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VOLUNTARY PRIVATE HEALTH CARE INSURANCE
AMONG THE OVER FIFTIES IN EUROPE:
A COMPARATIVE ANALYSIS OF SHARE DATA

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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 and Austria 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 to 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 (OOP) health spending.

In most European countries, major health shocks are covered by the public health system, thus individuals face 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.

Different proportions of individuals in various European countries cover these costs by purchasing insurance policies. Given the rising costs of health care induced by population ageing and new technology, European governments are considering the possibility of providing (even more) incentives for voluntary private health care insurance (VPHI) to complement or supplement public coverage. The argument is that providing tax incentives for VPHI is in the public interest because increasing the demand for additional private insurance should mitigate the demand for statutory health services (thereby reducing upward pressure on public expenditure) while enhancing (or preserving) access to essential health care.

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 issues of the joint determination of the decision to have an insurance policy, and of actual OOP spending. We tackle these issues by using data from the first wave of SHARE (the Survey of Health, Ageing and Retirement in Europe). This survey collects information on the individual life circumstances of about 28,000 persons aged 50 and over in eleven European countries, ranging from Scandinavian to the Mediterranean. 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).

The data show that holding VPHI among 50+ people is highly differentiated among European countries. In some countries, such as France, Belgium and the Netherlands, a very high percentage of households have a VPHI. On the other hand, in countries with a National health service (NHS) –

such as Sweden, Italy, and Spain – the percentage of households covered by VPHI is much lower (less than 10.2%).

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, by making the identification assumption that past or current occupation and cognitive abilities have an impact on the probability to hold a VPHI but only current occupation may affect the levels of OOPs.

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 the 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

In table 1 we report some characteristics of the health care systems in the SHARE countries in 2004. It can be seen that most SHARE countries have a statutory coverage for more than 90% of the entire population, with the exception of the Netherlands and Germany, respectively with 71.2%[1] and 89.8% of public coverage. Private health insurance is used at different levels and for different reasons. In some countries it is the primary source of health coverage for at least part of population, while in others 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 contributes to explain high levels of private insurance expenditure in the Netherlands (18.4% of total expenditure on health care), Germany (9.1%) and Switzerland (8.7%), 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 (12.8%).

Considering the differential relevance of VPHI, 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 until 2006, Germany, Belgium, Spain and Austria), and b) countries characterised by universal (public or mandatory) basic coverage (Denmark, France, Greece, Italy, Sweden and Switzerland).

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 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). Before the 2006 reform, in the Netherlands nearly 28% of the population (those in the right tail of the income distribution) was excluded from public coverage and could voluntarily rely on private health insurance for principal coverage[2]. In Germany about 10% of population is

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[1] In Table 1, the Dutch system is classified as "social insurance" since the reported data refer to 2005, the year before the reform introducing a private mandatory insurance system was implemented. After the 2006 reform, in the Netherlands, the mandatory coverage raised from 71.2 to 98.7% of population.

[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, similarly to the Swiss system which is based on private mandatory insurance. In the Netherlands there are three major layers of coverage providing protection against the financial risks of disease. (i) Under the first layer (the AWBZ), the total population is protected against certain types of exceptional medical expenses, primarily catastrophic bills, long-term care and certain chronic care. (ii) Until 2006, the second layer (ZFW) covered wage and salary earners, including self employed since 2000, below a stated income level. Those with an income above the stated income level could subscribe to a private insurance. From 2006 the new Health Insurance Act requires all residents 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

covered by primary substitutive private insurance (the self-employed who are excluded from the social security system and employees above a certain income who opt for private insurance)[3].

Finally, in Belgium, Spain and Austria there are lower percentages of population (mainly self-employed, professionals and civil servants) who are covered by primary private health insurance (respectively 7.1%, 2.5% and 1%)[4].

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 three countries; a social security system for France; a mixed public system for Greece). 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].

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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. (iii) Until 2006, the third layer is private insurance for those with an income above the stated income level, and for supplementary insurance. From 2006 the third layer is only for supplementary insurance. On the Dutch health care reform, see Ministerie van Volksgezondheid, Welzijn en Sport (2006).

[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). Self-employed people are excluded from the statutory health insurance coverage unless they have been a member previously, with the exception of those who fall under compulsory statutory cover, such as farmers. Moreover, active and retired civil servants are excluded from the statutory health insurance scheme, as they are directly reimbursed by the government for most of their health care and only need VPHI to cover the remainder. They therefore purchase complementary rather than substitutive VPHI (Mossialos and Thomson, 2004, p. 53).

