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THE DRIVERS OF VOLUNTARY PRIVATE HEALTH INSURANCE DEMAND IN EUROPEAN COUNTRIES

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Abstract

During the pandemic, health care services have gained in importance. One of the ways used to finance these services is through voluntary private health insurance. Existing studies on the demand for voluntary private health insurance are based predominantly on the micro-economic level. Therefore, the aim of this paper is to analyse the factors of demand at the macro-economic level. The analysis covers economic and demographic factors, the quality of the public health care system, risk aversion and the status of the population's health. The empirical research is based on the databases of 29 European countries in the period from 2013 to 2017 and on the dynamic panel model. The results of the empirical analysis revealed that income, price, urbanization, health care system quality, risk aversion/education and self-perceived health are important determinants of demand for voluntary private health insurance in European countries.

Keywords**: **insurance demand, voluntary private health insurance, dynamic panel analysis, European countries

1. INTRODUCTION

Public health care systems in most European countries provide universal access to health care services. However, the costs of health care services are not completely covered by the public health care funding. Additionally, there are waiting times and waiting lists for some medical treatments. Thus, in order to reduce the burden of health care costs and to achieve faster access to medical treatment individuals are increasingly buying voluntary private health insurance (VPHI). The density of VPHI in European countries in the period from 2004 to 2017 increased by 122.3 percent (Insurance Europe, 2020). However, there are differences in the level of health insurance coverage of the population between countries. Taking into account these facts, our research aim is to explore the drivers of demand for VPHI, in line with Kiil's findings (2012, p. 60) "knowledge on this type of private health insurance is of widespread relevance".

The health care insurance schemes are heterogonous across Europe. Due to different socio-economic and political-historical circumstances, the coverage against the health cost is funded through a variety of financing arrangements such as: universal health care coverage, direct expenditure by households (out-of-pocket) and voluntary private health insurance (OECD, 2019). Another OECD study (2004) describes the existence of four main types or a combination of them for VPHI: additional, substitute, duplicate and mandatory private health regimes. The additional insurance consists of complementary and supplementary insurance. Complementary represents the insurance for co-payments, meaning that it ensures the difference in price of a health service, covered by the compulsory health insurance, and the full price of the service, while supplementary provides cover for additional health care services not covered by the public scheme like luxury care, long-term care, and rehabilitation. Duplicate insurance operates as a private alternative in parallel with the public system and mandatory private health regimes include some public aspects and full private complementary cover.

Although VPHI provides a way of reducing the burden of health care costs as well as timely access to medical treatment, when considering VPHI in European countries Sagan and Thompson (2016) point out the problem of inequalities in access to health care services. The authors find that VPHI predominantly provides health care coverage to wealthy individuals. Additionally, health care providers prefer to deliver services to VPHI policyholders first, in preference to patients funded by public health insurance due to the higher fees the providers of the services are paid by insurers. Moreover, tax incentives are provided to those who buy VPHI, primarily to employers who purchase the insurance for their employees, but also to individuals, and this may result in inequalities. Employers are more prone to buy insurance on behalf of employees with higher income (Sagan and Thompson, 2016, p. 25). These issues could deepen the problem of inequalities in access to health care (besides Sagan and Thompson, 2016, for the problem of inequalities in access to health care in European countries, see Beaten et al., 2018). In order to

encourage VPHI, many governments of European countries apply tax incentives. Nowadays, there is a trend of tax incentive restrictions due to the burden on government budgets. Nevertheless, the abolition of the incentives has not had significant negative effect on buying VPHI (Sagan and Thompson, 2016, p. 25).

The rational background of our research lies in the Kiil's work (2012) on reviewing the existing studies on demand for VPHI. Kiil (2012) found a few studies that apply dynamic models (Finn et al., 2006; Bolhaar et al., 2008) and suggested that "future studies might benefit from increased emphasis on the use of panel data and methods in order to be able to capture dynamic effects" (Kiil, 2012, p. 74). Additionally, the existing empirical studies are based on survey data. Based on that, the aim of this research is to analyse the determinants of demand for voluntary private health insurance by applying a dynamic panel model and country-level data. The research explores economic and demographic factors, the quality of the health care system, risk aversion and the population health status. The analysis is based on a sample of 29 European countries in the period from 2013 to 2017.

