitations, even though in some countries (Austria, Germany and the Netherlands) we find a large share (more than 40%) of insured people with some limitations as measured by Global Activity Limitations Indicator (GALI)[10]. The "objective" health index reported in the last column of table 4 is a measure of that part of the self-reported health status that can be explained using information on health problems and physical tests available in SHARE (Jürges, 2005). It ranges from 0 to 1, when 1 is the best health possible. On average, considering the entire SHARE sample, this particular index is higher for insured heads.

Table 5 reports information about the cognitive abilities of the insured heads. They show better levels of several cognitive functions (verbal ability, numeracy and reading skills). The only exceptions are given by the Mediterranean countries (especially Spain and Greece), where low levels of verbal and reading abilities even for insured people.

Finally, table 6 reports statistics about the current and past occupational status of the members of households with a VPHI. On average, insured households are more likely to have at least one member who is currently employee, currently or previously civil servant or employed in a average size firm with more than 24 employees. Sweden, Switzerland, Italy and Greece show a quite large share of insured households where at least one member is or was a self-employed.

Summing up, in SHARE VPHI is predominantly held by individuals with higher income, education levels and employment conditions, in agreement with evidence on OECD countries (OECD, 2004, pp. 59-62).

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insurance, diverse levels of dependent coverage by policies, and other factors. In several countries where private health insurance is provided as a condition of employment, coverage is highest among the middle age cohorts.

[10] Moreover, in France we find that the share of people with more than one ADL limitation is higher for the insured than for the whole sample.

Table 2 : Characteristics of VPHI at the household level

Country	Weighted % of households with at least one VPHI	% of insured households with more than 1 policy	VPHI yearly premiums [1]		Median income (PPP adjusted)	
			Mean	Median	Insured households	Not-insured households
Sweden	3.60	51.65	330.46 (54.77)	177.55	61587	29924
Denmark	40.14	58.13	262.12 (37.51)	201.65	42829	21878
Germany	13.91	57.35	1056.65 (132.47)	550.00	36142	23559
The Netherlands	71.14	56.94	1169.12 (162.73)	530.00	38594	32347
Belgium	76.43	72.89	348.50 (112.39)	124.00	26387	19182
France	82.74	96.13	770.48 (20.92)	670.00	24546	21212
Switzerland	35.26	71.38	970.15 (87.63)	391.08	42111	32454
Austria	26.61	39.28	858.96 (57.01)	480.00	26521	19486
Italy	7.51	38.32	672.22 (152.53)	300.00	31759	16801
Spain	10.15	66.83	2521.84 (1086.02)	370.00	23490	11528
Greece	6.18	48.94	515.36 (71.30)	300.00	18880	11425
All SHARE countries	30.57	77.63	874.01 (52.89)	540.00	28703	19230

All statistics are population weighted. All values are PPP-adjusted.
[1] For Germany, the Netherlands, Austria and Spain, total premiums amount refers both to primary PHI and to additional VPHI.

Table 3 : Demographic and educational characteristics of the head of the insured household (percentages)

Country	Gender (Male)	Age (years)				Marital status				Educational level – ISCED			
		< 60	60–69	70–79	>=80	Living with a partner	Separated or divorced	Widowed	Never married	0 [1]	1 or 2	3	4 or more
Sweden	62.58	68.71	25.92	2.78	2.59	83.81	9.03	0.00	7.16	1.20	28.50	25.47	44.83
Denmark	54.21	42.41	31.35	18.74	7.50	63.26	15.40	15.09	6.25	0.53	11.46	47.37	40.64
Germany	57.40	29.19	42.28	17.98	10.55	69.26	6.78	17.87	6.09	0.33	8.82	53.14	37.71
Netherlands	54.46	40.43	26.50	21.40	11.67	66.73	9.26	18.20	5.81	2.00	54.99	23.10	19.91
Belgium	53.45	36.79	29.06	24.89	9.26	68.66	8.73	18.84	3.77	2.40	45.67	25.76	26.17
France	51.48	34.48	25.33	24.08	16.11	59.63	11.00	22.86	6.51	20.64	34.54	26.13	18.69
Switzerland	49.45	39.73	31.17	21.57	7.53	68.08	13.00	15.93	2.99	6.05	39.01	21.76	33.18
Austria	53.91	34.69	28.95	26.18	10.18	60.48	8.68	22.48	8.36	0.18	15.50	43.84	40.48
Italy	60.80	47.64	35.37	12.64	4.35	72.60	8.18	6.54	12.68	1.57	36.91	33.92	27.60
Spain	52.01	46.61	21.25	24.28	7.86	71.09	5.60	15.27	8.04	7.28	48.43	16.20	28.09
Greece	64.30	55.84	31.38	8.20	4.58	67.49	10.22	16.44	5.85	4.71	31.79	32.19	31.31
(Insured) SHARE countries	53.40	36.42	28.63	22.18	12.77	64.00	9.80	19.74	6.46	11.41	34.29	30.02	24.28
(All) SHARE countries	50.68	32.58	28.53	24.36	14.53	58.96	8.97	23.90	8.17	8.77	43.46	29.42	18.35

All statistics are population weighted.
[1] This category includes also the answers "Still in school" and "Other type of educational degree"

