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Voluntary private health insurance among the over fifties in Europe[◇]

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Abstract

Using data from SHARE (Survey of Health, Ageing and Retirement in Europe), we investigate the determinants of voluntary private health insurance (VPHI) among the over fifties in eleven European countries, and their effects on health care spending. Firstly, we find that the main determinants of VPHI are different in each country, reflecting 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. We also analyse the effect of holding a voluntary additional health insurance policy on out-of-pocket (OOP) health care spending. We adopt a simultaneous-equations approach to control for self-selection into VPHI policy holding and find that only in the Netherlands VPHI policyholders have lower OOP spending than the rest of the population while in some countries (Italy, Spain, Denmark and Austria) they spend significantly more. This could be due to increased utilisation but also to cost-sharing measures adopted by the insurers in order both to counter the effects of moral hazard and to keep adverse selection under control.

Keywords

Voluntary private health insurance; Out-of-pocket expenditures; SHARE

1. Introduction

Health risks are a major determinant of household saving behaviour in old age (Levin, 1995). 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; Jappelli *et al.*, 2007; De Nardi *et al.*, 2010). In most European countries, major health shocks are covered by the public health system, but individuals may 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. These out-of-pocket (OOP) payments may create a barrier to health care utilisation: this raises the issue of equity in terms of financing which is particularly crucial in the oldest population. Different

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proportions of individuals in various European countries cover these costs by purchasing voluntary private health insurance (VPHI) policies that top up the basic mandatory coverage¹, aiming at reducing their OOP expenses and the need for precautionary saving. Given the rising costs of health care induced by population ageing and new technology, many European governments have chosen to provide a range of tax incentives to encourage the purchase of VPHI by individuals and (mostly) by employers (OECD, 2004, pp. 138-140; Mossialos and Thomson, 2004, pp. 90-97). The argument is that providing tax incentives for VPHI may be 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 (e.g. by reducing waiting times in the public system). The experience of different countries (e.g., Australia, UK, France) provide cautionary tales regarding the effectiveness of a VPHI in reducing public cost pressures and improve access to public services (Hurley *et al.* 2002; Mossialos and Thomson, 2004; OECD, 2004). But what can we say about the desired effect of VPHI as a tool for reducing the OOP payments to the insured? In other terms, is VPHI really capable to insure consumers against health costs not covered publicly? As we will show in section 2, quite surprisingly, the empirical literature has not devoted much attention to this important topic.

In this paper we address two main issues.

First, we investigate the differences among the people holding and not holding VPHI, and the services such a coverage provides, through a detailed analysis on the determinants and the characteristics of VPHI holding among people aged 50 or over in Europe. We focus on people over fifties since this group of the population accounts for most health care spending and is particularly exposed to related financial risks.²

Second, we ask the following question: are voluntary additional health insurance policies effective in reducing out-of-pocket health care spending for individuals aged 50 or over across a group of European countries? To answer this question, we model the joint determination of the decision to hold an insurance policy and to spend OOP on health care.

We tackle both 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 Scandinavia 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, while in other countries – such as Sweden, Italy, Greece, and Spain – the percentage of households covered by VPHI is much lower. This may be due to differences in the public health care system and in the characteristics of available VPHI policies (in terms of covered services and costs), but also to differences in household characteristics that affect the decision to hold such policies. For these reasons, we firstly estimate a separate Probit model for each country, considering a common set of

¹Additional health coverage is sometimes based on occupational schemes, which are compulsory according to salary agreements (e.g., in France, Greece and Sweden). Even when membership to the employment group insurance plan is the default option, we use the term VPHI.

²The Survey of Health, Ageing and Retirement in Europe (SHARE), like its sister surveys (the Health and Retirement Study - HRS - the English Longitudinal Study of Ageing - ELSA – and many others) focus on this age group precisely because health and health care start playing an ever larger role after age 50.

variables that can explain the holding of extra private health care insurance by 50+ people: physical health status, cognitive abilities, demographic, actual and expected economic and financial characteristics. Secondly, we consider the effects of VPHI on health care utilisation and out-of-pocket (OOP) expenses for inpatient care, outpatient care (including dental services), and prescribed drugs. In particular, we are interested in the causal effect of having a VPHI on OOP spending. To estimate the causal effect we specify 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 affects the levels of OOP spending.

Thus our paper makes two new contributions to the empirical literature on additional private health insurance.

First, we provide a comprehensive analysis of the determinants of holding a VPHI policy in eleven European countries included in SHARE, estimating a Probit model separately for each country in order to ascertain whether some particular determinants were recurrent in spite of the institutional differences across health care systems. We depart from Bolin *et al.* (2010) who also use data from SHARE to investigate which factors increase the probability of holding insurance, but estimate the same regression for all countries. We find little evidence for a significant impact of observed health status in the holding of VPHI. Rather, having additional coverage seems to be based primarily on past or current occupation, educational levels, cognitive abilities, and current economic and financial status. Cognitive variables play a significant role probably because (as shown by Fang *et al.*, 2008) they are linked both to individuals' ability to evaluate the costs and benefits of purchasing a VPHI, and to their awareness about potential health risks.

Second, our paper is, to our knowledge, the first to analyse within the European context the effectiveness of additional health coverage in reducing OOP payments to the insured, taking into account unobserved heterogeneity in individuals' decision to hold a VPHI policy.³ We consider data on OOP spending in eleven European countries (non-refunded payments for inpatient care, outpatient care and prescribed drugs) collected through the SHARE questionnaire. We adopt a simultaneous-equations model to control for self-selection into VPHI policy holding and we find that in only one country (the Netherlands) the insured households have lower OOP spending than the rest of the population, while in some countries (Italy, Spain, Denmark and Austria) they even spend more. Therefore, VPHI does not seem an effective way to protect households from OOP expenditures. It follows that additional private health insurance is likely purchased to gain a better access to health services, enhancing both people's choice over the providers and the conditions and timeliness of care.

The paper is organized as follows. In section 2 we provide a review of previous theoretical and empirical literature and briefly consider the role of VPHI across 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 different 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 in terms of policy.

³Some papers have analysed the effect of supplementary health insurance on out-of-pocket expenditures for prescription drugs in the U.S. (e.g. Davis et al., 1999, and Lillard et al., 1999).

2. Background

2.1 Review of literature

Some of the issues we investigate have been addressed in both theoretical and empirical papers. Here we provide a brief review of recent contributions, and stress that little attention has so far been devoted instead to the effects of voluntary private health insurance policies on out-of-pocket spending.

A general lesson we draw from the theoretical literature is that the welfare and equity effects of allowing supplementation of compulsory, community-rated insurance crucially depend on who buys the additional coverage and how the supplementation affects the basic coverage. Additional coverage by a VPHI is more likely to be welfare and equity improving if it is bought primarily by high risks and low-earners (for whom the basic coverage may be sub-optimal and out-of-pocket health care spending too high) and if it minimises the negative spill-overs (i.e. moral hazard effects) on the basic mandatory health care insurance.⁴ But, as we will see now, the empirical evidence shows that for actual VPHI policies this is not often the case.

On the empirical ground, a large body of literature has investigated two main issues related to VPHI: (i) the determinants of the propensity to hold or to purchase a private additional health insurance policy; (ii) the effect of additional coverage on the overall consumption of health care.⁵ Little has been done on the specific topic we address in this paper, that is, the effect of VPHI on out-of-pocket spending.