[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 (Mossialos and Thomson, 2004); the proportion of 7.1% includes the self-employed covered by VPHI for minor risks. In Spain the statutory public system does not cover a minority of population (including particular employment categories such as independent lawyers), 60% of which buys primary private insurance; another part of population, mainly central, government 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 1% of the population) opt out of the social security system, provided their relevant professional categories purchase primary private insurance for them. (OECD, 2004; Colombo and Tapay, 2004).

[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 provided by private insurers and it is heavily regulated: enrolment is open, premiums are community rated within a geographic area, the benefit package is standardised, and the insured can freely move across private insurers. The private insurers can also provide supplementary VPHI through affiliated insurers. Recently some providers have begun operating outside the negotiated fee frameworks defined by the insurers' cartels on a cantonal basis. Consequently, a separate supplemental insurance market has developed to cover the cost of these providers, which are presumed to offer higher quality or more advanced services. Supplementary insurance also allows access to private hospitals in those cantons that do not permit access under the basic insurance plan. Even within public hospitals, supplementary insurance can be used to pay for services such as private rooms that are not covered under the basic plan.

Table 1 : Characteristics of health care systems in SHARE countries - 2004

Country	Type of Coverage	% of population covered by		Type of VPHI (1)	Public expenditure as % of total health care expenditures	OOP as % of total health care expenditures	PHI (2) as % of total health care expenditures	All Other Private Funds (3) as % of total health care expenditures
		Public/ Mandatory Insurance	VPHI (1)					
Sweden	Public Tax Financed	100.0	1-1.5*	C, S	81.8	16.8°	n.a.	n.a.
Denmark	Public Tax Financed	100.0	28.0*	C, S	82.9`2	14.9	1.5	0.1
Germany	Social Insurance	89.8	14.2	C, S	77.0	13.1	9.1	0.9
Netherlands	Social Insurance (4)	71.2+ (5)	57.3	S	62.5`2	7.5	18.4	8.0
Belgium	Social Insurance	99.0 (6)	44.0 (7)	C, S	72,3°	19.7	4.7	1.4
France	Social Insurance	99.9 (8)	92.0 (9)	C, (S)	79.8	6.6	12.8	0.8
Switzerland	Private Mandatory Insurance	100.0	32.5`2	S	58.5	31.8	8.7	0.9
Austria	Social Insurance	98.0	31.8*	C, S	75.6	16.6	5.1	2.7
Italy	Public Tax Financed	100.0	9.6-10.5^	D,C,S	76.0	21.2	0.9	1.9
Spain	Public Tax Financed	99.5`1	11.9`1	D, S	70.5	23.1	5.7	0.7
Greece	Mixed (10)	100.0	15.6`2	D, S	61.8	25.4°	n.a.	n.a.

Sources:
OECD HEALTH DATA 2008, June 08; OECD (2004); Mossialos and Thomson (2004); Nomisma-Criep (2003); WHO Statistical Information System 2008
Our elaboration.

`1 : data in previous year; `4: data in previous 4 years; * OECD (2004); + Mossialos and Thomson (2004); ^ Nomisma-Criep (2003);
° estimate on 2005 data from *WHO Statistical Information System 2008*

Notes to Table 1

(1) Voluntary private health insurance (VPHI) includes duplicate (D), complementary (C) and supplementary (S) 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). VPHI data refer only to additional PHI and not to primary (principal or substitute) PHI.

(2) The percentage includes both primary PHI 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) The Dutch system is classified as "social insurance" since the reported data refer to 2005, the year before the reform introducing a "private mandatory insurance" was implemented.

(5) The data refer to coverage under ZFW (Ziekenfondswet statutory scheme provided by sickness funds covering employees and self-employed under a stated income level: 62.1% of population), KPZ (statutory health care insurance for civil servants in lower levels of government and the police: 4.9% of population), and WTZ (standard package policy covering students whose parents are in ZFW, individuals aged older than 65 and younger self-employed who had difficulty purchasing substitutive VPHI due to pre-existing conditions: 4.2% of population). 100% of Dutch population is covered by the universal statutory scheme AWBZ, which provides benefits in kind to all those resident in the Netherlands for expensive, uninsurable, long-term care.

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

(7) 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 and covered about 67% of the population in 2000.

(8) 0.1% of population (frontier workers) has a substitutive private insurance coverage.

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

(10) Greece can be considered as a "mixed" public system, presenting a mix of the main three types of coverage, without a clear prevalence of a specific source of funding.