The uniqueness of our paper is to enrich the existing literature in the field of demand for voluntary private health insurance by analysing the demand at the macro-economic level. The existing studies on the determinants of VPHI (for the review see Kiil, 2012) are based on micro-economic data (survey data), while some of those that encompass multiple countries also include country-specific data. Although there are studies of the demand for both life and non-life insurance at the macro-economic level (Outreville, 2013), according to the authors' best knowledge, there is no study on the demand for voluntary private health insurance exclusively that combines data at the macro-economic level, cross-country set and the application of the dynamic panel model.

The paper is structured as follows. Section 2 provides a literature review. Data and methodology are presented in Section 3. Section 4 refers to the results of the empirical analysis and discussion of the results, while the concluding remarks, policy implications and suggestions for future research are presented in Section 5.

2. LITERATURE REVIEW

The literature on determinants of demand for VPHI encompasses various economic and demographic factors, quality of health care system, as well as risk preferences and individual health characteristics. Kiil (2012) provides a detailed review of these studies.

Considering economic factors, one of the most important determinants of demand for VPHI that is regularly analysed in the empirical literature is income. It determines the ability of individuals to purchase VPHI. Thus, as income increases, VPHI becomes more affordable. However, with a higher level of income, individuals are more able to cover the costs of health care services by themselves. According to the numerous empirical studies, income is confirmed as an influential factor that positively affects demand for VPHI (Jofre-Bonet, 2000;

Propper et al., 2001; Costa-Font and Garcia, 2003; Buchmueller et al., 2004; Colombo and Tapay, 2004; Wallis, 2004; King and Mossialos, 2005; Cebula, 2006; Finn and Harmon, 2006; Saliba and Ventelou, 2007; Rodriguz and Stoyanova, 2008; Aarabu, 2010; Johar, et al., 2010; Paccagnella et al., 2013; Yamada et al., 2014; Sagan and Thompson, 2016).

Another economic variable associated with demand for VPHI, which is analysed in the existing empirical studies, is unemployment. Due to the lack of income, unemployed individuals have less propensity to purchase VPHI. The negative effect of unemployment is confirmed by the empirical literature (Jofre-Bonet, 2000; Buchmueller et al., 2004; Wallis, 2004; King and Mossialos, 2005). However, Tavares (2020) finds no significant relationship between unemployment and demand for VPHI in European countries.

In accordance with the general economic theory of demand, an increase in insurance price reduces demand for VPHI. According to Sagan and Thompson (2016) insurers in European countries usually set the premiums based on the age and health status of the insured. However, due to the problem of data availability, insurance price is not often included in the existing empirical studies. Costa-Font and Garcia (2003) and Wallis (2003) confirm the negative effect of insurance rate on the propensity of individuals to purchase VPHI in Spain and Great Britain, respectively. Additionally, Saliba and Ventelou (2007) find evidence that an insurance price that is lower than in the Paris region, increases the probability of buying VPHI in France. According to Costa-Font and Garcia (2003) insurance price, among other factors, depends on age and the health status of an individual. Thus, these factors on demand for VPHI could be used as proxies of the insurance rate.

Demographic determinants of VPHI most often encompass age, gender and urbanization. As individuals get older, the needs for health care services are increasing and there is more demand for insurance (Jofre-Bonet, 2000; Costa-Font and Garcia, 2003; Buchmueller et al., 2004; King and Mossialos, 2005; Finn and Harmon, 2006; Bolhaar et al., 2008; Doiron et al., 2008; Rodriguez and Stoyanova, 2008; Johar et al., 2010; Tavares, 2020). Besides the need for health care services, the positive impact of age could be related to accumulated wealth that increases with age (Finn and Harmon, 2006). Propper et al. (2001) find a cohort effect in demand for VPHI in the United Kingdom. Thus, the purchase of VPHI increases with age, but older generations reduce demand for the insurance.