(i) Several individual characteristics are found to be important determinants of demand. There is significant evidence that the decision to purchase a VPHI policy is mostly determined by socio-economic variables such as income, wealth, education, social class and employment status (e.g.: Cameron *et al.*, 1988; Wolfe and Goddeeris, 1991; Hurd and McGarry, 1997; Vera-Hernandez, 1999; van Doorslaer *et al.*, 2004; Jones *et al.*, 2006; Dormont *et al.*, 2007; Doiron *et al.*, 2008; Dardanoni and Li Donni, 2009; Schokkaert *et al.*, 2010; Bolin *et al.*, 2010) and by cognitive ability (Fang *et al.*, 2008), while a clear relationship between observable health measures and the probability to hold or purchase private supplemental insurance is not found, probably because the empirical literature does not provide consistent evidence of the role of adverse selection and because of cream skinning by private insurers. Recently, Bolin *et al.* (2010) revisit these arguments and observe a negative correlation between risk (measured by self-assessed health) and insurance, but find no evidence of heterogeneous risk-preferences as an explanation of this finding.⁶

⁴Several theoretical contributions have analysed mixed system of health insurance. Some authors model a mixed system created after the introduction of a government plan in a previously pure voluntary private health insurance system and do not consider – as in the case of European systems – the opposite, i.e. the addition of VPHI to a mandatory health insurance coverage (e.g., Besley, 1989; Selden, 1993, 1997; Blomqvist and Johansson, 1997a,b). Other papers investigate the welfare implications of VPHI integrating a compulsory/public basic insurance package (e.g., Petretto, 1999; Hansen and Keiding, 2002; Kifmann, 2002; Jacob and Lundin, 2005).

⁵Some authors develop the equity implications of their empirical findings about the two mentioned issues. Since both VPHI coverage and access to health care are positively related to income and social class, the moral hazard effects of supplemental insurance may increase income-related inequity in access to care (Buchmueller *et al.*, 2004; Van Doorslaer *et al.*, 2004; Jones *et al.*, 2006). Fiscal subsidies to VPHI policies could exacerbate inequity and may not be self-financing, i.e. their cost may not be outweighed by the savings made by the reduction in demand for care provided by mandatory social insurance (Emmerson *et al.*, 2001; Lopez Nicolas and Vera-Hernandez, 2008).

⁶Other variables – such as the perceived quality gap between private and public health care (Besley *et al.*, 1999; Propper *et al.*, 2001; Costa and Garcia, 2003), political beliefs (Propper, 1989 and 1993), and generational change in the propensity of individuals to buy health insurance (Propper *et al.*, 2001) – are also found to be important determinants of demand for VPHI in an NHS.

(ii) Most studies find that, after controlling for adverse selection, VPHI holding increases health care consumption, because of moral hazard (e.g., Hurd and McGarry, 1997; Holly *et al.*, 1998; Buchmueller *et al.*, 2004; Rodriguez and Stoyanova, 2004; Jones *et al.*, 2006; Grignon *et al.*, 2008; Pita Barros *et al.*, 2008; Fang *et al.*, 2008).⁷ Since insurance coverage may be endogenous with respect to care consumption, the correct evaluation of the moral hazard effect of VPHI requires controlling for adverse selection in the decision to purchase additional insurance. There is conflicting evidence on adverse selection. Most contributions (e.g., Wolfe and Goddeeris, 1991; Ettner, 1997; Hurd and McGarry, 1997; Vera-Hernandez, 1999; Buchmueller *et al.*, 2004; Doiron *et al.*, 2008) find that those in poor health are no more likely to hold VPHI than those in good health. Self-selection in terms of health-unrelated propensity to use services is found to be a function of socio-economic characteristics, including cognitive abilities and risk aversion.

Empirical studies have adopted different strategies to overcome the problem to distinguish between adverse selection and moral hazard effects of voluntary health insurance.

A first way is to run a randomised experiment, like in the Rand Health Insurance Experiment (RHIE) in the U.S., which assessed the moral hazard effect controlling for self selection by a random assignment of individuals to plans with different coverages (Manning *et al.*, 1987), or to exploit natural experiments where insurance choice is modified exogenously (e.g. Roddy *et al.*, 1986; Chiappori *et al.*, 1998; Eichner, 1998).

In non experimental settings, however, the decision to purchase additional health insurance is not random but depends on individual characteristics. In this case, three different approaches have been followed to control for self-selection.

(a) A first approach is to use an econometric model with instrumental variables (related to socio-economic characteristics and risk preferences) which should be correlated with the decision to hold a VPHI but not with the consumption of health care (e.g.: Cameron *et al.*, 1988; Coulson *et al.*, 1995; Holly *et al.*, 1998; Vera-Hernandez, 1999; Buchmueller *et al.*, 2004; Jones *et al.*, 2006; Doiron *et al.*, 2008).

(b) Some authors separate moral hazard and adverse selection effects, by focusing on a sample of individuals covered by an additional insurance plan which can be considered exogenous (e.g.: Ettner, 1997; Hurd and McGarry, 1997; Buchmueller *et al.*, 2004; Gardiol *et al.*, 2005; Pita Barros *et al.*, 2008). For example, Ettner (1997) distinguishes between Medigap coverage provided by a former employer and individually purchased policies, starting from the hypothesis that the former coverage is exogenous. Pita Barros *et al.* (2008) use a matching estimator technique where the control group is composed of individuals covered by the Portuguese NHS alone, and the treated group is composed of individuals who are also covered by ADSE, an additional coverage scheme exogenously assigned to all civil servants and their dependents.

(c) More recently, a third stream of literature considers the presence of multidimensional private information generating “advantageous selection” in the decision to buy additional

⁷A number of empirical papers consider a particular cost-shifting effect of complementary VPHI policies that cover all or part of the residual costs not reimbursed by the mandatory basic health insurance. For example, Wolfe and Goddeeris (1991), Ettner (1997) and Atherly (2002) show that Medigap policies subscribed by the elderly in the U.S drive up utilisation and costs incurred by the basic Medicare coverage, compounding the moral hazard effects inherent in the public insurance system. Several authors (e.g., Danzon, 2002; Buchmueller *et al.*, 2004; Glied, 2008) remark that these negative fiscal externalities are most likely in the case of “gap” policies that cover out-of-pocket expenses (e.g. copayments, prescription drugs) built in to the public policy, such as Medigap supplements to US Medicare or mutuelles policies in France. More recently, Chandra *et al.*, 2007 find that the externalities to Medicare from supplemental insurance coverage may be more modest than previously found due to a reduction in the hospitalisation of people insured with Medigap which benefit mostly Medicare.

insurance which may offset adverse selection based on actual health risks (Finklestein and McGarry, 2006; Fang *et al.*, 2008; Dardanoni and Li Donni, 2009). These studies identify different types of individuals sharing the same unobserved characteristics in terms of risk attitude and actual health risk. In particular, Fang *et al.* (2008) provide evidence of advantageous selection in the Medigap insurance market and find that its main sources include income, education, longevity expectations, and financial planning horizons. In addition, Fang *et al.* show evidence that factors generally omitted from economic models, such as cognitive ability and financial numeracy, are important sources of advantageous selection, while risk preferences are not. They also find that, conditional on health status, those with Medigap have higher total health expenditures (a moral hazard effect), even though, owing to a limitation in their datasets, they are not able to ascertain how much of the increased expenditure is attributable to OOP payments.

The empirical literature has not yet explored whether VPHI is effective in reducing OOP expenses by policyholders. As far as we know, the only exceptions are given by some analyses on the effect of supplementary health insurance on OOP expenditures for prescription drugs in the U.S. (Davis *et al.*, 1999; Lillard *et al.*, 1999) and by the exploratory work by Holly *et al.* (2005) (see also Borgia and Doglia, 2006, and Schultz and Tadesse, 2006). Since one of the desired effects of VPHI, in terms both of allocation efficiency and equity, should be the reduction of direct spending by the insured, this is surprising. Our paper attempts to fill this gap in the empirical analysis of the effects of VPHI. To control for self-selection, we follow the approach (a), but use also specific instrumental variables signalling cognitive ability as suggested by approach (c).