Table 4 : Physical health status of the head of the insured household

Country	Limitations with activities (GALI)	Long-term illness	N. of chronic diseases [1]:			N. of ADL limitations			Self-reported health (US scale)					Objective health index
			0	1	>1	0	1	>1	Excellent	Very good	Good	Fair	Poor	
Sweden	37.36 %	36.78 %	36.44%	38.31%	25.25%	93.49%	6.51%	0.00%	33.03 %	34.03%	27.55%	5.39 %	0.00 %	0.875
Denmark	38.99 %	52.10 %	28.17%	31.92%	39.91%	92.23%	5.24%	2.53%	25.84 %	31.24 %	25.00%	13.14%	4.77 %	0.834
Germany	46.60 %	53.60 %	30.47%	34.88%	34.65%	92.13%	5.14%	2.73%	6.60 %	21.71 %	41.04%	24.08%	6.57 %	0.837
Netherlands	46.40 %	44.19 %	30.71%	33.43%	35.86%	90.93%	4.89%	4.18%	12.17 %	18.00 %	41.43%	23.22%	5.18 %	0.825
Belgium	38.60 %	45.96 %	20.35%	32.11%	47.54%	87.83%	7.46%	4.71%	10.39 %	22.57 %	42.28%	19.22%	5.55 %	0.805
France	38.94 %	51.59 %	22.49%	32.84%	44.67%	86.97%	6.35%	6.68%	7.32 %	14.72 %	43.79%	24.62%	9.55 %	0.795
Switzerland	31.65 %	37.13 %	35.44%	35.21%	29.35%	93.84%	3.50%	2.66%	16.91 %	31.80 %	35.80%	11.79%	3.70 %	0.860
Austria	50.83 %	49.51 %	24.99%	37.47%	37.54%	89.63%	4.54%	5.83%	9.29 %	24.37 %	35.08%	23.60%	7.66 %	0.815
Italy	29.98 %	38.16 %	31.30%	36.23%	32.47%	92.89%	3.85%	3.26%	9.05 %	13.01 %	51.98%	22.03%	3.92 %	0.835
Spain	33.07 %	47.94 %	19.42%	37.03%	43.55%	90.21%	5.13%	4.66%	3.19 %	21.64 %	39.15%	32.34%	3.67 %	0.810
Greece	19.33 %	37.09 %	36.77%	33.86%	29.37%	90.80%	4.53%	4.67%	13.29 %	29.80 %	37.07%	15.67%	4.17 %	0.843
(Insured) SHARE countries	40.02 %	49.21 %	25.30%	33.62%	41.08%	89.01%	5.78%	5.21%	8.82 %	18.08 %	42.27 %	23.40%	7.43 %	0.811
(All) SHARE countries	44.82 %	52.70 %	24.36%	31.64%	44.00%	87.72%	6.18%	6.10%	6.96 %	16.43 %	39.30%	27.59%	9.72 %	0.796

All statistics are population weighted.

[1] Chronic diseases: heart problems; high blood pressure; high blood cholesterol; stroke and/or cerebral vascular disease; diabetes; chronic lung disease; asthma; arthritis/rheumatism; osteoporosis; cancer; stomach ulcer; Parkinson disease; cataracts; hip or femoral fracture.

Table 5 : Cognitive abilities of the head of the insured household

Country	Verbal fluency test (1)	Self-rated reading skills (2)			Numeracy score (3)		
		1 (excellent)	2 – 4	5 (poor)	1 (bad)	2 – 4	5 (good)
Sweden	27.58	65.31 %	34.69 %	0.00 %	0.00 %	70.82 %	29.18 %
Denmark	24.57	34.79 %	63.80 %	1.41 %	1.77 %	58.86 %	39.37 %
Germany	22.81	22.70 %	76.54 %	0.76 %	3.45 %	57.92 %	38.63 %
The Netherlands	20.72	16.88 %	79.29 %	3.83 %	3.06 %	64.62 %	32.32 %
Belgium	21.17	27.92 %	67.81 %	4.27 %	2.66 %	80.06 %	17.28 %
France	20.96	28.83 %	65.30 %	5.87 %	8.09 %	77.60 %	14.31 %
Switzerland	22.41	30.99 %	67.97 %	1.04 %	0.68 %	67.23 %	32.09 %
Austria	23.12	37.82 %	60.07 %	2.11 %	2.37 %	70.43 %	27.20 %
Italy	17.41	24.18 %	69.94 %	5.88 %	5.41 %	72.36 %	22.23 %
Spain	17.90	20.57 %	69.98 %	9.45 %	6.73 %	85.09 %	8.18 %
Greece	17.96	15.43 %	76.68 %	7.89 %	2.03 %	67.64 %	30.33 %
(Insured) SHARE countries	21.07	26.45 %	68.86 %	4.69 %	5.78 %	72.87 %	21.35 %
(All) SHARE countries	18.76	19.00 %	73.12 %	7.88 %	9.06 %	73.23 %	17.71 %

All statistics are population weighted.

(1) This test aims at measuring cognitive functions like memory and concentration. Respondents have to name as many different animals as possible within one minute. The score is given by the total number of different animal names.

(2) This is a self-report question on the respondent's reading ability, based on scale from 1 to 5.

(3) This test aims at establishing the respondent's level of mathematical or numeracy skills. Respondents have to carry out some calculations based on real life situations, beginning with relatively easy items and getting progressively more difficult. The scale from 1 to 5 is calculated taking into account the number of corrected answers and the difficulties of the questions.