Considering gender, the results of the empirical studies are not consistent. Rodriguez and Stoyanova (2008) find no difference in demand for VPHI among females and males in Spain when considering both types of insurance policies, those that are bought by individuals and those that refer to the groups and paid by employers. However, for individual policyholders, demand is higher for females in comparison to males. This is in line with the evidence that females are more risk averse and use more health care services in comparison to males (due to childbirth, as it is stated by Finn and Harmon, 2006). This is

confirmed by Buchmueller et al. (2004) for France and by Bolin et al. (2010) and Tavares (2020) for the set of European countries. On the other hand, Wallis (2004) for Great Britain and King and Mossialos (2005) for England find that private health insurance is more prevalent among men. The lower propensity of females to insure in comparison to males is also confirmed by Finn and Harmon (2006) for data on health insurance in Ireland. Johar et al. (2010) find no significant impact of gender on demand for VPHI in Australia.

Taking into consideration urbanization, it is expected that, due to a more extensive offer of health care services in urban regions, individuals who live in these areas demand more VPHI in comparison to people in rural regions. The positive impact of living in larger cities on demand for VPHI is confirmed by empirical studies based on a dataset for Great Britain (Wallis, 2003), Ireland (Bolhaar et al., 2008) and Spain (Jofre-Bonet, 2000; Costa-Font and Garcia, 2002; Rodriguez and Stoyanova, 2008). The findings of Tavares (2020) for the set of European countries are the opposite. Precisely, while there is no significant relationship between living in an urban area and purchasing VPHI, living in a rural area increases the probability of buying voluntary private health insurance coverage. The result is explained by poorer health care coverage in these areas, which increases demand for VPHI in order to receive better coverage.

Additional demographic variables that are analysed encompass marital status (Jofre-Bonet, 2010; Buchmueller et al., 2004; Doiron et al., 2008; Bolin et al., 2010; Johar et al., 2010; Tavares, 2020), the number of children (Finn and Harmon, 2006; Taylor and Ward, 2006; Doiron et al., 2008; Johar et al., 2010) and the number of elderly within the household (Finn and Harmon, 2006; Johar et al., 2010; Tavares, 2020). They are included in the empirical models of VPHI demand because they could influence the stock of wealth or make individuals more risk averse, and consequently, decrease or increase their demand for VPHI (Finn and Harmon, 2006).

The quality and efficiency of the public health care system are important drivers of the demand for VPHI. According to Colombo and Tapay (2004, p. 18) in some OECD countries, "waiting times, increasing demand for choice, and perceptions of inadequacy of public systems are leading motivations" for buying VPHI. In the empirical research, the quality of the public health care system is usually measured by waiting lists, waiting time for the medical treatment, spending on the health care system and its capacity (Kiil, 2012). The results of the studies confirm that the perception of low quality of health care system contributes to the demand for VPHI (Costa-Font and Garcia, 2003; Taylor and Ward, 2006). Jofre-Bonet (2000) confirms that longer waiting lists for surgery in public hospitals in Spain encourage demand for VPHI. The longer waiting time for the treatment increases demand for VPHI in the United Kingdom (King and Mossialos, 2005) and Norway (Aarabu, 2010). Propper et al. (2001) confirm that there is a relationship between the standards of quality of the public health care system (except for the waiting list) and the holding VPHI. Sagan and Thompson (2016, p. 29-30) state that VPHI is driven by the need to finance the gaps in the public health insurance system or to get the benefits of faster access to health care services and the choice of the provider of the services. However, the gaps

in the publicly financed health insurance are an important condition for VPHI, but they are not sufficient for the growth of the private health insurance market. The same is confirmed by Tynkkynena et al. (2018) for Nordic countries in which the further development of VPHI is more related to cultural factors. Contrary to the expectation and the earlier empirical evidence Tavares (2020) finds that a higher level of satisfaction with the health care system among elderly people in European countries stimulates them to buy VPHI. This implies the crowding-in effect between the health care system and VPHI as opposed to the crowding-out effect, which is confirmed in most of the studies.

Since the most important reason for purchasing VPHI is to reduce financial consequences related to illnesses, those with a higher level of risk aversion will demand more health insurance in comparison to those who are more prone to risk taking. However, Costa-Font and Garcia (2003) do not find a relationship between risk attitude and holding VPHI. Doiron et al. (2008) evidence that risk takers have a lower level of health and demand less insurance. Tavers (2020) finds that when people are risk takers they buy more VPHI and that self-assessed health increases risk taking by individuals. The first finding implies moral hazard since those who buy VPHI have a propensity to risky behaviour, and this may cause more losses. The second finding indicates advantageous selection, with benefits for insurance companies.