2.2 Role of private health care insurance within health care systems of SHARE countries

Private health insurance is used at different levels and for different reasons. In all countries it integrates the primary statutory coverage.⁸ In some countries it is the primary source of health coverage for a part of population⁹.

As pointed out by the OECD (2004), voluntary additional health insurance (VPHI) can integrate statutory health insurance in three ways: providing “supplementary”, “complementary” and “duplicate” coverage. 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 Switzerland. For instance, in the Netherlands, before the 2006 reform, almost all of the population with social health insurance and some individuals who buy primary private insurance purchased supplementary insurance covering dental care for adults, physiotherapy, drugs, medical appliances (such as spectacles and hearing aids), luxury services (private rooms in the hospitals), and alternative care. Complementary VPHI provides full or partial funding for goods and services that are not freely provided 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

⁸In Germany and Belgium the supplementation by private insurance may also be mandatory and is offered by basic health insurers (sickness funds) (Paolucci *et al.* 2007). In our paper we exclude this type of supplementary insurance and focus only on voluntary additional health insurance, as defined in the Health Care Section of the SHARE questionnaire.

⁹Before 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; 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 (Ministerie van Volksgezondheid, Welzijn en Sport, 2006). In Germany about 10% of population is 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). 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% (OECD, 2004; Colombo and Tapay, 2004).

complementary insurance reaches almost 92% of the population (for a smaller fraction of the French population VPHI has important supplementary coverage features, though). Duplicate VPHI covers goods and services already included under statutory health insurance, by increasing consumer choice (privately funded providers operating 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 thrives when the level of satisfaction with publicly funded services is low.

In many SHARE countries we find different combinations of the three types of additional 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 insurance companies, while complementary and supplementary coverage by employer-based, professional and mutual aid funds).

2.3 A theoretical framework of additional private health care insurance

Even though additional private health insurance presents diverse characteristics and is used for different reasons in different European countries, a common feature of all types of VPHI is that they should reduce the burden of OOP expenditures to subscribers. The main aim of a VPHI, independently of its particular configuration, should be the reduction of the illness-related financial risks.¹⁰

In other terms, for each policy-holder i resident in country j , the expected relationship between OOP spending for health care and VPHI holding can be specified as:

$$OOP_{ij} = f_j(VPHI_{ij}(X_{ij}))$$

where X_{ij} is a vector of characteristics of the individual. The f function is allowed to differ across countries, to allow for the presence of a wide range of different institutional characteristics of the health care systems.

In principle we might expect a negative relationship between OOP_{ij} and $VPHI_{ij}$. In other terms, we expect VPHI policyholders to spend less out of pocket, other things being equal. In fact, if VPHI is duplicate, it reduces OOP spending for buying from private providers services which are covered by social insurance. If it is supplementary, it reduces OOP spending for buying from private providers services which are not covered by social insurance. If it is complementary, it reduces OOP spending on services which are covered by social insurance, via cost-sharing. Finally, if it is, at the same time, duplicate/supplementary/complementary (in various combinations), it anyway reduces OOP spending both for buying services from private providers and for cost-sharing.

However, we note that VPHI could also be associated to higher OOP spending, because it enhances access to health care, by providing a wider choice over the providers and better conditions and timeliness of health care. Policyholders could experience a positive effect of VPHI on OOP expenditures because of the high levels of cost-sharing set out by insurance companies in VPHI contracts providing for a duplicate or supplementary coverage to both reduce moral hazard and get an advantageous selection of the insured: high cost-sharing discourages insurance coverage to the higher health risk individuals (with higher expected

¹⁰This statement holds even though we consider that an illness gives rise to a loss of utility in addition to the financial loss due to the cost of treatment. On these issues, see Zweifel *et al.* (2009), chapter 6.

health care consumption) while it may not curb more risk averse individuals (with higher propensity for prevention). Even when VPHI performs a complementary function, covering the reimbursement of co-payments for health care provided by a National Health Service or a social health insurance (typically physician services and prescription drugs), the insured pay less OOP for each unit of public health care they consume, but could end up using more publicly funded health care (a moral hazard effect created by VPHI coverage and only partly reduced by private cost-sharing); if the second effect is stronger, insured households can spend more OOP than the non-insured¹¹.

It is worth noting that a positive relationship between OOP and VPHI does not necessarily contradict the individual utility maximising behaviour: the increased utility determined by the better availability of health care guaranteed by the VPHI can counterbalance the utility loss caused by the increase of OOP spending that can be experimented by VPHI policyholders.

3. Characteristics of voluntary additional health 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 = 19356). Within couples, the head is chosen as the elder partner, or the female when 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 VPHI (i.e., complementary, supplementary, and duplicate of primary statutory coverage) described in section 2.2.

Table I shows some characteristics of VPHI at the household level. In our sample, 6963 households report holding at least one VPHI (30.7% of total weighted population) and 77.7% of insured households have more than one policy. Table I also reports mean and median total yearly premiums paid by households for VPHI. The higher median values of total premiums are in Germany, France, Spain, and Greece (but in Germany and Spain 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 II reports four types of characteristics of the heads of the households of the entire SHARE sample, distinguishing between insured (with at least one VPHI policy) and not insured, and shows that on average:

a) the insured heads are more concentrated among persons younger than 60: 36.5% against the average of 30.9% for the not-insured¹²; moreover, most heads live with a partner and this percentage is higher for the insured (64.4% against 56.9% of the not insured) and the

¹¹This weakens also the effect of public cost-sharing in controlling moral hazard for public health care. In this way, VPHI could contribute to increase the use of public health care services by the insured and consequently (not only OOP but also) public expenditure (Atherly, 2002; Danzon, 2002; Glied, 2008).

¹²As 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.

insured heads exhibit higher educational levels (ISCED 3 or more): 54.3% against 45.0% for the not-insured;

b) the heads with a VPHI are usually characterized by good or very good self-reported health, fewer reported long-term illness, chronic diseases, and physical limitations as measured by the Global Activity Limitations Indicator (GALI); the “objective” health index reported in the section b) of table II is a measure of that part of the self-reported health status that can be explained using information on health problems (prevalence of chronic conditions and Body mass index) and physical tests (grip strength and walking speed) 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;

c) the insured heads show better levels of cognitive functions (verbal ability, numeracy and reading skills)¹³;

d) the 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.

Summing up, in SHARE countries VPHI is predominantly held by individuals with better health status, 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).

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

Table III reports the types of coverage provided by VPHI in each SHARE country.¹⁴ 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 coverage does not fit well. In Sweden a large proportion of insured households indicated “any other type of VPHI coverage” because they hold a private insurance policy that covers income loss during longer periods of sickness (normally more than three months). This kind of insurance, however, does not include any kind of health care and therefore we do not treat it as a VPHI and exclude these data from table III. 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 (Schokkaert *et al.*, 2010).

¹³The only exceptions are given by the Mediterranean countries, where there are low levels of verbal and reading abilities even for insured people.

¹⁴The health care services covered by VPHI are reported according to country specific answer categories of the question HC060 in the Health Care Section of SHARE questionnaire: “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: 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).”