Table 6 : Occupational status of insured heads

Country	At least one member is currently retired	At least one member is currently an employee	At least one member is currently a homemaker	At least one member is or was a civil servant	At least one member is currently a self-employed	At least one member is or was a self-employed	At least one member works or worked in a firm with more than 24 employees
Sweden	16.25 %	69.38 %	0.83 %	41.84 %	29.82 %	35.96 %	49.48 %
Denmark	44.84 %	53.17 %	2.72 %	21.96 %	11.12 %	22.07 %	61.55 %
Germany	57.98 %	32.37 %	14.84 %	10.34 %	15.17 %	20.65 %	50.95 %
Netherlands	41.51 %	35.97 %	30.48 %	18.94 %	6.79 %	14.95 %	51.91 %
Belgium	59.98 %	27.84 %	24.90 %	25.78 %	6.10 %	17.84 %	65.02 %
France	62.30 %	30.84 %	16.36 %	24.72 %	6.03 %	18.63 %	60.70 %
Switzerland	40.44 %	45.97 %	15.10 %	7.75 %	17.52 %	25.15 %	59.46 %
Austria	60.47 %	33.66 %	15.45 %	21.95 %	8.83 %	19.05 %	51.92 %
Italy	49.67 %	32.73 %	18.02 %	29.79 %	24.18 %	34.54 %	55.18 %
Spain	38.67 %	33.17 %	29.03 %	16.56 %	14.03 %	24.29 %	36.01 %
Greece	39.58 %	44.36 %	26.12 %	28.55 %	26.91 %	41.17 %	42.93 %
(Insured) SHARE countries	56.23 %	32.80 %	18.73 %	21.74 %	9.19 %	19.87 %	57.10 %
(All) SHARE countries	54.29 %	27.41 %	23.58 %	15.62 %	8.67 %	19.45 %	46.96 %

All statistics are population weighted.

3.2 The additional coverage provided by voluntary private insurance in the SHARE countries

Table 7 reports the types of coverage provided by VPHI in each SHARE country, according to the country specific answer categories of the following question in the Health Care Section of SHARE questionnaire:

HC060: "Do you have any voluntary, supplementary or private health insurance for at least one of the following types of care in order to complement the coverage offered by the National Health System? If yes, please say what is covered. (CODE ALL THAT APPLY)

1. Medical care with direct access to specialists

2. Medical care with an extended choice of doctors

3. Dental care

4. A larger choice of drugs and/or full drugs expenses (no participation)

5. An extended choice of hospitals and clinics for hospital care

6. (Extended) Long term care in a nursing home

7. (Extended) Nursing care at home in case of chronic disease or disability

8. (Extended) Home help for activities of daily living (household, etc.)

9. Full coverage of costs for doctor visits (no participation)

10. Full coverage of costs for hospital care (no participation)

96. No voluntary health insurance at all

97. Any other type of voluntary health insurance

Given the different characterizations of VPHI across SHARE countries (supplementary, complementary or duplicate) it is not easy to trace a prevalent type of covered health care.

In addition, for some countries the proposed classification of VPHI coverages proved not easily adaptable. In Sweden a very large proportion of insured households indicates "any other type of VPHI coverage". This answer apparently refers to a private insurance scheme which covers income loss during longer periods of sickness (normally more than three months). This kind of insurance, however, does not cover any kind of health care, and therefore we do not treat it as a VPHI. For France and Belgium, a different classification of covered health care has been adopted. In France more than 80% of insured households are covered for the reimbursement of co-payments (for outpatient and inpatient care, and for drugs), of dental care and of optical protheses, confirming that VPHI predominantly complements public coverage. In Belgium, VPHI mostly covers full costs of

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hospital care (75.63% of insured households) and an extended choice of hospitals (40.02% of insured households) and therefore it seems predominantly supplementary of public coverage.

In general, from table 7, we observe that the most frequent VPHI coverages are for providing direct access to specialists, extended choice of hospitals and clinics, full coverage of hospital care costs, and access to dental care. In other terms, VPHI can enhance choice over the providers, conditions and timeliness of care.[11] Besides, where cost-sharing on public systems is large, it provides a complementary coverage for services and costs that may otherwise be paid out-of-pocket; in this case, the issue of the right balance between improving access and controlling moral hazard from over-utilization of services becomes crucial.[12]

Moreover, analysing the data collected from the Health care section of SHARE questionnaire, we observe that there are some differences between insured and not insured 50+ people as far as health care utilization concerns.[13] People with a VPHI are more likely to have outpatient surgery (6.29% for the insured against 4.48% for the others); to visit a heart specialist (12.23% against 10.21%), a dermatologist (2.03% against 1.63%) or a surgeon (2.61% against 1.88%); to see a dentist or a dental hygienist (57.40% against 49.66%). We also observe that the probability to forego health care because of its unavailability is relatively lower among people with a VPHI (1.31 against 2.70%).[14]

Summing up, it seems that, apart from equity considerations, the additional coverage provided by VPHI somehow enhances access to care.[15] But the higher accessibility guaranteed by a private insurance does not necessarily mean that VPHI contributes to a reduction of households' out-of-pocket expenditures (OOPs) as we shall show in section 5.

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[11] As pointed out by OECD (2004, p. 55), in social-insurance based health systems, such as Germany, the Netherlands, Austria, France and Belgium, VPHI usually pays for upgraded accommodation in hospitals (but the cost of hospital treatment is usually covered for by public system, regardless of treating hospitals). Meanwhile, in tax-based health systems, such as United Kingdom, Denmark, Italy, and Spain, VPHI improves access to timely elective care: those who lack VPHI have comparatively less choice of provider and timing of care, unless they opt to pay for such care OOP (OECD, 2004, p. 178).