In many empirical studies of life and non-life insurance demand with a macro-economic approach (Outreville, 2013) the risk aversion is usually measured by the level of education. More educated people are more risk aware and express a higher level of risk aversion. Moreover, they have more knowledge about risk management methods. They are "capable of making better health-related decisions or formulating better mixtures of health inputs, of which insurance might be one" (Finn and Harmon, 2006, p. 9-10). Consequently, more educated individuals are more prone to buy VPHI (King and Mossialos, 2005; Finn and Harmon, 2006; Bolhaar et al., 2008; Johar et al., 2010; Paccagnella, 2013; Tavares, 2020). However, Buchmueller et al. (2004) and Aarabu (2010) find no significant relationship between education and VPHI in France and Norway, respectively. According to Kiil (2012) the results for France could be related to a very high share of the population holding VPHI.

Following the hypothesis of adverse selection, those who are more exposed to risks will be more prone to buy insurance. Thus, it is expected that individuals with poor health status have a higher propensity to VPHI in comparison to those with good health. However, according to the opposite hypothesis, advantageous selection, those who are more safety aware are more prone to buy insurance, implying that healthier people demand more insurance in comparison to those with a higher level of health risk (Tavares, 2000). In assessing the impact of health status on demand for VPHI, the researchers take into account self-assessed health, chronic diseases, previous use of health care services and (un)healthy habits of individuals.

According to Roudriguez and Stoyanova (2008), the better the health of individuals implies less need for health care services and reduces demand for VPHI.

However, when self-assessed health comes into consideration, its relationship with the holding of VPHI is not consistent. Tavares (2020) finds (negative) direct and (positive) indirect influence of the self-assessed health on demand for VPHI. With a higher level of self-assessed health, people buy less VPHI. However, better health contributes to the risk behaviour and those who are more prone to risk, buy more insurance. According to the findings of Finn and Harmon (2006), Bolhaar et al., 2008, Bolin et al. (2010) and Paccagnella et al. (2013), those who are insured have better health status in comparison to uninsured individuals in Ireland and a set of European countries. All these findings confirm advantageous selection or imply that there is no problem with adverse selection. Buchmueller et al. (2004) and King and Mossialos (2005) do not find evidence of the relationship between health status and health insurance.

Chronic disease represents an additional health-related variable included in the empirical studies of demand for VPHI. According to Kiil (2012), most of the studies do not confirm the relationship between this variable and VPHI. However, Bolin et al. (2010) provided evidence that cancer, heart problems, diabetes and chronic lung diseases negatively affect demand for VPHI, while the impact of high blood pressure is positive or has no effect.

When taking into account the past use of health care services, according to Kiil (2012), it is confirmed to be a factor that positively affects the purchasing of VPHI. This is in line with the adverse selection hypothesis. However, Bolhaar et al. (2008) find that those who used more health care services have a lower propensity to buy insurance, implying advantageous selection.

(Un)healthy habits of individuals are related to smoking, alcohol consumption, obesity and regular exercise. Wallis (2003), Buchmueller et al. (2004), Doiron et al. (2008) and Bolhaar et al. (2008) find a negative correlation between smoking and holding VPHI. Contrary to these results, the study of the determinants of holding VPHI of elderly individuals in European countries shows that smoking and alcohol consumption positively affect demand for VPHI (Bolin et al. 2010). Using data from Spain, Jofre-Bonet (2000) finds no relationship between regular smoking and demand for VPHI, as well as the negative effect of heavy alcohol drinking on purchasing of VPHI. According to the same research, overweight individuals are more prone to buy health insurance. Additionally, healthy habits, in terms of regular exercise, also positively affect demand for VPHI. The same effect of the healthy habits of individuals is confirmed by Bolin et al. (2010).

The review of the literature on demand's factors for buying VPHI showed that many studies are focused on exploring the factors that explain the decision on buying insurance in European countries. The empirical studies indubitably confirm a positive effect of income on demand for VPHI. In addition, the expected relationship for other economic factors, as well as an age variable is commonly confirmed. However, the results of the effects of other potential factors on demand for VPHI are ambiguous. Since the presented studies are based on the micro-economic level, we apply macro-economic approach in our empirical research which is in line with other

empirical research on determinants of both life and non-life insurance (Outreville, 2013) but which, according to the authors' best knowledge, do not cover VPHI exclusively.