In general, from Table III 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. 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). The provision of a direct access to specialists usually has a strong positive effect on demand and this could determine a significant impact of VPHI in increasing the level of OOP spending. For some countries this is confirmed by the results of our econometric analysis, as reported in section 5.3. Besides, where public systems require substantial cost-sharing (co-payments), 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-utilisation of services becomes crucial.¹⁵

Summing up, descriptive statistics suggest that the additional coverage provided by VPHI enhances access to care.¹⁶ However, the higher accessibility guaranteed by a private insurance does not necessarily mean that VPHI contributes to a reduction of households' OOP spending 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 (as in Cameron *et al.*, 1988; Buchmueller *et al.*, 2004; Fang *et al.*, 2008). The dependent variable takes value one if the household has at least one VPHI, zero otherwise.¹⁷ 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 (defined as the entitlement to at least one form of pension in the future).¹⁸

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 missing items are replaced by five distinct imputations. Therefore, five different datasets are created and we perform the analysis on each dataset separately. The estimated parameters are then combined as suggested by Rubin (1987)¹⁹, in order to obtain one final set of estimates and standard errors (see Little and Rubin, 2002 for a recent survey).

¹⁵According to Buchmueller and Couffinhal (2004), in France VPHI significantly increases medical care utilisation of physician services and prescribing drugs, since it seems to reduce (and sometimes eliminate) OOP costs.

¹⁶We have also analysed the SHARE data on health care utilisation, observing that there are some differences between insured and not insured 50+ people. People with a VPHI are more likely to use health services and have a lower probability to forgo health care because of its unavailability. However, these comparisons must be considered with caution since different utilisation of health care services depends also on other individual and institutional (organisational and cultural) factors. For example, using SHARE data, Bolin *et al.* (2009) find 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.

¹⁷As explained in Section 3.1, we consider the head of the household as the reference person. However, the VPHI indicator equals one also when the spouse is covered but the household head is not; this happens for a small percentage of households holding at least one VPHI (about 6.8%).

¹⁸Table A1 in the Appendix reports a brief description of the explanatory variables. Full descriptions of these variables are available in Börsch-Supan *et al.* (2005).

Results are summarized in Table IV, 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 differences in the underlying health care systems. For most countries the educational level and 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 Italy and France). This finding is in accordance with a study by Fang *et al.* (2008) and other recent contributions (Chatterjee and Nielsen, 2010; Buchmueller *et al.*, 2011) who stress that cognitive ability may act as an important source of advantageous selection in the VPHI market, probably because it is linked both to individuals' ability to evaluate the costs and benefits of purchasing an additional coverage, and to their awareness about potential health risks.

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

For most countries we do not find a clear relationship between physical health and the probability to hold a VPHI policy. This result is consistent with findings of other studies (e.g.: Cameron et al. (1988) for Australia; Wolfe and Goddeeris (1991), Hurd and McGarry (1997) and Fang et al. (2008) for the U.S.; Buchmueller et al. (2004) for France; Jones et al. (2006), for five European countries). Only in Denmark, the Netherlands, Switzerland, and Austria a low physical health status is associated to a higher probability to be insured, while for Greece the evidence is mixed: a positive (negative) relationship between poor health and coverage when physical health is measured by reported long term illness (GALI)²⁰. The results for Denmark, the Netherlands, Switzerland, and Austria could be due to adverse selection. Tapay and Colombo (2004) report evidence of adverse selection in the Dutch market for supplemental insurance especially for dental care; after the de-listing of many dental services, insurers affiliated with sickness funds informally agreed to accept all applicants for supplemental insurance, at least for a while; hence, insurers were without the ability to deny coverage to high-risk applicants, as normally done in supplemental markets.²¹ In Austria, adverse selection could arise since insurers are prohibited by law from carrying out medical examinations and they cannot refuse to insure someone with a chronic illness, even though they are allowed to adopt risk rating mechanisms (Mossialos and Thomson, 2004; Hofmarcher, 2001). In Switzerland, where insurers providing VPHI are allowed to select risks by health tests and product differentiation, adverse selection could depend on two main reasons: first, as in Austria, there are some legal limitations on insurers' ability to impose exclusions on coverage of pre-existing conditions (OECD, 2004); second, VPHI is predominantly sold by specialised sickness funds who also offer mandatory health insurance for which no price discrimination (based upon age, gender, or health condition) is allowed (Colombo, 2001; OECD, 2004).²² In Denmark, the VPHI market is dominated (99% share in 2004) by a mutual non-profit association which offers individual insurance policies

¹⁹The point estimate of a parameter in a multiple imputations (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.

²⁰In particular, for the Netherlands we find evidence that individuals who reported long-term illness are more likely to hold additional insurance, while for the other three countries (Denmark, Switzerland, and Austria) the significant coefficients for the "objective" health index indicate a negative relationship between good health and coverage. This is in accordance with Doiron *et al.* (2008) who found that the conventional negative relationship predicted by adverse selection is recovered when using more objective indicators of health.

²¹Godfried *et al.* (2001) find that after the 1995 change high-risk individuals were more likely to purchase supplementary dental insurance than low-risk individuals.

to cover mainly cost-sharing for dental care, pharmaceuticals, physiotherapy and corrective lenses (Strandberg-Larsen *et al.*, 2007). This additional coverage is typically based on long-term contracts characterised by group-rated premiums which make it quite difficult for the insurer to limit the presence of high risks within the pool of the insured, even though the maximum age limit for purchasing coverage is 60 and the insurer may use several tools to limit the consequences of adverse selection.²³

We see that in all countries but Switzerland past or current occupational status of household 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. This confirms previous analyses on the employment characteristics of VPHI subscribers (e.g., OECD, 2004, pp. 59-62).

In agreement with what is reported in other European studies (e.g. van Doorslaer *et al.*, 2004; Mossialos and Thomson, 2004; Jones *et al.*, 2006; Dormont *et al.*, 2007), we find that high current economic and financial status (in particular in terms of household income) has a positive effect on the probability to hold a VPHI policy in six countries: Sweden, Denmark, Germany, Spain, Greece, and (to some extent) Italy.

Overall, as in other studies (e.g.: Wolfe and Goddeeris, 1991; Vera-Hernandez, 1999; Doiron *et al.*, 2008; Fang *et al.*, 2008; Dardanoni and Li Donni, 2009; Bolin *et al.*, 2010), we find evidence that VPHI policies are mostly held by better educated, cognitively more able and, in some countries, more affluent people.

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

5.1. Descriptive analysis

It is important to assess how effective voluntary private health insurance is in reducing out-of-pocket (OOP) spending for individuals aged 50 or over across SHARE countries. We define OOP spending as the sum of non-refunded payments for hospital inpatient care, outpatient care and prescribed drugs.²⁴ Expenses for outpatient care include consultations with all health professionals (including dentists), diagnostic tests, therapies prescribed by doctors and outpatient surgery. Expenses for alternative medicines, self-medication and not prescribed drugs are not considered.

In an exploratory analysis of the first SHARE data to be released, Holly *et al.* (2005) found that in most countries the proportion of people paying out-of-pocket (OOP) is not significantly different between those who have subscribed a VPHI and those who have

²²Insurers offering statutory health cover can offer voluntary supplementary VPHI via associated insurance companies also in the Netherlands (OECD, 2004, p. 40).

²³In Denmark, applications for additional coverage may be rejected if applicants do not fulfil the requirements which basically regard health status; premiums vary according to the level of coverage chosen (pre-existing conditions excluded from the coverage) (Strandberg-Larsen *et al.*, 2007), even though they are rather low on average (see previous table 1).

²⁴The OOP expenditures refer to questions HC045, HC047 and HC049 of the Health Care Section of SHARE questionnaire: "Not counting health insurance premiums or reimbursements from employers, about how much did you pay out-of-pocket for all your hospital inpatient care/outpatient care/ prescribed drugs in the last twelve months?".

not²⁵. Our analysis, based on a recent release of the same data set (that includes many more observations), produces results which are rather different (Table V).