[12] According to Buchmueller and Couffinhal (2004), in France VPHI significantly increases medical care utilisation for physician services and prescribing drugs, since it seems to reduce (and sometimes eliminate) OOP costs.

[13] In this paper we do not report all the statistics on health care utilization by household's heads with a VPHI policy. These data are available on request to the authors.

[14] This confirms the results of OECD (2004) study on the benefits covered by VPHI.

[15] Since in many countries private health insurance coverage increases with economic and financial status (as we will show in next section) the strong effect of insurance on utilization could imply that VPHI contributes to a "pro-rich" horizontal inequality in the use of health care. On this point, see also Van Doorslaer, Masseria et al. (2004) and Jones, Koolman and Van Doorslaer (2005).

Table 7: Health care covered by VPHI (percentages of insured households) (1)

Type of health care	Sweden	Denmark	Germany	The Netherlands	Switzerland	Austria	Italy	Spain	Greece	Type of health care	France (2)	Belgium (2)
1. Medical care with direct access to specialists	15.85	26.09	26.28	0.00	25.89	12.39	30.50	69.03	34.15	**1. Medical care with direct access to specialists (Reimbursement of co-payments)**	80.03	….
2. Medical care with an extended choice of doctors	5.28	14.17	24.23	0.00	28.57	11.28	12.77	47.35	24.39	**2. Medical care with an extended choice of doctors (Reimbursement of additional costs for doctors of *secteur deux)***	58.99	….
3. Dental care	2.46	50.40	39.03	69.28	10.71	6.86	7.09	35.84	6.50	**3. Dental care**	88.10	8.16
4. A larger choice of drugs and/or full drugs expenses (no participation)	5.28	36.55	4.85	41.62	23.21	7.08	6.38	10.62	13.01	**4. A larger choice of drugs and/or full drugs expenses (no participation)**	0.00	0.00
5. Extended choice of hospitals and clinics for hospital care	4.93	15.30	28.83	0.00	58.33	71.02	29.79	47.35	27.64	**5. Extended choice of hospitals and clinics for hospital care:** - private rooms - other private costs	65.23 74.01	40.02 ….
6. (Extended) Long term care in a nursing home	1.41	1.13	0.00	0.00	13.69	2.88	0.00	2.21	5.69	**6. (Extended) Long term care in a nursing home**	30.24	….
7. (Extended) Nursing care at home in case of chronic disease or disability	0.70	2.25	0.00	0.00	14.29	3.54	2.13	25.66	6.50	**7. (Extended) Nursing care at home in case of chronic disease or disability**	58.07	10.88
8. (Extended) Home help for activities of daily living (household, etc.)	0.70	0.64	0.00	0.00	13.69	2.65	3.55	4.42	3.25	**8. (Extended) Home help for activities of daily living and home care (medical and nursing services, medical appliances, etc.)**	15.58	17.09
9. Full coverage of costs for doctor visits (no participation)	15.14	5.31	0.00	0.00	4.17	8.41	7.80	45.58	21.95	**9. Full coverage of costs for doctor visits (no participation)**	0.00	….
10. Full coverage of costs for hospital care (no participation)	10.56	4.67	39.29	0.00	8.33	28.76	19.15	42.48	45.53	**10. Full coverage of costs for hospital care (no participation)**	0.00	75.63
11. Any other type of VPHI coverage	72.18	30.60	19.64	24.35	23.21	12.61	29.08	11.50	16.26	**11. Any other type of VPHI coverage** - Protheses and medical appliances (glasses, lenses, hearing protheses, etc.) - Alternative Medicine/Homeopathy - Ambulance services - Co-payments on drugs - Medical care abroad - Other types	84.92 …. …. 85.48 …. 1.91	11.03 5.34 33.40 …. 22.47 8.67

(1) Sum of percentages can exceed 100% since the household can hold more than one VPHI policy.

(2) For some categories, France and Belgium have adopted different definitions for health care covered by VPHI.

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4. Main determinants of VPHI holding

In order to identify the main determinants of having a VPHI policy in the SHARE sample, for each country we estimate a probit model over a wide set of variables that can explain the holding of VPHI by 50+ people. The dependent variable takes value of 1 if the household has at least one VPHI, zero otherwise. The explanatory variables can be divided in seven groups: 1) demographic characteristics of the head and the household; 2) educational level of the head; 3) current physical health status of the head; 4) current cognitive abilities of the head; 5) current and past occupational status of the household's members; 6) current economic and financial status of the household; 7) expected economic status of the head.

Household income and real asset values are PPP-adjusted. Reading skills, numeracy score and the self-reported health status are expressed on a 0-1 scale, as the "objective" health index.

In SHARE five different datasets are available for income and asset variables, because of Multiple Imputations (MI). Therefore, five different datasets are created and we perform the analysis on each dataset separately. The estimated parameters are then combined using the results of Rubin (1987)[16], in order to create one repeated-imputation inference (see Little and Rubin, 2002 for a recent survey). Results are summarized in Table 8, where for each country we report sign and significance of each parameter.

As expected, the main determinants of VPHI are different in each country and this reflects the differences in the underlying health care systems.

For most countries the educational level and the cognitive abilities of the household's head are the main determinants that explain the holding of a VPHI policy.