3. DATA AND METHODOLOGY

The empirical research is based on the sample that includes 29 European countries[1] in the period from 2013 to 2017. The data are on an annual basis. The number of independent variables included in the model, the selected measures and the selected countries in the sample determined the length of the analysed period. The research is based on a panel analysis that, besides being spatial, also encompasses the time component.

The voluntary private health insurance demand is measured by market density that refers to the average amount per capita spent on voluntary private health insurance products. The main data source was the Insurance Europe database (the European Insurance and Reinsurance Federation). Other variables, variable measures, data sources, and expected impact of the variables on demand for VPHI are presented in Table 1.[2]

Table 1

Definition, source and expected impact of the explanatory variables

Variable	Variable measure	Data source	Expected impact
Income	GDP per capita measured in current international dollars and adjusted by purchasing power parity.	World Bank	+
Price	Healthy life years indicator that presents disability free life expectancy at birth.	Eurostat	- (+)[3]
Age	Share of the population aged 50 to 65 years.[4]	World Bank	+
Urban population	Share of urban population.	World Bank	+
Risk aversion / Education	Total enrolment in tertiary education regardless of age.	World Bank	+
Health system quality	Generalist and specialist medical practitioners per 1,000 inhabitants.	World Bank	-
Unhealthy habits	Share of deaths from obesity.	Our World in Data	+/-
Self-perceived health	Share of respondents who described their general health status and health and health care needs at the population level with rate "good".	Eurostat	+/-

Source: Created by authors.

[1] The sample includes 29 countries composed of 27 EU member countries, and Norway and Turkey.
[2] The unemployment variable is not included in the model. It is related to the lack of income and the inclusion of income variable serves for adjustment (Kiil, 2012).
[3] A positive sign is expected as healthy life years have been used as a price indicator. The longer the estimated healthy life, the lower the cost of voluntary health insurance. Therefore, we expect a positive sign.
[4] The age variable is measured using the proportion of the population aged 50 to 65 years since this is an age group that frequently requires the use of health care services. In the observed countries, insurance companies generally set the upper age limit for insured persons at 65 years (Sagan and Thompson, 2016).

The mean value of the voluntary health insurance demand measured by the density for all countries in the sample is 107.32 EUR. During the observed period, the voluntary private health insurance shows a growth trend.

Table 2

Summary Statistics

Variable code	Mean	Std. Dev.	Min	Max	Number of countries
Income	39.69	17.28	16.58	112.82	29
Price	62.41	5.09	51.40	73.60	29
Age	20	1.24	16.37	22.40	29
Urban population	73.79	12.77	53.33	97.96	29
Risk aversion / Education	68.94	16.97	19.15	136.60	29
Health system quality	3.41	0.81	1.75	5.48	29
Unhealthy habits	11.81	3.00	7.57	18.00	29
Self-perceived health	43.57	7.16	24.50	63.40	29

Source: Created by authors.

It is expected that the demand for VPHI is determined by the contracted insurance policies in the previous period. The latter assumption requires an autoregressive model, which implies the inclusion of the lagged dependent variable as an explanatory determinant (Baltagi, 2008). Dynamic panel methodology allows the analysis of autoregressive models. The analysis of determinants of the voluntary private health insurance demand is based on the following model:

$$\text{VPHI Density}_{i,t} = \alpha + \gamma \text{VPHI Density}_{i,t-1} + \beta X'_{i,t} + \mu_i + \varepsilon_{i,t}$$

where $\text{VPHI Density}_{i,t}$ is the voluntary private health insurance demand of country i at time t, with $i=1,2,...,N$ and $t=1,2,...,T$. α is a constant term. γ is a lagged dependent variable parameter. $\text{VPHI Density}_{i,t-1}$ is lagged dependent variable. β is a vector of coefficients to be estimated. $X'_{i,t}$ is set of explanatory variables. μ_i is an unobserved country-specific effect. $\varepsilon_{i,t}$ are error terms that are assumed to be identically and independently distributed.

According to Hsiao (2005) panel data contain inter-individual differences and intra-individual dynamics. According to the latter, the advantage is reflected in the more accurate inference of model parameters in comparison to cross-sectional or time-series data. Furthermore, according to Hsiao (1985) panel data reduce estimator bias, while simultaneously reducing problems of data multicollinearity. The possible multicollinearity problem is analaysed by the correlation matrix in Table 3.