In Sweden, Germany, the Netherlands, Belgium, Switzerland and Greece the proportion of people with positive OOP spending does not significantly differ between households with or without VPHI (for all of these countries, P-values are higher than 0.10 in part 1 of Table V). In the other countries but France, households holding a VPHI have a higher probability of paying OOP.

When we consider the levels of OOP spending, we find that in some countries (Denmark, Austria and Spain) VPHI coverage seems associated with significantly higher OOP (Table V, part 2). These results are then confirmed when the possibility of zero OOP spending is considered (Table V, part 3).

5.2 The econometric model

The descriptive statistics discussed in section 5.1 cannot ascertain whether VPHI actually substitutes for households' direct payments or determines an incentive to spend more OOP. In fact, the total effect of VPHI on OOP spending 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 to the estimate of the VPHI dummy parameter in a standard linear regression of OOP spending.

In this paper we intend to provide causal inference of the effect of VPHI holding on OOP spending on health care. To this end, we make some identifying assumptions. In particular, we assume that some variables affect the probability of holding a VPHI policy, but not the desired OOP spending. The identification assumption we make is that past or current occupation and cognitive abilities have an impact on the probability to hold a VPHI but of these variables only current occupation may affect the levels of OOP spending.²⁶

Therefore, taking into account the Probit estimates in Table IV, we consider six variables that can be used as instruments for VPHI in the OOP spending 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).

The first three instruments reflect institutional features of the VPHI market across European countries. The last group of instruments, instead, is justified because cognitive abilities are determinants of the individual decision on VPHI holding (e.g.: Fang et al., 2008; Chatterjee and Nielsen, 2010; Buchmueller et al., 2011), but do not seem to have a direct effect on the choice over health care (and consequent OOP spending) which is more influenced by physicians.

²⁵In two countries (Austria and Italy) 50+ people covered by a VPHI showed a higher probability of OOP spending, 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 OOP spending and who were covered by a VPHI met higher OOP spending (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 OOP levels in Italy do not differ between insured and not-insured households.

²⁶In our sample of 50+ individuals, only 30% of respondents are currently working, 50% are retired from work. Consequently, in most interviewed households, the decision of subscribing a VPHI policy was taken many years before the interview, probably when respondents were working.

All four types of variables are in principle exogenous to both the policy holding and the out-of-pocket spending decisions. Also, for each variable the Probit analysis confirms their statistical relevance in the policy holding decision in at least some countries, and indeed quite often in most countries (see Table IV). We checked that omitting insignificant variables from the Probit equations (country by country) does not affect the econometric analysis of the out-of-pocket spending equations, nor the corresponding over-identifying restrictions tests.

We let *current* occupational status (at least one household member is currently an employee, a self-employed, a retired, a homemaker) affect the level of OOP expenditure. 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.

Considering the theoretical framework introduced in section 2.3, the relationship between OOP spending and 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* spending), conditional on three sets of explanatory variables: the first (X_1) includes variables that affect both the decision of holding a VPHI and OOP spending; the second (X_2) includes variables that affect OOP spending, 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 OOP spending (the instrumental variables described above).

The regression function of interest for country j is:

$$OOP_{ij} = X_{1ij}\beta_1 + X_{2ij}\beta_2 + \delta_j VPHI_{ij} + \varepsilon_{ij} \quad i=1, \dots, n \quad (1)$$

where $VPHI_{ij}$ is the endogenous dummy variable, indicating whether the household has at least one voluntary private health insurance, and ε_{ij} is a random term. From now on we omit the j index for notational simplicity.

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 :

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

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

The observed decision is:

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

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:

$$\Pr(VPHI_i=1|W_i)=\Phi(W_i\gamma) \quad (3)$$

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

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

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 .²⁷

5.3 Estimation Results

In Table VI we present the main results of our analysis. In some countries (the Netherlands, France and Spain) the proportion of households with zero OOP spending is very large (see the third column of Table VI). Since this can strongly affect the estimation of the treatment effect model, for these countries an instrumental variable Tobit model (IV-Tobit) is estimated instead of the Treatment-Effect model. This method however treats as continuous the endogenous variable $VPHI$ (implicitly employing a linear probability model for the first stage).

The models described above plus an OLS regression are estimated for each country. Table VI reports the main results of the estimation for the dummy variable $VPHI$ in these three types of regression of OOP spending (OLS, IV-Tobit, Treatment-Effect). Under “instrumental variables” we report the estimates of the model adopted for the final analysis, that is IV-Tobit for the Netherlands, France and Spain and Treatment-Effect estimates for the remaining countries.²⁸

Table VI also shows whether the instruments are informative and valid. The fourth column of Table VI reports the F-statistic 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 at 1% of significance level for all countries, except Italy (whose P-value is equal to 0.087) and Spain (P-value equal to 0.012). Failure to reject might be a sign of weak instruments: the addition of many weak instruments increases the bias of the two stage estimation procedure. However, the bias should be relatively minor when the F-test is above 10 (Stock *et al.*, 2002; see also Angrist and Pischke, 2008, for a more general discussion). In our case, for both Italy and Spain we can report F-statistics larger than 10. Moreover, further analyses reveal that for Spain the null hypothesis can be rejected at 1% of significance level just removing the “ever been a self-employed” variable from the set of instruments, while for Italy the null hypothesis can be rejected at 5% of significance level removing the “ever been a civil servant” and the “self-reported reading ability” variables from the set of instruments. After these adjustments

²⁷The Treatment-Effect model is estimated through the *treatreg* command of the STATA software. Standard errors are estimated consistently by using the residuals from the augmented regression and the parameter estimate on the hazard h (Cong and Drukker, 2001, Terza *et al.*, 2008).

²⁸Table A2 in the Appendix reports the results of the second stage estimation for each country.

for both countries, VPHI estimates of the instrumental solutions do not change in magnitude and significance, as is shown in the following lines (in *italics*) in Table VI.

Residuals for the IV-Tobit model²⁹ and Treatment-Effect model are then computed and used to construct a Sargan test for the validity of the instruments (column 7 of table VI)³⁰. The null hypothesis of the Sargan test is rejected for Germany, Sweden and Belgium. However, also this problem can be solved simply removing one or two variables from the list of instruments. More specifically, the null hypothesis of the Sargan test is no longer rejected excluding: the “ever been a self-employed” variable for Belgium; the “ever been a civil servant” and “ever worked in firms with more than 24 employees” variables for Germany; the “ever worked in firms with more than 24 employees” and “numeracy score” variables for Sweden. Thus, for these countries the use of a reduced set of (informative) instruments leads to VPHI estimates that are still not significant.³¹ The corresponding estimates are reported in the line below, in *italics*.

We observe that for Spain, Austria, Italy and Denmark the VPHI estimated parameter is positive and significant. For these countries private insurance seems to create a strong incentive to spend more OOP. On the other hand, in the Netherlands the VPHI estimated parameter is significantly negative. In France, Switzerland, Greece, Germany, Sweden and Belgium the estimated parameter is not significant, signalling that for these countries holding a VPHI does not have a systematic effect on OOP spending.³²

Altogether, in only one country (the Netherlands) there is a significant effect of VPHI in reducing the level of OOP spending, as we might have expected thinking about the role of these policies. In this country VPHI is only supplementary and covers especially dental care and full expenses for drugs. Supplemental insurance is mainly offered by sickness funds to their members through affiliated private insurers and premiums are often community rated (Tapay and Colombo, 2004). The presence of a supplemental VPHI represent for the Netherlands a means to “de-list” certain items from the social insurance coverage package, without thereby compelling people to self-fund these services.³³ In this respect, our results confirm that in the Netherlands VPHI is really effective in reducing the burden of OOP spending to subscribers.