The presence of a partner has a significantly positive effect on the probability to be voluntary insured in Sweden, Denmark, the Netherlands, Belgium, France, and Austria, while gender and age of the respondent influence the decision to have a VPHI only in a few countries. Demographic characteristics are very important in Belgium and Denmark.

In several countries the past or current occupational status of the household's members can significantly affect the probability of holding a VPHI policy. In particular, the presence of self-employed in the household is positively related with the holding of a VPHI policy in Sweden, Denmark, Italy and Greece, while the presence of household's members employed in firms with more than 24 employees increases significantly the probability to hold a VPHI in Belgium, France, Italy and Greece.

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[16] The point estimate of a parameter in a MI analysis is the average value of the point estimates obtained in each separate analysis, while the variance of the MI estimate is calculated by a formula involving both the between-imputation and the within-imputation variance.

Tab. 8 : List of sign and significance of the estimated coefficients in each country probit regression

	Variable	Sweden	Denmark	Germany	Netherlands	Belgium	France	Switzerland	Austria	Italy	Spain	Greece
	Weighted % households with at least a VPHI	3.60	40.14	13.91	71.14	76.43	82.74	35.26	26.61	7.51	10.15	6.18
1. Demographic Characteristics	Male	+	– ***	–	–	–	–	–	– **	+	–	– *
	Age less than 60	+	+	– ***	+	+ ***	+	+	–	+	+	+ **
	Age 60-69	+	+ **	– *	+	+ ***	+	+	–	+	–	+ *
	Age 70-79	+	+ **	– **	+	+ ***	+	+	+	+	+	+
	Partner	+ **	+ *	+	+ ***	+ ***	+ ***	+	+ ***	+	+	–
	Household size	–	+	–	+	+	– ***	–	–	–	–	+
2. Educational Level	Education - ISCED 3	+	+ ***	+ *	+	+	–	+	+ ***	+ ***	+ ***	+ ***
	Education – ISCED 4 or more	+	+ ***	+ **	+	+	–	+ **	+ ***	+ ***	+ ***	+ ***
3. Physical health Status	Limitations with activities (GALI)	+	–	+	+	–	+	–	–	–	–	–
	Long-term illness	–	–	–	+ **	–	+	–	+	–	–	+
	"Objective" health index	+	– **	+	–	–	+	– ***	– **	–	–	–
	Self-reported health status (US scale)	+	+	+	+	+	+	+	–	–	–	+
4. Cognitive abilities	Numeracy (best household performance)	–	+ ***	+ **	+ ***	+ ***	+	+	+ ***	+	+ *	+
	Verbal fluently test (best household performance)	+ *	+ **	+ **	+	–	+	+ **	– *	+ *	+	+ ***
	Reading skills (best household performance)	+ *	+	+ ***	– *	+	+	+ *	+ ***	+	+ *	– ***
5. Occupational status	Any civil servant in the household (past or current)?	– ***	+	– *	– ***	+ *	–	+	+ ***	–	+ **	+
	Any self-employed in the household (past or current)?	+ **	+ **	+	–	–	–	–	+	+ **	+	+ **
	Any employed in a firm with more than 24 employees in the household (past or current)?	+	+	–	+	+ ***	+ ***	+	–	+ **	–	+ ***
6. Economic and financial status	Ownership of the house	– **	+	+	+	–	+ ***	+	+	–	+	– **
	Household income	+	+	+ *	–	+	–	+	+	+	+	+
	Real assets	+ ***	+	+	–	–	–	–	+	+	+ *	+ **
7. Expected economic status	Respondent is entitled to receive a future pension	+	+	–	+ *	+	–	+	+ *	+ ***	+	–

Significance levels: *** = 1% level; ** = 5% level; * = 10% level

Past or current presence of civil servants in the households increases the probability to hold a VPHI policy in some countries (Belgium, Austria and Spain) while it reduces the probability of VPHI in other countries (Sweden, Germany, the Netherlands).

Finally, current physical health status, current economic and financial status, and expectations on future economic status are important determinants of holding a VPHI policy only in a few countries. In particular, households with higher levels of real assets show a higher probability to hold a VPHI in Sweden, Spain and Greece.

Overall, there is evidence that VPHI policies are mostly held by better educated and cognitively more able people.

5. The relationship between out-of-pocket payments and voluntary private health insurance

5.1. Descriptive analysis

Table 1 in section 1 shows that people of all SHARE countries have some out-of-pocket (OOP) expenditures. It can be important to assess how effective voluntary private health insurance is in reducing out-of-pocket expenditures (OOPs) for individuals aged 50 or over across SHARE countries. We define OOPs as the sum of non-refunded payments for hospital inpatient care, outpatient care (including dental services) and prescribed drugs[17].

In the first results SHARE book, Holly et al. (2005) found that in most countries, the proportion of people paying out-of-pockets (OOPs) is not significantly different between those who have subscribed a VPHI and those who have not[18], confirming previous results (e.g., OECD, 2004). Our analysis, based on a more complete data set than Holly et al. (2005), produces results which are rather different (Table 9).

In Sweden, Germany, the Netherlands, France, Switzerland and Greece the proportion of people with positive OOPs does not significantly differ between people with or without VPHI (for all these counties, P-values are higher than 0.10 in part 1 of table 9). In all other countries VPHI heads have a higher probability of paying OOPs.