Table 3

Correlation matrix

	Income	Price	Age	Urban population	Risk aversion / Education	Health system quality	Unhealthy habits	Self-perceived health
Income	1							
Price	0.2892* (-0.0006)	1						
Age	-0.4169* (0)	-0.4896* (0)	1					
Urban population	0.4506* (0)	0.5508* (0)	-0.3059* (0.0002)	1				
Risk aversion / Education	-0.1425 (0.0968)	0.0215 (0.8049)	-0.0155 (0.8569)	0.0631 (0.4641)	1			
Health system quality	0.0165 (0.8502)	-0.078 (0.3831)	0.1 (0.2597)	-0.0106 (0.9036)	0.3981* (0)	1		
Unhealthy habits	-0.5878* (0)	-0.5096* (0)	0.4451* (0)	-0.5143* (0)	-0.2019* (0.018)	-0.1979* (0.0219)	1	
Self-perceived health	0.1264 (0.131)	0.2224* (0.009)	0.1552 (0.068)	0.285* (0.0005)	-0.1877* (0.0287)	-0.2922* (0.0006)	0.0139 (0.8685)	1

Note: Standard errors in parentheses; * $p < 0.05$

Source: Created by authors.

Table 3 contains the Pearson correlation coefficients between explanatory variables. Since Hinkle, Wiersma and Jurs (2003) claim that an absolute correlation coefficient value above 0.7 represents a strong correlation, absolute values of the Pearson correlation coefficients show there is no multicollinearity problem that could give spurious results.

4. EMPIRICAL RESULTS

Regarding estimation, generalized methods of moments (GMM) panel estimator developed by Blundell and Bond (1998) was applied. The analysis includes the implementation of the two-step estimator. The results of the dynamic panel analysis of the determinants of voluntary private health insurance are presented in Table 4. The models differ according to the added variables. Independent variables were added in models according to the criterion of correlation significance and correlation strength between independent variables and the dependent variable. Based on this approach, four models are presented. Extending the model with variables that the theory considers as relevant factors of influence on VPHI demand, it is possible to compare the estimated coefficients, their signs and significance in several models. Altogether, it provides control over the estimation reliability. Consideration of an additional model was not possible. Namely, the number of used instruments is equal to or above the number of groups, so violation occurred in this case, therefore the estimated model cannot be taken into account. It can be concluded that the models do not differ in the sign of

estimated coefficients. Changes in the level of significance of individual independent variables were noted. While adding variables to the models, it was observed that the price variable and the urban population variable gain in significance while age loses in significance.

Table 4

Estimation Results (GMM System Estimator)

		Model_1	Model_2	Model_3	Model_4
Factor description		Density	Density	Density	Density
	L.density	0.443***	0.474***	0.560***	0.591***
		(0.0362)	(0.0673)	(0.189)	(0.210)
Economic factor	Income	1.66***	0.953***	0.494***	0.457*
		(-0.122)	(-0.138)	(-0.148)	(-0.253)
Individual health characteristics	Unhealthy habits	1.052	5.885	5.792	
		(-2.988)	(-4.128)	(-3.604)	
Economic factor	Price	0.0293	0.254***	0.434***	0.599***
		(0.0923)	(0.0878)	(0.0966)	(0.160)
Demographic factor	Age	3.019**	1.807	0.418	0.803
		(-1.322)	(-1.216)	(1.048)	(1.368)
Demographic factor	Urban population	0.141	0.178	2.553	2.921*
		(-1.162)	(-1.355)	(-1.621)	(-1.751)
Risk preferences	Risk aversion / Education		0.320***	0.285***	0.249**
			(0.0977)	(0.102)	(0.114)
Quality of health care system	Health system quality			-2.065**	-2.761*
				(-1.006)	(-1.477)
Individual health characteristics	Self-perceived health				-0.406***
					(0.142)
	dummy_country_id4	42.07	84.07*	6.500	-14.37
		(52.81)	(47.35)	(14.42)	(20.79)
	dummy_country_id7	14.35	100.2**	-120.1	-208.8**
		(26.29)	(39.97)	(88.89)	(100.2)
	dummy_country_id12	255.2	-24.34	53.53	-33.26
		(386.4)	(131.1)	(62.16)	(50.55)
	dummy_country_id15	183.5***	271.6***	264.2**	205.2**
		(39.80)	(48.20)	(110.8)	(103.8)
	dummy_country_id16	-203.7	19.95	-70.10	-116.2*
		(134.2)	(73.41)	(67.65)	(69.79)
	dummy_country_id18	52.92	129.7***	94.06**	50.70
		(41.02)	(41.66)	(46.02)	(35.48)
	dummy_country_id21	31.1	116.1	77.57	7.885