As pointed out by the 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 instance, in the Netherlands almost 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

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

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 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 supplements national health insurance. In Italy, VPHI can duplicate, supplement, or complement NHS coverage (duplicate coverage is mostly provided for by profit insurance companies, while complementary and supplementary coverage by employer-based, professional and mutual aid funds).

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[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 has 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).

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 = 19467). Within couples, the head is chosen as the elder, or the female when the two partners have the same age.

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 additional VPHI (i.e., complementary, supplementary, and duplicate of primary statutory coverage) according to OECD taxonomy (OECD, 2004).

Table 2 shows some characteristics of VPHI at the household level. In the SHARE sample, 7003 households report holding at least one VPHI (30.58% of total weighted population) and 77.67% of insured households have more than one 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, the Netherlands and Germany (but in the two latter cases 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 one VPHI policy. For all countries but Germany, a very large proportion of insured heads are less than 60 years old (in Germany, the highest percentage of insured heads 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: 36.46% against the average of 30.99% for the not-insured.[9] In all countries most heads live with a partner and this percentage is higher for the insured (60.18% against 52.29% of the not insured). 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): 54.10% against 44.83% for the not-insured.

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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 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.

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 proportion (more than 40%) of insured people with some limitations as measured by Global Activity Limitations Indicator (GALI). 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, 2007). It ranges from 0 to 1, when 1 is the best health possible. On average, considering the entire SHARE sample, this index is slightly 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, where there are 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 VPHI household members. On average, insured households are more likely to have at least one member who has ever been civil servant or employed in a firm with more than 24 employees. Sweden, Switzerland, Italy and Greece show a quite large proportion of insured households where at least one member has ever been a self-employed.

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

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	3.25	53.46	363.61 (62.59)	158.16	54568	31713
Denmark	40.24	58.13	321.96 (33.31)	268.86	43350	24436
Germany	13.92	57.35	1212.95 (107.11)	550.00	38140	25641
The Netherlands	71.14	56.94	1359.74 (134.03)	580.00	34654	31611
Belgium	76.40	73.03	443.10 (84.30)	150.00	27490	18973
France	82.85	96.13	1020.63 (26.52)	840.00	27253	24640
Switzerland	35.37	71.38	1238.81 (104.35)	502.02	46647	32945
Austria	26.69	39.28	998.24 (61.98)	550.00	31922	22802
Italy	7.51	38.32	656.23 (94.26)	300.00	35634	19585
Spain	10.15	66.99	2587.79 (1010.93)	360.00	22963	13298
Greece	6.18	48.94	631.99 (70.34)	380.00	20045	13702
All SHARE countries	30.58	77.67	1071.56 (43.71)	625.28	30683	21174

All statistics are population weighted. All values are in Euro 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 households (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	61.03	66.47	27.58	3.08	2.87	78.31	12.64	0.00	9.05	1.33	30.43	24.49	44.75
Denmark	53.80	42.82	30.94	18.74	7.50	60.65	16.49	15.60	7.26	0.52	11.59	47.09	40.80
Germany	57.40	29.19	42.28	17.98	10.55	64.80	8.28	19.63	7.29	0.33	8.82	53.14	37.71
Netherlands	54.46	40.50	26.44	21.40	11.66	63.42	10.60	19.51	6.47	1.99	54.99	23.18	19.84
Belgium	53.50	36.95	29.18	24.86	9.01	64.16	10.42	20.93	4.49	2.41	45.73	25.78	26.08
France	50.84	34.54	25.44	24.13	15.89	55.47	12.26	24.30	7.97	20.40	34.88	26.02	18.70
Switzerland	49.45	39.72	31.17	21.57	7.54	61.12	16.63	18.45	3.80	6.05	39.01	21.76	33.18
Austria	53.91	34.69	28.95	26.18	10.18	59.08	9.09	22.98	8.85	0.18	15.50	43.84	40.48
Italy	60.80	47.63	35.37	12.64	4.36	69.04	11.07	7.18	12.71	1.57	36.91	33.92	27.60
Spain	52.13	46.72	21.30	24.33	7.65	67.94	7.31	16.40	8.35	7.30	48.31	16.23	28.16
Greece	64.30	55.84	31.38	8.20	4.58	65.20	10.76	18.05	5.99	4.70	31.79	32.19	31.31
(Insured) SHARE countries	53.06	36.46	28.29	22.21	12.64	60.18	11.22	21.00	7.60	11.43	34.47	29.92	24.18
(Not Insured) SHARE countries	49.44	30.99	28.48	25.23	15.30	52.29	9.61	27.84	10.26	7.60	47.57	29.07	15.76
(All) SHARE countries	50.54	32.66	28.54	24.31	14.49	54.55	10.07	25.88	9.50	8.77	43.57	29.33	18.33