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[17] These OOP expenditures refer to questions HC045, HC047 and HC049 of the Health Care Section of SHARE questionnaire. If the answer in any item is missing, a conditional hot-deck procedure is used for imputing the corresponding amount. In imputation, we stratify by country, gender, age and unfolding bracket information. In fact, in the SHARE questionnaire, if the answer to an amount question is "Don't Know" or "Refusal", a number of subsequent questions on whether the amount is larger than, smaller than, or about equal to a given amount are asked; this is the so-called unfolding bracket design and it was proved to be an effective way to collect categorical information on the initial non-respondents.

[18] In two countries (Austria and Italy) 50+ people covered by a VPHI showed a higher probability of spending OOPs, whereas the opposite relationship were observed in Greece, France and in the Netherlands. Moreover, Holly et al. (2005) found that in Austria, Germany, Spain, Italy, and Denmark, people in the subgroup of those having positive OOPs and who are covered by a VPHI meet higher OOPs (this relationship remained true across income quintiles). They concluded that these results could suggest that the VPHI may induce people in these countries to consume more and make higher health expenditures. Using different data, Borgia and Doglia (2006) show that in Italy OOP levels do not differ between insured and uninsured households.

Table 9: Relationship between OOP Payments and the coverage by VPHI in SHARE countries

Country	Weighted percentage households with VPHI	(1) Weighted percentage of households with OOP> 0			(2) Weighted mean OOP expenditures if OOP > 0			(3) Weighted mean OOP expenditures		
		Without VPHI	with VPHI	*P*-value	without VPHI	With VPHI	*P*-value	without VPHI	with VPHI	*P*-value
Sweden	3.60	92.66%	93.11%	0.89	371.70	336.96	0.49	344.43	313.74	0.52
Denmark	40.14	85.34%	92.26%	<0.01	445.04	552.45	0.05	379.80	509.69	0.01
Germany	13.91	87.55%	87.23%	0.89	296.23	333.60	0.30	259.33	291.01	0.33
Netherlands	71.14	40.94%	42.67%	0.51	470.92	474.86	0.97	192.82	202.63	0.83
Belgium	76.43	93.02%	95.48%	0.03	1084.33	935.22	0.19	1008.67	892.97	0.28
France	82.74	46.02%	42.96%	0.30	594.93	373.43	0.20	273.79	160.44	0.16
Switzerland	35.26	76.44%	71.64%	0.19	646.90	729.33	0.43	494.51	522.52	0.73
Austria	26.61	74.85%	84.54%	<0.01	292.95	433.17	<0.01	219.28	363.21	<0.01
Italy	7.51	80.60%	94.71%	<0.01	788.57	1449.80	0.18	635.66	1373.04	0.11
Spain	10.15	43.69%	67.15%	<0.01	449.27	691.24	0.04	196.27	464.15	<0.01
Greece	6.18	86.71%	83.46%	0.35	690.40	863.68	0.26	598.67	720.84	0.35

On the other hand, in Denmark, Austria and Spain the VPHI coverage seems associated with significantly higher OOPs (table 9, part 2); and these results are confirmed also when the possibility of zero OOPs is considered (table 9, part 3). It would be interesting to investigate whether this OOP spending behaviour of insured households is associated with an increase of the services they use in the health care system as a whole.

5.2   The econometric model

Previous results cannot be considered decisive to ascertain whether VPHI actually substitutes for private expenditures or determines an incentive to spend more on OOPs. In fact, the total effect of VPHI on OOP expenditures is likely to differ across households within the same country, partly as a result of observable characteristics (age, income, education, health status, wealth, etc.), partly as a consequence of unobserved heterogeneity in preferences. Therefore, unobserved heterogeneity makes it impossible to give a causal interpretation of the estimate of the VPHI dummy parameter in a standard linear regression of OOPs.

We tackle this problem by assuming that some variables affect the probability of holding a VPHI policy, but not the desired OOP expenditures. According to the Probit estimates in Table 8, we consider six variables that can be used as instruments for VPHI in the OOP regression: a) at least one household member *was or is* a civil servant; b) at least one household member *was or is* a self-employed; c) at least one household member *worked or works* in firms with more than 24 employees; d) current cognitive abilities of the head of the household (d1) numeracy, d2) verbal fluency test score, d3) self-reported reading ability).

Moreover, some types of *current* occupational status (at least one household member is currently an employee, a retired, a homemaker) can affect the level of OOP expenditures, but has no effect on the probability to be covered by a VPHI. Finally, those who are currently self-employed have higher opportunity costs of time. Hence, they have a relatively higher propensity to spend OOP privately, in order to avoid waiting times to access to public services.

The relationship between OOP expenditures and the VPHI coverage is then investigated by means of a simultaneous-equations model with an underlying continuous latent variable, also known as the "treatment effect model" (Maddala, 1983). More precisely, this model estimates the effect of an endogenous binary variable (*VPHI*) on a continuous, fully observed variable (*OOP* expenditures), conditional on three sets of explanatory variables: the first (X_1) includes variables that affect both the decision of holding a VPHI and the OOPs; the second (X_2) includes variables that affect OOP expenditures, but not the decision of holding a VPHI (the current occupational status in this analysis); the third (X_3) includes variables that affect the decision of holding a VPHI, but not the OOP expenditures (the six instrumental variables described above).