		(89.00)	(71.07)	(50.23)	(51.88)
	dummy_country_id25	-24.02	54.77	-31.09	-48.33
		(96.98)	(36.49)	(27.26)	(48.74)
	dummy_country_id26	-198.3	215.1***	258.0**	207.6*
		(184.9)	(52.21)	(106.4)	(122.9)
	dummy_country_id27	-200.5	-167.8	-108.5**	-46.34
		(205.0)	(129.0)	(54.97)	(50.47)
	_cons	-91.56	-162.4	-287.0**	-229.6*
		(94.91)	(102.5)	(139.4)	(124.4)
	N	135	132	121	121
Sargan test (p-value)		0.3784	0.3962	0.5823	0.6751
First-order correlation (p-value)		0.1548	0.2762	0.8137	0.9916
Second-order correlation (p-value)		0.1169	0.1707	0.1326	0.099

Note: Standard errors in parentheses; * p< 0.1, ** p< 0.05, *** p< 0.01

Source: Created by authors.

Furthermore, the possible existence of a mutual causation between the voluntary private health insurance demand *(VPHI Density)* and income *(Income)* forced us to treat income as an endogenous variable. Namely, if a mutual causation exists at the same time between the dependent and the explanatory variables, the latter variable becomes correlated with a random error. According to Baltagi (2008), the dynamic panel model efficiently solves the problem of endogeneity. Country dummies are added to the model in order to capture the differences in unobservable country-specific factors such as the differences in the types of VPHI schemes among the analysed countries, as well as for the differences in other institutional and cultural factors.

In order to test the validity of the models, two types of tests are performed. The first test refers to the Sargan test which does not show the presence of endogenous problems. The second test refers to the autocorrelation of residuals. While considering the validity of the model estimates, the reference value of the diagnostic test is a second-order serial correlation of the differenced residuals, because it determines whether there is a serial correlation of the residuals at the level. The test confirms that there is no serial correlation in the residuals.

In line with the theoretical predictions and results of the previous empirical studies, the coefficient of income variable is positive and statistically significant. Thus, with an increase in income, VPHI becomes more affordable and thus more in demand.

Considering the insurance price, its coefficient is positive. However, since the variable is measured in healthy life years, longer healthy life years imply lower risks and lower insurance premium. Consequently, the lower price of insurance encourages people to buy VPHI. The results are in line with the

theoretical expectation, as well as the findings of the previous empirical research (Costa-Font and Garcia, 2002; Wallis, 2003; Saliba and Ventelou, 2007).

Although the coefficient of the age variable is positive, it is not statistically significant in three out of the four models, which is opposite to many of the existing studies. If data on the number of people who buy VPHI were available for each age group, a possible nonlinear relationship between age and demand for VPHI could be analysed. However, the data are not available.

As studies of Jofre-Bonet (2000), Costa-Font and Garcia (2002), Wallis (2003), Bolhaar et al. (2008) and Rodriguez and Stoyanova (2008) show, this research, referring to the Model 4, also confirms that living in urban areas contributes to holding VPHI. A more extensive supply of health care providers and accessible health care services exist in urban areas in comparison to rural regions, encouraging people to buy VPHI.

The results confirm the impact of the health care system quality on demand for VPHI. As expected, the quality of the public health system has a negative relationship with the demand for VPHI, implying the crowding-out effect. These results are in line with many previous studies.

The coefficient of risk aversion/education variable is statistically significant. As in many existing studies of demand for life and non-life insurance at the macro-economic level, in this study education is used as a measure of risk aversion. People that are more educated are more risk aware and risk averse, have more knowledge on risk management and consequently, demand more VPHI. When comparing our results with previous research, they are in line with King and Mossialos (2005), Finn and Harmon (2006), Bolhaar et al. (2008), Johar et al. (2010), Paccagnella (2013) and Tavares (2020).