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 households

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	33.18 %	36.85 %	41.16%	34.20%	24.64%	94.12%	5.88%	0.00%	31.37 %	33.70%	29.23%	5.70 %	0.00 %	0.877
Denmark	39.24 %	52.51 %	28.19%	31.89%	39.92%	91.97%	5.31%	2.72%	25.93 %	30.83 %	25.22%	13.24%	4.78 %	0.834
Germany	46.60 %	53.60 %	30.12%	35.37%	34.51%	92.28%	4.93%	2.79%	6.16 %	21.06 %	42.07%	23.94%	6.77 %	0.836
Netherlands	46.58 %	44.43 %	30.10%	33.10%	35.80%	91.04%	4.95%	4.01%	12.22 %	17.99 %	41.54%	23.01%	5.24 %	0.825
Belgium	38.88 %	46.22 %	20.75%	32.10%	47.15%	87.81%	7.36%	4.83%	10.42 %	22.69 %	42.10%	19.36%	5.43 %	0.805
France	39.65 %	52.50 %	22.51%	32.79%	44.70%	87.07%	6.39%	6.54%	7.34 %	14.84 %	43.83%	24.20%	9.79 %	0.795
Switzerland	31.65 %	37.13 %	36.97%	33.66%	29.37%	93.92%	3.51%	2.57%	17.28 %	31.64 %	35.93%	11.45%	3.70 %	0.860
Austria	50.83 %	49.51 %	24.57%	37.81%	37.62%	89.69%	4.55%	5.76%	9.48 %	24.18 %	35.29%	23.42%	7.63 %	0.815
Italy	29.98 %	38.16 %	30.53%	36.72%	32.75%	91.38%	4.92%	3.70%	8.84 %	11.89 %	52.48%	21.59%	5.20 %	0.835
Spain	33.15 %	48.05 %	19.57%	36.55%	43.88%	90.34%	5.31%	4.35%	3.74 %	21.84 %	39.11%	32.11%	3.20 %	0.809
Greece	19.33 %	37.09 %	37.75%	33.42%	28.83%	91.23%	4.36%	4.41%	13.47 %	30.66 %	37.08%	14.88%	3.91 %	0.844
(Insured) SHARE countries	40.42 %	49.74 %	25.41%	33.63%	40.96%	89.08%	5.82%	5.10%	8.77 %	18.02 %	42.52 %	23.16%	7.53 %	0.811
(Not Insured) SHARE countries	47.11 %	54.45 %	24.13%	30.79%	45.08%	87.21%	6.34%	6.45%	6.23 %	15.51 %	38.11 %	29.40%	10.75 %	0.790
(All) SHARE countries	45.06 %	53.01 %	24.50%	31.61%	43.89%	87.75%	6.19%	6.06%	6.96 %	16.24 %	39.38 %	27.60%	9.82 %	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 households