The regression function of interest is

$$OOP_i = X_{1i}\beta_1 + X_{2i}\beta_2 + \delta VPHI_i + \varepsilon_i \qquad\qquad i = 1,\ldots,n \qquad\qquad (1)$$

where $VPHI_i$ is the endogenous dummy variable, indicating whether the household has at least one voluntary private health insurance, and ε_i is a random term. The binary decision of holding health insurance is modelled as the outcome of an observed latent variable, $VPHI_i^*$, through a linear function of the exogenous variables X_1 and X_3 and a random component u_i

$$VPHI_i^* = X_{1i}\gamma_1 + X_{3i}\gamma_3 + u_i = W_i\alpha + u_i \qquad\qquad i = 1,\ldots,n$$

where $W = [X_1, X_3]$ and $\gamma' = (\gamma_1', \gamma_3')$. The observed decision is

$$VPHI_i = \begin{cases} 1 & VPHI_i^* > 0 \\ 0 & otherwise \end{cases}$$

where ε and u are bivariate normal with zero mean and covariance matrix

$$\begin{bmatrix} \sigma & \rho \\ \rho & 1 \end{bmatrix}$$

This model can be estimated by maximum likelihood (ML). However, Maddala (1983) derives a two-step estimator, which can be useful with large datasets (as in our case), even though it is less efficient than the ML estimator. At first stage of the two-step estimation, probit estimates of the treatment equation are obtained,

$$\Pr(VPHI_i = 1 \mid W_i) = \Phi(W_i\gamma)$$

that is the same results of Section 4. From these estimates the hazard h is computed for each observation i:

$$h_i = \begin{cases} \phi(W_i\hat{\gamma})/\Phi(W_i\hat{\gamma}) & VPHI_i = 1 \\ -\phi(W_i\hat{\gamma})/\{1 - \Phi(W_i\hat{\gamma})\} & VPHI_i = 0 \end{cases}$$

where $\phi()$ and $\Phi()$ are respectively the density function and the cumulative function of the standard normal distribution. The two-step parameter estimates are then obtained by augmenting the regression equation (1) with the hazard h.

5.3 *Estimation Results*

In table 10, we present the main estimation results. In some countries (France, the Netherlands and Spain) the proportion of households with zero OOPs is very large (see second column of table 10). Since this can strongly affect estimation of the treatment effect model, an instrumental variable Tobit model (IV-Tobit) is also presented. This however treats as continuous the endogenous variable *VPHI*.

The models described above plus an OLS regression are estimated for each country. Table 10 reports the main results of the estimation for the dummy variable VPHI in these three types of regression of OOP expenditures (OLS, IV-Tobit, Treatment-Effect). Treatment-Effect estimates are obtained by the two-step procedure described above.

The estimates in table 10 provide information on the relationship between VPHI and OOP rather different from those in table 9. Also, OLS estimates are different to IV-Tobit and Treatment-Effect results, as expected because of the inconsistency of the OLS estimations. As explained above, given the high proportion of households with zero OOP, for the Netherlands, France and Spain, we look at the VPHI parameter of IV-Tobit model, while the other countries are analysed by the Treatment-Effect model.

P-values in the third column of table 10 signal that the six instrumental variables we consider (Probit model estimates of Section 4) are jointly significant at 5% level in estimating the probability to subscribe a VPHI in all countries, i.e. they are informative instruments for identifying VPHI holders. Residuals for the IV-Tobit and Treatment-Effect methods are computed and used to construct a Sargan test for the validity of the instruments (columns 6 and 8 of table 10)[19]. Restricting the attention to the countries with significant point estimates, the null hypothesis is strongly rejected in Austria, Germany and Sweden (for the Treatment-Effect procedure). In all other countries the null hypothesis cannot be rejected.

In France and Spain (analysed with IV-Tobit model) private insurance seems to create a very strong incentive to spend more OOPs. The similarity of results is surprising in view of the fact that in France, a very large share of population (more than 80% of households in the SHARE sample) subscribes at least one health insurance, while in Spain this share is only 10%.

For all other countries, we look at the VPHI parameter of the Treatment-Effect model. The VPHI estimate is significant in only three countries (Austria, Italy and Belgium), but only in two (Italy and Belgium) the validity of instruments cannot be rejected by the Sargan test. In Italy, the estimated effects are similar to those of France and Spain, that is we found a positive effect of VPHI in OOPs; on the contrary, in Belgium VPHI seems to reduce OOPs for the insured. In Switzerland, Greece, Denmark, Germany, and Sweden the estimates parameter is not significant, signalling that for these countries holding a VPHI does not affect (either negatively or positively) the propensity to spend OOP.

In Belgium, VPHI shows a strong and significant impact on reducing OOP expenditures, providing an effective supplementary coverage, as we might have expected thinking about the role of these policies. Conversely, in seven countries (the Netherlands, Switzerland, Austria, Greece, Denmark, Germany and Sweden) we do not find any significant effect of VPHI in

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[19] In the case of the IV-Tobit model, generalized residuals (Chesher and Irish, 1987) are calculated.

reducing the level of OOPs, while in three Southern European countries (France, Spain and Italy) there is evidence of a significant effect of VPHI in increasing the level of OOPs.[20]

It would be interesting to further investigate the causes of the positive relationship between VPHI and OOPs in Southern European countries. Given that our estimation procedure corrects for the effects of self-selection into VPHI, a first conclusion we can draw from our analysis is that higher OOP's by policy holders are due to the high levels of cost-sharing (in the form of co-payments, deductibles and ceilings) set out in VPHI contracts. Cost-sharing is normally used to reduce moral hazard risks. The end result of higher OOP's for the insured may be interpreted as evidence that insurance companies in these countries are overly cautious.