On the contrary, in Italy, Spain, Denmark and Austria there is evidence of a significant effect of VPHI in increasing the level of OOP spending. 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 spending by policyholders 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. As we argued in section 2.3, cost-sharing is normally used to increase subscribers’ awareness of the costs of health care (and reduce moral hazard) but it may also be used by insurance companies as a cream skimming tool in order to get an

²⁹In such case, generalized residuals (Chesher and Irish, 1987) are calculated.

³⁰Both the instruments relevance and the over-identification tests are calculated following Schafer (1997), taking into account multiple imputations.

³¹Given that the first stage reflects institutional differences, the exclusion of different variables for different countries is fully justified.

³²When we omit cognitive abilities from the instruments list, we get similar point estimates of the parameter of interest in those countries where we find significant effects with the full set of instruments, but larger standard errors. First stage regressions F-tests on the additional instruments fall below 10 in seven countries. Estimation results are available upon request.

³³In general, the low level of OOP expenditures in the Netherlands supports the notion that the Dutch appear to prefer to insure against the costs of health care, whether through social insurance or private health insurance.

advantageous selection of the insured with respect to the particular types of covered health care. The end result of higher OOP spending for the insured may be interpreted as evidence that the insurers in these countries are overly cautious in limiting their financial liability.³⁴

One could argue that our approach cannot rule out another potential source of endogeneity of insurance status, namely the adoption of cream-skimming strategies by the insurers which may deny, or restrict, additional coverage to high-risk individuals. This cream-skimming would bias the effect from insurance on health care consumption (and consequently on OOP) downwards. But we find that only in one country (the Netherlands) the insured households have lower OOP spending than the rest of the population, while in four countries (Italy, Spain, Denmark and Austria) they even spend more. The consideration of screening behaviour by the insurers would strengthen our result for these four countries while it should not weaken our finding for the Netherlands, since we have shown in section 4 that Dutch individuals with long-term health problems are more likely to hold additional insurance.

Actually, there is evidence that the adoption of price discrimination and cost-sharing arrangements by VPHI companies can be quite relevant in Austria, Denmark, Italy and Spain. In all these countries insurers are permitted to charge higher premiums according to individual characteristics and the level of coverage or to introduce some form of cost-sharing (Mossialos and Thomson, 2004; Hofmarcher, 2001; Strandberg-Larsen *et al.*, 2007).³⁵ In Spain and Italy VPHI is essentially duplicate or supplementary of public coverage (and enhances the access to timely elective care), while in Denmark, Austria, and to a lower extent in Italy, VPHI performs also a complementary function, covering the reimbursement of co-payments or deductibles for health care included within the public or social insurance coverage package (typically prescription drugs, dental care for adults, physiotherapy). As we argued in section 2.3, where VPHI is complementary, it could induce insured households to spend more OOP than the non-insured through a strong increase of their demand for publicly funded health care.³⁶ Anyway this further explanation of the positive relationship between additional private health insurance and OOP in Austria, Denmark, and Italy should be tested through a specific analysis of the utilisation effect of complementary VPHI coverage.

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 eleven European countries, focusing on the impact of additional coverage on the insured's OOP spending.

For each country, we first estimated how a wide set of variables explains the probability of holding a private health insurance by households' heads. The main determinants of VPHI are different in each country, reflecting 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 household heads and high economic status are also found to play an important role in many countries.

³⁴This assertion is somewhat confirmed by the rather low loss ratios (the portion of health insurance premiums paying for health care services) which characterise voluntary health insurers particularly in Austria and Italy: all are below 77% (Mossialos and Thomson, 2004, p. 98).

³⁵It is worth noting that in all these countries group policies (i.e. policies purchased by groups) - characterised by reduced premiums and lower cost sharing-while gaining an increasing share of the VPHI market - are still a minority. The 1998 Spanish reform of the personal income tax shifted incentives to buy additional health insurance from individual policies (which decrease by 10% between 1997 and 2001) to group employer-paid policies (Rodríguez and Stoyanova, 2008).

³⁶In this way it could even generate a negative fiscal externality on the public system because private purchases compound the moral hazard effects inherent in the public insurance system (as shown also by Buchmueller and Couffinhal, 2004 and Glied, 2008).

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

Our key estimation result is that in only one country (the Netherlands) the insured households have lower OOP spending than the rest of the population, while in four countries (Italy, Spain, Denmark and Austria) they even spend more. This could be due to increased utilisation, i.e. higher demand for health care goods and services (especially when VPHI is complementary of basic statutory coverage), but also to cost-sharing measures adopted by the insurers in order both to counter the effects of moral hazard and to limit the effects of adverse selection (mostly when VPHI is supplementary or duplicate).

These findings have important implications in terms of equity and health care policy. In particular, our analysis, in agreement with other studies (OECD, 2004; Mossialos and Thomson, 2004), suggests 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, with the exception of the Netherlands, it does not reduce the need for the insured to rely on OOP payments and personal savings to cover the costs of health care excluded from public coverage. These inequalities may be further amplified by tax incentives, which act as a government subsidy to wealthier people.

On the basis of the results of this paper and other papers cited above, we can derive policy conclusions for those European countries that want VPHI to be an effective tool to integrate the health care statutory coverage, enhancing accessibility without negative effects on equity. First, it seems better to promote supplementary (rather than duplicate or complementary) VPHI since this kind of integrative insurance can be effective in reducing OOP expenditure (as in the case of the Netherlands) and is less likely to drive up utilisation and costs incurred by the basic statutory coverage: this calls for a clear definition of the boundaries between statutory and voluntary additional coverage, as suggested also by some theoretical contributions on additional private health insurance considered in section 2.1. Second, tax incentives to VPHI should be concentrated on group (employer-paid or open mutual fund) policies, because individual policies are generally more affected by adverse selection (and to the consequent cream skimming strategies by insurers), and because employers and mutual aid funds may be able to negotiate better coverage packages with insurance companies reducing informational problems for consumers. Third, since education level and cognitive ability are found to be important factors influencing the decision to subscribe a VPHI, as pointed out also by Fang *et al.* (2008) and OECD (2004), it seems useful to develop educational and informational interventions to facilitate choice within private insurance markets, and to foster simplification of VPHI rules to make the cost-benefit calculations of additional coverage simpler for the potential insured. Disclosure requirements and benefit standards may be useful especially for senior citizens who may have difficulties in understanding the features of additional insurance.

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Conference on economic policy issues in the European union “Towards an ageing and globalising Europe: challenges for the European social model(s)” (June 8, 2007, Bologna, Italy), the 7th European Conference on Health Economics “Health Economics and global renaissance” (July 23-26, 2008, Rome, Italy). We especially thank the discussants Alberto Holly and Gianluca Fiorentini for helpful comments.