Country	Verbal fluency test (1)	Self-rated reading skills (2)			Numeracy score (3)		
		5 (poor)	2 – 4	1 (excellent)	1 (bad)	2 – 4	5 (good)
Sweden	27.47	0.00 %	33.46 %	66.54 %	0.00 %	70.17 %	29.83 %
Denmark	24.57	1.41 %	63.80 %	34.79 %	1.77 %	58.85 %	39.38 %
Germany	22.81	0.76 %	76.54 %	22.70 %	3.45 %	57.92 %	38.63 %
The Netherlands	20.72	3.83 %	79.29 %	16.88 %	3.06 %	64.62 %	32.32 %
Belgium	21.19	4.18 %	68.03 %	27.79 %	2.68 %	80.02 %	17.30 %
France	20.96	5.87 %	65.30 %	28.83 %	8.10 %	77.58 %	14.32 %
Switzerland	22.41	1.04 %	67.97 %	30.99 %	0.68 %	67.23 %	32.09 %
Austria	23.12	2.11 %	60.07 %	37.82 %	2.37 %	70.43 %	27.20 %
Italy	17.41	5.88 %	69.94 %	24.18 %	5.41 %	72.36 %	22.23 %
Spain	17.91	9.47 %	69.92 %	20.61 %	6.75 %	85.05 %	8.20 %
Greece	17.96	7.89 %	76.68 %	15.43 %	2.03 %	67.64 %	30.33 %
(Insured) SHARE countries	21.07	4.69 %	68.88 %	26.43 %	5.78 %	72.87 %	21.35 %
(Not Insured) SHARE countries	17.73	9.30 %	75.02 %	15.68 %	10.52 %	73.38 %	16.10 %
(All) SHARE countries	18.76	7.88 %	73.13 %	18.99 %	9.07 %	73.22 %	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 a homemaker	At least one member is currently an employee	At least one member is currently a self-employed	At least one member has ever been a civil servant	At least one member has ever been a self-employed	At least one member has ever worked in a firm with more than 24 employees
Sweden	17.99 %	0.92 %	67.31 %	28.42 %	39.17 %	35.21 %	48.86 %
Denmark	44.84 %	2.72 %	53.17 %	11.12 %	21.96 %	22.07 %	61.55 %
Germany	57.98 %	14.84 %	32.37 %	15.17 %	10.34 %	20.65 %	50.95 %
Netherlands	41.51 %	30.48 %	35.97 %	6.79 %	18.94 %	14.95 %	51.91 %
Belgium	59.94 %	25.02 %	27.93 %	6.11 %	25.84 %	17.88 %	65.33 %
France	62.30 %	16.36 %	30.84 %	6.03 %	33.77 %	18.63 %	60.70 %
Switzerland	40.44 %	15.10 %	45.97 %	17.52 %	7.75 %	25.15 %	59.46 %
Austria	60.47 %	15.45 %	33.66 %	8.83 %	21.95 %	19.05 %	51.92 %
Italy	49.67 %	18.02 %	32.73 %	24.18 %	42.59 %	34.54 %	55.18 %
Spain	38.53 %	29.10 %	33.25 %	14.07 %	16.59 %	24.12 %	36.10 %
Greece	39.58 %	26.12 %	44.36 %	26.91 %	28.55 %	41.17 %	42.93 %
(Insured) SHARE countries	56.24 %	18.75 %	32.79 %	9.18 %	26.93 %	19.86 %	57.13 %
(Not Insured) SHARE countries	53.48 %	25.74 %	25.09 %	8.46 %	15.00 %	19.30 %	42.53 %
(All) SHARE countries	54.32 %	23.60 %	27.44 %	8.68 %	18.65 %	19.47 %	47.00 %

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 large proportion of insured households indicated "any other type of VPHI coverage". However, this answer referred 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 and we do not report the data in table 7. 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 prostheses, confirming that VPHI predominantly complements public coverage. In Belgium, VPHI mostly covers full costs of hospital care (75.6% of insured households) and an

extended choice of hospitals (40% 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.[10] This is particularly true for Spain where patients cannot freely choose a specialist unless they have private health insurance, and where the waiting lists and quality problems have led to the development of a growing private insurance alternative (Rodríguez, 2001). Besides, where cost-sharing on public systems is large, VPHI 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.[11]

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[12]. 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 forgo health care because of its unavailability is relatively lower among people with a VPHI (1.31 against 2.70%).[13] Anyway, these comparisons must be considered with caution since different utilization of health care services depends also both on other individual and institutional (organisational and cultural) factors.[14]

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[10] 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).

[11] 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.

[12] 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.

[13] It is well known that utilisation increases with the comprehensiveness of insurance, as shown by the RAND Health Insurance Experiment (Manning et al., 1987). Hence, when VPHI covers benefits in addition to those covered by existing public programmes, it likely results in higher utilisation.

[14] Using data from the early release 1 of SHARE 2004, Bolin et al. (2004) found that individual differences in health accounted for the major part of the between-country variation in physician visits while organisational factors played a less important role, accounting for about 15 percent of the variation.

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	0.00	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.

Summing up, it seems that, apart from equity considerations, the additional coverage provided by VPHI somehow enhances access to care.[15] However, 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.

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. In particular, the cognitive variables play a significant role in all countries but France.

The presence of a partner has a significantly positive effect on the probability to be voluntarily insured in Sweden, the Netherlands, Belgium, France and Austria, while gender and age of the head influence

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

[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.

the decision to have a VPHI only in a few countries. Demographic characteristics are very important in Denmark and Germany. Only in Denmark, Switzerland, Austria, and the Netherlands a low physical health status represents an important determinant of holding a VPHI policy.

On the other hand, in all countries but Germany past or current occupational status of household's members (ever been a civil servant, a self-employed or employed in firms with more than 24 employees) significantly affects the probability of holding a VPHI policy.