While this tentative conclusion appears plausible and well grounded for Italy and Spain, it does not square with the notion that in France VPHI is mostly complementary, covering the reimbursement of co-payments and extra-billing for health care under basic public coverage (*ticket modérateur* for drugs and ambulatory services; prices higher than the public reimbursed tariffs for visits, prothesis and medical devices).[21] We have found that in France the proportion of privately insured people paying OOP is relatively low but, on the same time, VPHI has a strong positive impact on OOP expenditures. We could interpret these data in this way: French VPHI holders pay less OOP for each unit of public health care they consume, but on the same time, they demand more public health care (a moral hazard effect created by VPHI coverage and only partly reduced by private co-insurance); since the second effect is stronger, at the end VPHI holders spend more OOP than the non-insured. Therefore, our analysis seems to confirm that in France VPHI, by adding a complementary coverage to for the same types of services covered by social insurance, weakens the effect of public cost-sharing (*ticket modérateur*, fixed tariffs) in controlling moral hazard for public health care; in this way VPHI contributes to increases the use of public health care services by the insured and consequently (not only OOPs but also) public expenditure.[22] However, this conclusion should be adequately verified by developing a further analysis of SHARE data, in order to ascertain the existence of a significant positive relationship between the subscription of a VPHI policy and the consumption of publicly provided health care.

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[20] In Southern European countries the positive effect of VPHI on OOPs is particularly strong.
[21] Moreover, in France mutuelles reduce financial barriers for access to outpatient care. In fact, they generally pay directly providers, while non insured patients are expected to pay the provider themselves and then they receive (total or partial) reimbursement of their expenses from the statutory health insurance fund.
[22] This effect of VPHI is analysed by Mossialos and Thomson (2002), Couffinhal (2003), and Buchmueller and Couffinhal (2004).

Table 10 : Main results of the relationship between OOPs and VPHI

Country	(1) Number of households	(2) Percentage of households with positive OOP among those with non missing OOP	(3) P-value of the joint significance test for additional instruments (informative instruments)	(4) OLS	IV-Tobit (5) Point estimate	IV-Tobit (6) Sargan test (instruments validity)	Treatment Effect model 2-step estimation (7) Point estimate	Treatment Effect model 2-step estimation (8) Sargan test (instruments validity)
The Netherlands	1809	42.54 %	0.000	− 13.81	− 1154.29	5.43	− 474.85	1.85
France	1900	43.33 %	0.013	− 118.80 ***	3035.95 *	6.49	1313.80 ***	4.64
Spain	1555	47.06 %	0.005	178.60 ***	4068.97 ***	7.63	− 53.08	8.94
Switzerland	651	74.51 %	0.002	67.64	790.86	8.14	− 83.41	8.91
Austria	1349	77.32 %	0.000	106.14 ***	1059.11 ***	10.81 *	397.26 **	13.97 **
Italy	1700	81.59 %	0.019	426.16 **	14453.57 *	4.69	1824.17 **	6.87
Greece	1867	86.13 %	0.000	142.46	656.42	3.72	679.89	4.33
Denmark	1109	87.43 %	0.000	69.01 *	555.97 *	6.81	356.33	7.91
Germany	1925	88.11 %	0.000	2.19	− 905.75 *	11.33 **	− 315.28	17.62 ***
Sweden	2033	93.04 %	0.000	− 9.34	n.c.	n.c.	− 92.25	14.88 **
Belgium	2390	94.46 %	0.000	− 38.49	− 1230.34	7.54	− 1151.53 **	7.92

Significance levels: *** = 1% level; ** = 5% level; * = 10% level
n.c.: not converged.
Parameters on controls not reported

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6. Conclusions

Using data form SHARE, in this paper we have analysed the characteristics of voluntary private health insurance (VPHI) among the European over fifties.

For each country, we first estimate how a wide set of variables explain the probability of holding a private health care insurance. We find that the main determinants of VPHI are different in each country, reflecting the differences in the underlying health care systems. However, for most countries current education levels and cognitive abilities have a strong positive effect on holding a VPHI policy. Past or current occupations are also found to play an important role in several countries.

We also show that the additional coverage provided by VPHI enhances access to health care of 50+ people, even though our analysis suggest that it can exacerbate inequity since VPHI is mostly held by better educated and cognitively more able people. Our results confirm that the strong effect of insurance on utilization (particularly in countries such as Italy, Spain, Greece and France) could increase income-related inequality in access to care (OECD, 2004 page 179).

In this paper, we also ask whether the better access granted by private insurance is accompanied by a reduction of households' OOPs, once allowance is made for the possibly non-random nature of the sample of VPHI policy holders (adverse selection).

To analyse the causal effect of having a VPHI on out-of-pocket expenditures we adopt a simultaneous-equations model approach. We use as instruments some variables that affect the decision to hold VPHI, but that should not directly affect OOP expenditure. The identification assumption is that past or current occupation and current cognitive abilities have an impact on the probability to subscribe a VPHI, but only current occupation can affect the OOP spending level.

Our key estimation result is that only in Belgium VPHI provides an effective supplementary coverage, reducing OOPs for insured households. Conversely, in all other countries the insured do not have lower OOP's than the rest of the population, and in some countries (France, Italy and Spain) they even spend more. This could be due to increased utilization, i.e. an increased demand for health care goods and services stimulated by VPHI coverage (this is true especially for France), but also to cost-sharing measures adopted by insurance companies and funds in order to limit the effects of moral hazard.

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