With consideration to the health status, obesity does not significantly affect demand for VPHI. As in the case of age variable, this might be related to the nonlinear effect. However, the data necessary for the analysis are not available. When taking into account self-perceived health, it negatively and significantly affects demand for VPHI. As people perceive that their health is well, they anticipate a lower need for health care services and consequently buy less VPHI. This could imply the problem of adverse selection. The negative (direct) effect of the self-assessed health on demand for the health insurance is also found by Tavares (2000).

5. CONCLUSION

In this paper, we analysed the determinants of demand for voluntary private health insurance in 29 European countries. Applying a dynamic panel data methodology, the analysis confirms the importance of income, price, urbanization, health care system quality, risk aversion and self-perceived health for demand for the voluntary private health insurance.

The results of this research have an impact on policymakers, as well as insurers. For the development of VPHI, it is important that policymakers ensure a strong macro-economic environment. However, the importance of income on demand for VPHI may imply the inequity concerns in achieving health care services. Taking into consideration the negative effect of the quality of the public health care system on demand for VPHI, there is a crowding-out effect. Consequently, by improving the conditions in the public health care system, the policymakers could negatively influence the demand for VPHI, but at the same time, they could also contribute to the reduction of the inequity problem. The importance of insurance price could imply the beneficial effects of tax incentives for the development of VPHI. However, due to the equity concerns, as well as fiscal and efficiency issues (Sagan and Thomson, 2016), the policymakers should balance these issues and the incentives for the development of VPHI. Due to the importance of risk aversion/education, insurance related courses, training activities and information about VPHI provided to the individuals by educational institutions, insurers and the insurance companies' associations could contribute to financial/insurance literacy and consequently to higher demand for VPHI. Since those who have better self-perceived health buy less VPHI, insurance companies could be exposed to the adverse selection problem, implying the importance of good risk assessment in the process of risk underwriting.

One of the limits of the study is that, due to data unavailability, it was not possible to take into account the differences between the drivers of demand for specific types of voluntary health insurance. Additionally, available data on voluntary private health insurance in the analysed countries do not allow for making the difference between the insurance purchased by the individuals and those in the group base, financed by employers. Thus, depending on the data availability, future research could cover the demand for these separate categories of the VPHI. Thereafter, depending on data availability, the empirical model could be extended on the basis of using the insurance risk price models, as well as for tax incentives, that can encourage purchasing of VPHI. Furthermore, digitalization on both sides: the development of telemedicine, Insurtech and digitalization of insurance underwriting, sales and claims processes could also have an impact on the demand side. Finally, the impact of the pandemic on demand for VPHI would be an interesting topic for future research in the field of health insurance.

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ČIMBENICI POTRAŽNJE ZA DOBROVOLJNIM ZDRAVSTVENIM OSIGURANJEM U EUROPSKIM ZEMLJAMA

Sažetak

Za vrijeme pandemije, usluge zdravstvene zaštite posebno su dobile na važnosti. Jedan od načina financiranja ovih usluga jest dobrovoljno zdravstveno osiguranje. Postojeće studije o potražnji za dobrovoljnim zdravstvenim osiguranjem dominantno primjenjuju mikroekonomski pristup. Stoga je cilj ovog rada analizirati čimbenike potražnje na makroekonomskoj razini. Analiza obuhvaća ekonomske i demografske čimbenike, kvalitetu javnog sustava zdravstvene zaštite, averziju prema riziku, kao i zdravstveni status populacije. Empirijsko istraživanje temelji se na skupu od 29 europskih zemalja u razdoblju od 2013. do 2017. i na dinamičkoj panel analizi. Rezultati ukazuju kako su dohodak, cijena, urbanizacija, kvaliteta sustava zdravstvene zaštite, averzija prema riziku/obrazovanje i zdravstveno stanje populacije važne odrednice potražnje za dobrovoljnim zdravstvenim osiguranjem u europskim zemljama.

***Ključne riječi**: potražnja za osiguranjem, dobrovoljno zdravstveno osiguranje, dinamička panel analiza, europske zemlje.*

JEL klasifikacija: G22, G52, I13.