Differently from most studies (e.g. van Doorslaer, Masseria et al., 2004; Mossialos and Thomson, 2004; Jones Koolman and Van Doorslaer, 2005), Table 8 shows that a high current economic and financial status (in terms either of income or real assets) seems to affect positively the probability to hold a VPHI policy only in a few countries: Sweden, Italy, Spain and Greece. This result is not surprising since, differently from those studies, the SHARE sample is composed by older individuals, with a very high proportion (about 70%) of retired persons.

Overall, there is evidence that VPHI policies are mostly held by better educated, cognitively more able and, in some countries, more affluent people[17].

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[17] Mossialos and Thomson (2004) and OECD (2004) find that information about the characteristics of VPHI subscribers suggests that those who purchase these policies are more likely to have higher socio-economic conditions and live in wealthier regions.

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	Ever been a civil servant in the household	− ***	+	−	− ***	+	−	+ *	+ ***	−	+ **	−
	Ever been a self-employed in the household	+ **	+ *	+	−	−	+	−	+	+ **	+	+
	Ever been employed in a firm with more than 24 employees in the household	+	+	−	+	+ ***	+ **	+	−	+ **	−	+ **
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

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

5.1. Descriptive analysis

Table 1 shows that people of all SHARE countries have some out-of-pocket expenditures (OOPs); in Greece private OOPs are particularly relevant amounting to 47% of total health care expenditure. 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[18].

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[19], 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, Belgium, Switzerland and Greece the proportion of people with positive OOPs does not significantly differ between people with or without VPHI (for all of these counties, P-values are higher than 0.10 in part 1 of Table 9). In the other countries, VPHI households have a higher probability of paying OOPs.

On the other hand, in some countries (Denmark, Germany, Austria and Spain) the VPHI coverage seems associated with significantly higher OOPs; conversely, in Belgium VPHI seems to reduce significantly the level of the household OOPs. (Table 9, part 2). These results are confirmed when the possibility of zero OOPs is considered, but in this case VPHI coverage is positively related to higher private direct expenditures also in Italy (Table 9, part 3).

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[18] These OOP expenditures refer to questions HC045, HC047 and HC049 of the Health Care Section of SHARE questionnaire. Expenditure for outpatient care include consultations with health professionals (including dentists), diagnostic tests or therapies prescribed by doctors and outpatient surgery; alternative medicines are not considered. The households where at least one of these items is missing (about 12% of the overall households) are not included in the following analysis.

[19] 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 not-insured 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	3.25	92.67%	93.11%	0.89	393.56	341.36	0.31	364.70	317.84	0.34
Denmark	40.24	86.16%	92.26%	<0.01	459.30	562.33	0.06	395.73	518.80	0.02
Germany	13.92	87.76%	87.23%	0.82	312.74	467.47	0.03	274.46	407.79	0.03
Netherlands	71.14	41.84%	42.71%	0.74	571.62	565.82	0.96	239.17	241.65	0.96
Belgium	76.40	94.63%	95.51%	0.38	1630.72	1257.97	0.06	1543.08	1201.52	0.07
France	82.85	50.26%	43.26%	0.02	682.90	599.36	0.68	343.25	259.31	0.42
Switzerland	35.37	77.60%	72.17%	0.13	779.14	788.51	0.94	604.63	569.10	0.71
Austria	26.69	75.52%	84.54%	<0.01	326.09	425.32	0.03	246.25	359.57	<0.01
Italy	7.51	81.12%	94.71%	<0.01	825.45	1583.84	0.12	669.63	1499.98	0.08
Spain	10.15	44.28%	67.46%	<0.01	474.96	826.44	0.02	210.29	557.50	<0.01
Greece	6.18	86.75%	83.46%	0.34	723.72	926.79	0.20	627.84	773.44	0.28

All values are in Euro PPP-adjusted.

5.2   The econometric model

Previous results cannot be considered decisive to ascertain whether VPHI actually substitutes for households' direct payments 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, wealth, education, health status, etc.), partly as a consequence of unobserved heterogeneity in preferences. 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. In particular, the identification assumption we adopt is that past or current occupation and cognitive abilities have an impact on the probability to hold a VPHI but only current occupation may affect the levels of OOPs.[20]

Therefore, 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 *has ever been* a civil servant; b) at least one household member *has ever been* a self-employed; c) at least one household member *has ever worked* in firms with more than 24 employees; d) current cognitive abilities of the head of the household (numeracy; verbal fluency test score; self-reported reading ability).

Moreover, we assume that some types of *current* occupational status (at least one household member is currently an employee, a self-employed, a retired, a homemaker) can directly affect the level of OOP expenditures. For instance, those who are currently self-employed have higher opportunity costs of time. Hence, usually 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).