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Appendix

Table A1

List of explanatory variables

	Variable	Description
1. Demographic Characteristics	Male	dummy=1 if the household head is male
	Age less than 60	dummy=1 if the household head is younger than 60 years
	Age 60-69	dummy=1 if the household head is aged between 60 and 69 years
	Age 70-79	dummy=1 if the household head is aged between 70 and 79 years
	Age 80 and more	dummy=1 if the household head is older than 79 years (baseline)
	Partner	dummy=1 if the household head lives with a partner
	Household size	Total number of household members
2. Educational Level	Education - ISCED 2 or less	dummy=1 if the international standard classification of education code of the household head is at most 2 (baseline)
	Education - ISCED 3	dummy=1 if the international standard classification of education code of the household head is 3
	Education - ISCED 4 or more	dummy=1 if the international standard classification of education code of the household head is at least 4
3. Physical health Status	GALI	dummy=1 if the household head reports limitations with activities according to the Global Activity Limitations Indicator
	Long-term illness	dummy=1 if the household head reports long-term illness
	“Objective” health index	“Objective” health index score of the household head ranging from 0 to 1 (Jürges, 2007)
	Self-reported health status	Self-reported health status (US scale) of the household head (5-point scale ranging from “poor” to “excellent”)
4. Cognitive abilities	Numeracy	Best household result of the numeracy score test in 0-1 scale
	Verbal fluency test	Best household result of the verbal fluency score test
	Reading skills	Best household result of self-rated reading skills in 0-1 scale
5. Occupational status	Ever been a civil servant in the household	dummy=1 if at least one household member has ever been a civil servant
	Ever been a self-employed in the household	dummy=1 if at least one household member has ever been a self-employed

	Variable	Description
	Ever been employed in a firm with more than 24 employees in the household	dummy=1 if at least one household member has ever worked in a firm with more than 24 employees
	At least one member currently self-employed	dummy=1 if at least one household member is currently a self-employed
	At least one member currently employee	dummy=1 if at least one household member is currently an employee
	At least one member currently retired	dummy=1 if at least one household member is currently retired
	At least one member currently homemaker	dummy=1 if at least one household member is currently a homemaker
6. Economic and financial status	Home ownership	dummy=1 if the household head is home owner
	Household income	Household income
	Real assets	Household real assets
7. Expected economic status	Entitlement to a future pension	dummy=1 if the household head is entitled for at least one pension in the future (not currently received)

Table A2

Results of the second stage estimations for each country

Variable	Sweden	Denmark	Germany	Netherlands	Belgium	France	Switzerland	Austria	Italy	Spain	Greece
Having at least a VPHI	- 850.97	3924.61 *	- 169.30	- 1262.01 *	- 588.75	2099.33	- 879.13	352.69 *	1964.13 **	3748.19 **	427.01
Male	592.61 **	695.58	12.79	21.78	72.61	0.54	- 254.79	- 3.81	79.85	9.71	33.25
Age less than 60	- 428.73	- 659.64	41.19	148.62	- 68.25	- 49.43	- 334.95	- 65.63	- 150.72	499.32 ***	241.42 **
Age 60-69	132.44	- 403.04	30.81	204.24	189.94	- 25.03	- 193.11	- 31.92	- 153.56	384.43 **	170.77 *
Age 70-79	891.61 *	- 173.50	29.78	272.44 *	148.62	34.96	- 334.31	- 62.13	- 180.18	23.33	181.26 **
Partner	904.46 *	1894.85 ***	112.18 ***	292.04 *	537.98 ***	37.17	211.30	89.76 *	270.59 **	69.32	173.61 **
Household size	164.53	- 691.13 *	5.04	5.06	- 37.59	57.57	- 34.24	- 14.08	- 3.80	20.89	21.32
Educ: ISCED 3	971.79 **	- 33.48	63.76 *	202.12 **	152.30	- 12.10	- 38.91	53.71	116.71	- 237.32	75.60
Educ: ISCED 4 or more	297.29	632.35	103.76 **	533.44 ***	64.22	406.61 ***	323.28	26.16	372.12 *	- 674.64	131.23 *
GALI	- 308.62	287.32	36.36	92.66	241.88 **	235.65 **	151.50	74.69 *	97.68	- 2.99	191.64 ***
Long-term illness	420.41	602.56	39.36	190.03 *	58.86	25.13	- 36.89	8.08	280.08 **	180.03 *	34.53
"Objective" health index	- 5080.66 ***	- 5024.06 **	- 441.23 ***	- 1845.09 ***	- 730.39 *	- 146.48	- 5037.36 ***	- 753.43 ***	- 857.55 **	- 437.38	- 1769.56 ***
Self-reported health status	- 180.55	- 2497.79 **	- 36.20	268.65	- 702.56 ***	- 327.74	- 100.24	80.04	- 200.56	- 309.95	- 27.97
At least one member currently self-employed	582.11	1700.58 **	99.58 **	167.01	- 121.14	44.25	795.58 **	80.53	42.37	516.31 ***	190.35 **
At least one member currently employee	768.30 *	159.54	72.68 **	282.09 **	16.10	- 59.02	611.46 **	71.74	254.87 *	404.60 ***	127.56 *
At least one member currently retired	299.52	816.84	180.87 ***	202.23 *	152.08	- 74.45	902.27 **	96.72 *	357.99 ***	78.88	183.05 **
At least one member currently homemaker	1284.36	1645.77	103.51 ***	- 46.11	247.13 **	124.98	359.29	98.95 **	210.75 **	291.84 ***	89.12
Home ownership	205.26	544.61	21.65	154.70 *	- 27.04	- 77.45	4.15	45.40	130.02	64.28	- 117.57

Variable	Sweden	Denmark	Germany	Netherlands	Belgium	France	Switzerland	Austria	Italy	Spain	Greece
Household income	-0.008	0.002	0.001**	-0.001	0.002	0.003**	0.003	0.001*	0.003**	-0.001	-0.001
Real assets	0.0001	0.0001	0.0001**	0.0001	-0.0001	-0.0001	<0.0001	-0.0001	-0.0001	-0.0001	-0.0001
Entitlement to a future pension	-61.15	633.70	35.49	41.84	-134.20	-43.30	-120.31	-39.57	-63.42	80.73	-94.82
Constant	5956.16***	5982.15***	224.50**	830.62	1453.48***	-2268.67**	5089.47***	549.19***	477.42	-999.60***	1450.20***

Significance levels:

*** = 1% level;

** = 5% level;

* = 10% level

For the Netherlands, France and Spain the results refer to the IV-Tobit model estimation; for the remaining countries the results refer to Treatment-Effect model estimation. The set of additional instruments includes: "At least one household member has ever been civil servant"; "At least one household member has ever been self-employed"; "At least one household member has ever worked in a firm with more than 24 employees"; "Numeracy score of the household head"; "Verbal fluency test score of the household head"; "Self-reported reading ability of the household head".

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Table 1

Characteristics of VPPI at the household level

Country	Weighted % of households with at least one VPPI	% of insured households with more than 1 policy	VPPI yearly premiums (<i>l</i>)		Median income (PPP adjusted)	
			Mean	Median	Insured households	Not-insured households
Sweden	3.29	54.64	232.50 (22.22)	145.14	59483	31211
Denmark	40.12	57.96	184.34 (5.81)	184.33	44182	23232
Germany	13.94	57.53	2359.76 (129.25)	1523.35	40888	28374
The Netherlands	71.32	56.95	1270.14 (44.51)	636.31	35487	31999
Belgium	76.61	73.05	323.46 (24.88)	175.36	26960	18332
France	83.92	96.11	892.94 (24.75)	743.05	28564	23553
Switzerland	35.72	71.26	782.70 (67.72)	298.14	50682	34756
Austria	26.77	39.28	965.93 (58.12)	625.49	37026	27175
Italy	7.52	38.55	916.56 (148.56)	489.53	35232	19600
Spain	10.16	67.51	1040.89 (98.65)	729.26	34492	15254
Greece	6.18	48.94	870.00 (100.05)	644.30	32043	15463
All SHARE countries	30.71	77.72	1188.40 (22.11)	701.52	32115	22519

All statistics are population weighted. All values are in Euro PPP-adjusted.