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[20] Since the SHARE sample is composed by 50+ individuals, only about 30% of respondents are currently working, while about half of them are retired from work. Consequently, in most interviewed households, the decision of subscribing a VPHI policy were taken many years before the interview, probably when respondents were working.

The regression function of interest is

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

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

$$VPHI_i^* = X_{1i}\gamma_1 + X_{3i}\gamma_3 + u_i = W_i\gamma + u_i \qquad i = 1,\dots,n \qquad (2)$$

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,

$$Pr(VPHI_i = 1 \mid W_i) = \Phi(W_i\gamma) \qquad (3)$$

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

$$h_i = \begin{cases} \phi(W_i\hat{\gamma})/\Phi(W_i\hat{\gamma}) & VPHI_i = 1 \\ -\phi(W_i\hat{\gamma})/\{1-\Phi(W_i\hat{\gamma})\} & VPHI_i = 0 \end{cases} \qquad (4)$$

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 results of our analysis. 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 the 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 in the previous section.

Table 10 also shows whether the instruments are informative and valid. The third column of Table 10 reports the P-values of the joint significance test for the six instrumental variables. Rejection of the null hypothesis means that these instruments are informative for identifying VPHI holders. We can reject the null hypothesis for all countries, apart from France. Residuals for the IV-Tobit model[21] and Treatment-Effect model are then computed and used to construct a Sargan test for the validity of the instruments (columns 6 and 8 of table 10)[22]. The null hypothesis of Sargan test is rejected for France (for the IV-Tobit procedure), Germany and Sweden (for the Treatment-Effect procedure). Therefore, for these countries the validity of the instruments is rejected. This result can be explained for France by the very high proportion of people (about 83% of the entire SHARE sample) with a complementary VPHI, mainly devoted to the reimbursement of cost sharing for treatment in the statutory health care system. This makes it quite difficult to single out satisfactory instrumental variables: almost everyone paying OOP is likely to be insured with a VPHI (and the converse). On the contrary, in Sweden the percentage of insured people is so low (and the percentage of people spending OOP so large) as to make the choice of any potential instrumental variable problematic. Finally, the rejection of the validity of the instruments in Germany could be mostly due to the health insurance coverage of the self-employed (they are excluded from the social security system and may subscribe a VPHI which can be both substitutive and complementary/supplementary of the social insurance).

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.

In Table 10 the OLS estimates are different from the IV-Tobit and Treatment-Effect results, as expected because of the inconsistency of the OLS estimations. Moreover, Table 10 provides information on the relationship between VPHI and OOP rather different from that in Table 9.

Excluding the three countries for which the validity of the instruments is rejected, we observe that for Spain, Austria, Italy and Greece the VPHI estimate is positive and significant. For these countries (particularly for the Mediterranean ones) the private insurance seems to create a strong incentive to spend more OOPs. In the Netherlands, Switzerland, Denmark and Belgium the

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[21] In such case, generalized residuals (Chesher and Irish, 1987) are calculated.
[22] Both the tests for the informative instruments and the Sargan test are calculated according to the Schafer (1997)'s results, in order to take into account the MI nature of the SHARE data.

estimated parameter is not significant, signalling that for these countries holding a VPHI does not affect (either negatively or positively) the propensity to spend OOP.

Altogether, in no country there is a significant effect of VPHI in reducing the level of OOPs, as we might have expected thinking about the role of these policies.

In Southern European countries and Austria there is evidence of a significant effect of VPHI in increasing the level of OOPs. It would be interesting to further investigate the causes of this positive effect. Given that our estimation procedure corrects for the effects of the self-selection into VPHI, a first consideration we can draw from our analysis is that higher OOP's by policy holders may be due to the high levels of cost-sharing (in the form of co-payments, deductibles and ceilings on benefits) set out in VPHI contracts providing for a duplicate or supplementary coverage. Cost-sharing is normally used to increase subscribers' awareness of the costs of health care, reducing moral hazard. The end result of higher OOP's for the insured may be interpreted as evidence that insurance companies in these countries are overly cautious trying to limit their financial liability.[23] There is some evidence that the adoption of cost-sharing arrangements by VPHI companies can be quite relevant in Austria and Mediterranean countries. On one hand, since Austrian insurers cannot refuse to insure someone with a chronic illness, they are permitted to charge higher premiums or introduce some form of cost-sharing (Hofmarcher, 2001). On the other hand, group policies (characterised by lower premiums and cost sharing), while gaining an increasing share of the VPHI market, are still the minority in Spain, Austria and Italy.

Therefore, in Spain, Greece and Italy VPHI is essentially duplicate or supplementary of public coverage (and enhances the access to timely elective care), while in Austria (and in lower extent in Italy) VPHI performs also a complementary function, covering the reimbursement of co-payments for public provision of health care (physician services and prescription drugs). This means that insured households pay less OOP for each unit of public health care they consume, but at 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 insured households spend more OOP than the non-insured.[24]

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[23] This assertion is somewhat confirmed by the rather low loss ratios (the portion of health insurance premiums paying for health care services) which characterises voluntary health insurers particularly in Austria, Greece and Italy, all below 77% (Mossialos and Thomson, 2004, p. 98).

[24] This weakens also the effect of public cost-sharing in controlling moral hazard for public health care. In this way, VPHI could contribute to increases the use of public health care services by the insured and consequently (not only OOPs but also) public expenditure. A similar effect is found in the US Medicare system, where supplemental "Medigap" covers coinsurance for services obtained in the public system. Controlling for selection into coverage, Atherly (2002) has shown that people with Medigap coverage have public expenditures that are about 6% higher than do those without such private coverage. However this effect should not be overrated because, differently from France, the market for VPHI to cover co-payments is not substantial in Austria and Italy. VPHI coverage for co-payments is also less likely to be offered by commercial insurers, perhaps because it is not particularly profitable.

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		2-steps	
					(5) Point estimate	(6) Sargan test (validity of instruments)	(7) Point estimate	(8) Sargan test (validity of instruments)
The Netherlands	1726	43.00 %	0.00	− 29.69	− 1140.59	1.51	− 463.94	0.23
France	1634	44.22 %	0.08	− 70.31	5207.73 *	2.32 **	867.18	1.30
Spain	1460	47.64 %	0.00	152.47 **	4471.52 ***	1.21	− 132.58	1.62
Switzerland	593	75.46 %	0.00	62.29	834.60	1.35	243.25	1.77
Austria	1271	77.79 %	0.00	70.95 **	974.36 ***	1.50	339.39 **	1.65
Italy	1566	81.95 %	0.00	492.81 ***	10614.02 **	0.71	1803.05 **	1.46
Greece	1733	86.17 %	0.00	175.94	1641.70 *	0.54	1004.13 **	0.69
Denmark	1030	87.89 %	0.00	99.82 **	486.32	1.09	372.61	1.09
Germany	1719	88.29 %	0.00	− 9.93	− 30.15	3.05 ***	− 98.97	3.94 ***
Sweden	1959	93.04 %	0.00	0.71	n.c.	n.c.	8.87	2.74 **
Belgium	1531	94.74 %	0.00	− 43.07	248.37	1.36	− 488.00	1.21

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

6. Conclusions

Using data from the first wave of SHARE (Survey of Health, Ageing and Retirement in Europe), we have analysed the characteristics of voluntary private health insurance (VPHI) among the 50+ in Europe.

For each country, we first estimated how a wide set of variables explains the probability of holding a private health care insurance by households' heads. The main determinants of VPHI are different in each country, reflecting the differences in the underlying health care systems, but in most countries education levels and cognitive abilities have a strong positive effect on holding a VPHI policy. Past or current occupation of the household heads are also found to play an important role in many countries.

We also asked whether the better access granted by private insurance is accompanied by a reduction of households' out-of-pocket expenditures (OOPs), once allowance is made for the likely non-random nature of the sample of VPHI policy holders (adverse selection). To analyse the causal effect of having a VPHI on OOPs we adopt a simultaneous-equations model approach. Our identification assumption is that past or current occupation and cognitive abilities have an impact on the probability to hold a VPHI but only current occupation affects the levels of OOPs. We have argued that these assumptions are in line with the evidence in eight out of the eleven countries considered.

Our key estimation result is that in no country the insured households have lower OOP's than the rest of the population, while in some countries (Italy, Spain, Greece and Austria) they even spend more. This could be due to increased utilization, i.e. higher demand for health care goods and services, but also to cost-sharing measures adopted by the insurers in order to counter the effects of moral hazard.

The findings of our analysis, as well as those from other studies (OECD, 2004; Mossialos and Thomson, 2004), suggest that VPHI may create or increase the inequalities in access to health care, as it is mostly purchased by affluent and better educated people and does not reduce OOP expenditure. These inequalities may be further amplified by tax incentives which act as a government subsidy to wealthier people.

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