(*l*) For Germany, the Netherlands, Austria and Spain, total premiums amount refers both to primary PHI and to additional VPPI. In the Mean column, standard errors are reported in parentheses

Table II

Characteristics of the household head

a) Demographic and educational characteristics (%)														
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 (I)	1 or 2	3	4 or more		
Insured	52.79	36.53	28.49	22.31	12.67	64.37	9.59	19.62	6.42	11.48	34.08	30.05	24.28	
Not Insured	49.35	30.89	28.49	25.33	15.29	56.85	8.57	25.67	8.90	7.51	47.49	29.24	15.76	
All	50.41	32.62	28.49	24.40	14.48	59.16	8.88	23.82	8.14	8.73	43.37	29.48	18.38	
b) Physical health status														
Limitations with activities (GALI) %	Reported Long-term illness %	N. of chronic diseases % (2);		N. of ADL limitations %			Self-reported health (US scale) %				Objective health index			
		0	1	> 1	0	1	> 1	Excellent	Very good	Good		Fair	Poor	
Insured	40.76	50.32	25.19	33.54	41.27	89.00	5.83	5.17	8.77	18.01	42.37	23.25	7.60	0.808
Not Insured	47.29	54.78	23.96	30.85	45.19	87.19	6.35	6.46	6.15	15.74	38.00	29.42	10.69	0.787
All	45.28	53.41	24.34	31.68	43.99	87.75	6.18	6.07	6.95	16.44	39.34	27.53	9.74	0.794
c) Cognitive abilities														
Verbal fluency test (3)	Self-rated reading skills % (4)			Numeracy score % (5)										
	5 (poor)	2 – 4	1 (excellent)	1 (bad)	2 – 4	5 (good)								
Insured	20.94	4.71	68.93	26.36	5.81	2.97	21.22							
Not Insured	17.65	9.30	75.10	15.60	10.52	73.40	16.08							
All	18.67	7.89	73.19	18.92	9.07	73.27	17.66							
d) Occupational status (%)														
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 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									
Insured	56.31	18.67	32.73	9.14	22.24	19.83	57.10							

d) Occupational status (%)						
	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 self-employed	At least one member has ever been a civil servant	At least one member has ever been a self-employed
Not Insured	53.75	25.86	25.54	8.47	14.91	19.38
All	54.53	23.65	27.75	8.68	17.16	19.52
All statistics are population weighted.						
						42.87
						47.24

All statistics are population weighted.

(1) This category includes also the answers "Still in school" and "Other type of educational degree".

(2) Chronic diseases reported by the respondents: 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.

(3) 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.

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

(5) 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 III

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 (Reimbursement of co-payments)	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 <i>secteur deux</i>)	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 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

Type of health care	Sweden	Denmark	Germany	The Netherlands	Switzerland	Austria	Italy	Spain	Greece	Type of health care	France (2)	Belgium (2)
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 - Prostheses and medical appliances (glasses, lenses, hearing prostheses, 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.

Table IV
List of signs 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	3.29	40.12	13.94	71.32	76.61	83.92	35.72	26.77	7.52	10.16	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 fluency 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	+	+	-	+	***	***	+	-	***	-	***

Variable		Sweden	Denmark	Germany	Netherlands	Belgium	France	Switzerland	Austria	Italy	Spain	Greece
Weighted % households with at least a VPHI		3.29	40.12	13.94	71.32	76.61	83.92	35.72	26.77	7.52	10.16	6.18
6. Economic and financial status	Home ownership	- **	+	+	+	-	+	+	+	-	+	- *
	Household income	+	+	+	-	+	-	-	+	+	+	+
		***	***	***						*	*	***
	Real assets	+	-	+	-	-	-	-	+	+	+	+
7. Expected economic status	Entitlement to a future pension	+	+	-	+	+	-	+	+	***	+	-
									*	+		

Significance levels:

*** = 1% level;

** = 5% level;

* = 10% level

Table V

Country	Weighted percentage households with VPHI	(1) Weighted percentage of households with OOP> 0			(2) Weighted mean OOP spending if OOP > 0			(3) Weighted mean OOP spending		
		Without VPHI	with VPHI	P-value	without VPHI	With VPHI	P-value	without VPHI	with VPHI	P-value
Sweden	3.29	92.76	93.11	0.91	375.23	342.22	0.52	348.06	318.64	0.54
Denmark	40.12	86.16	92.51	<0.01	437.00	551.83	0.04	376.48	510.51	0.01
Germany	13.94	87.87	87.19	0.77	296.98	342.09	0.15	260.94	298.28	0.19
Netherlands	71.32	41.83	42.99	0.66	489.41	485.04	0.97	204.70	208.53	0.94
Belgium	76.61	94.72	95.50	0.45	875.42	807.23	0.45	829.25	770.90	0.50
France	83.92	51.17	44.44	0.03	532.63	394.66	0.43	272.55	175.39	0.28
Switzerland	35.72	77.85	72.05	0.11	706.27	750.36	0.72	549.84	540.67	0.92
Austria	26.77	75.50	84.54	<0.01	298.39	431.10	<0.01	225.27	364.46	<0.01
Italy	7.52	81.00	95.28	<0.01	753.97	1409.87	0.17	610.73	1343.26	0.11
Spain	10.16	44.16	67.00	<0.01	474.10	744.61	0.02	209.38	498.88	<0.01
Greece	6.18	86.75	83.46	0.34	777.05	953.99	0.30	674.06	796.22	0.40

All values are in Euro PPP-adjusted. The “*P*-value” refers to the equality test of the sample means displayed in the previous two columns.

Table VI

Main results of the relationship between OOP spending and VPHI (3)

(1) Country	(2) Number of households	(3) Percentage of households with positive OOP spending among those with non missing OOP	(4) F-statistic of the joint significance test for additional instruments (informative instruments)	VPHI parameter estimate		
				(5) OLS	(6) Point estimate	(7) Sargan test (validity of instruments)
The Netherlands	1924	43.24 %	27.19 ***	-20.39	-1262.01 *	1.39
France	2073	45.25 %	18.85 ***	-105.62 **	2099.33	0.86 **
Spain	1726	47.39 % <i>a)</i>	16.35 ** 16.15 ***	150.81 ***	3748.19 ** 3696.62 **	1.68 1.85
Switzerland	702	75.64 %	21.27 ***	98.46	-879.14	0.91
Austria	1404	77.78 %	36.41 ***	76.59 **	352.69 *	1.57 **
Italy	1766	81.88 % <i>b)</i>	11.06 * 10.11 **	366.02 **	1964.13 ** 1872.35 **	1.02 0.65
Greece	1980	86.16 %	29.43 ***	114.76	427.01	1.29
Denmark	1154	87.95 %	30.18 ***	749.25 *	3924.61 *	1.19
Germany	1992	88.40 % <i>c)</i>	32.12 *** 26.27 ***	-0.76	169.30 92.79	4.83 *** 1.98
Sweden	2116	93.15 % <i>d)</i>	24.54 *** 23.88 ***	-38.57	-850.97 -355.10	3.16 *** 1.40
Belgium	2519	94.76 % <i>a)</i>	59.49 *** 51.10 ***	5.59	-588.75 -105.67	2.61 ** 1.16

Significance levels:

*** = 1% level;

** = 5% level;

* = 10% level

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For the Netherlands, France and Spain the instrumental variables refer to the IV-Tobit model estimation; for the remaining countries the instrumental variables refer to Treatment-Effect model estimation. The set of additional instruments includes: "At least one household member has ever been civil servant"; "At least one household member has ever been self-employed"; "At least one household member

has ever worked in a firm with more than 24 employees"; "Numeracy score of the household head"; "Verbal fluency test score of the household head"; "Self-reported reading ability of the household head". Parameters on controls not reported, but available on request.

- a) Excluding "At least one household member has ever been self-employed" from the set of additional instruments.
- b) Excluding "At least one household member has ever been civil servant" and "Self-reported reading ability of the household head" from the set of additional instruments.
- c) Excluding "At least one household member has ever been civil servant" and "At least one household member has ever worked in a firm with more than 24 employees" from the set of additional instruments.
- d) Excluding "At least one household member has ever worked in a firm with more than 24 employees" and "Numeracy score of the household head" from the set of additional instruments.