# INCOME AND WEALTH AS DETERMINANTS OF VOLUNTARY PRIVATE HEALTH INSURANCE: EMPIRICAL EVIDENCE AND POLICY CONSEQUENCES IN SPAIN, 2008-2014

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# Income and wealth as determinants of voluntary private health insurance: empirical evidence and policy consequences in Spain, 2008-2014

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**Abstract**

Few studies have quantitatively estimated the income elasticities which affect the probability of contracting voluntary private health insurance (VPHI) in countries with a universal National Health Service, and most use cross-sectional data. In this paper we used a longitudinal database prepared by the Bank of Spain to analyse the financial behaviour of approximately six thousand families per wave. We used three waves (2008, 2011 and 2014). We estimated income and wealth semi-elasticities of VPHI in Spain, i.e., changes in the probability to buy a VPHI derived by a 1% change in the continuous explanatory variable, considering personal and family characteristics (age, sex, level of health, education, composition of the household). We estimated cross-sectional models for each wave and longitudinal models for families remaining for at least two years, taking account of possible selection bias due to attrition. Our three main conclusions are: 1) Cross-sectional estimates of semi-elasticities of VPHI might be biased upwards; 2) Wealth is an economic determinant, together with income, when analysing decisions to buy VPHI in developed countries; 3) The effects of income and wealth on the probability of buying VHPI are neither linear nor log-linear. There are no significant differences among 60% of the most disadvantaged families, while the families of the two upper quintiles show clearly differentiated behaviour with a higher probability of insurance.

**Keywords**

Voluntary private health insurance, income and wealth semi-elasticities, longitudinal data.

**JEL**: I10, I13, D81, G22

**Introduction**

Even in countries with a universal National Health Service (NHS), a number of individuals and families buy private health insurance (voluntary private health insurance, VPHI), thus having double cover. VPHI is very prevalent in Europe [1], with a large variety of reasons for affiliating. Although VPHI has had, for many years, an important role in the health sector of many low- and middle-income countries, it has traditionally been of minor importance in developed countries with a universal public NHS and a welfare state.

The trend towards an increasing prevalence of VPHI is noticeable even in the Nordic countries, which are benchmarks in terms of their NHS and as welfare states. Complementary VPHI plays a significant role in Denmark and in Finland, while supplementary VPHI is prominent in Norway and Sweden [2]. Although double insurance was initiated to respond to difficulties in gaining access to the public system, once the private insurance market became established, it acquired a life of its own, and as cultural patterns changed, the demand remained strong. Another argument to explain the increasing trend towards VPHI relies on the progressive inequality in income distribution, particularly among the top earners [3]. As the level of economic inequality increases, it becomes more and more difficult for publicly provided insurance to satisfy the median voter, as the targeted population is more and more heterogeneous. This may be the case in some OECD countries. Income becomes a paramount focus of interest when analysing the phenomenon of VPHI in developed countries.

The demand for voluntary, complementary or substitute private insurance depends on aversion to risk, quality of, and access to, public services in the area, as well as on the supply of private insurance in the area, its cost and the level of health (risks to health). Adverse selection and moral hazard, which may vary widely among individuals, influence in opposite directions the relationship between risks to health and the proclivity to take out VPHI [4]. Individuals with bad health will have a higher probability of purchasing VPHI as they expect to use more services, but premiums will increase with the probability of using healthcare services, thus reducing the probability of purchasing VPHI.

In Spain, which has an almost universal NHS, substitute voluntary insurance with a relatively low premium, and cover limited to a range of specialised services, are prevalent. Pre-existing conditions are

excluded from the cover and many high-cost patients are excluded because their policies are not renewed when their health deteriorates. Unlike other countries such as France, where voided insurance has higher prices than in the public system and is differentiated by perceived quality of services [5], in Spain itis usually bought to avoid waiting for attention in the public system. According to the 2018 Healthcare Barometer [6], 78% of the individuals with double cover declared that their main reason for buying VPHI was the waiting time. According to the Healthcare Barometer of Catalonia - one of the richest and most populated regions in Spain – [7], in 2017 54% of households with income above 3,000€ per month had a VPHI policy. In the highest-income district of the city of Barcelona, Sarriá-Sant Gervasi, 72% of the population had voluntary health insurance [8]. A study for Catalonia has a pseudo-structural model that estimates the probability of buying VPHI and concludes that there is a quality gap, and that the difference in perceived quality between the private and public services (including waiting times) largely determines the likelihood of getting privately insured [9]. For the United Kingdom there is evidence that the probability of taking out VPHI is also positively related to waiting times in the public sector, and private supply in a specific area is positively related to the median of the area and to year-specific public-sector waiting times [10]. If the public insurance limits the quality of healthcare available (longer access times) and healthcare is a normal good, it is expected that richer individuals will be willing to pay for private insurance.

In Spain, an increasingly active private health insurance sector is putting pressure on the health system [11], and there is an influential lobby which favours generalising to the whole population the model that covers healthcare for approximately two million civil servants, who have the privilege of being able to choose their insurance company, either the public insurer (NHS) or a private profit-making company under an agreement with the mutual fund.

There is abundant literature about price and income elasticities of health expenditure, and about the price elasticities of private insurance, but references to income elasticities of private health insurance are scarce. Studies of the association between wealth and VPHI are scarce, many for low- or medium-income countries and using ownership of a dwelling as a substitute for assets [12].

As there is a substantial difference between the premiums paid, the mere fact of purchasing VPHI signals a large gap between preferences and the care provided by the publicly financed system. If preferences differ between income levels, a two-tier or dual-provision healthcare system may arise.

Few studies have quantitatively estimated the income and wealth semi-elasticities of the probability of purchasing private insurance, i.e., changes in the probability to buy a VPHI derived from a 1% change in the continuous explanatory variable, and most have used cross-sectional data. In this paper we take advantage of a longitudinal database prepared by the Bank of Spain to analyse the financial behaviour of families. A fundamental characteristic of its sample is the over-representation of high-wealth households, while surveys of health and living conditions, being of proportional allocation, include very few well-off families. Another characteristic of this survey is that the question about private health insurance relates only to a policy voluntarily taken out by the family, excluding the civil servants (approximately 1.8 million insurance policies, 20% of the total, and insurance policies taken out) and paid for by the employer (approximately 3.1 million, 34% of the total in 2017).

In addition, our data include a panel of three periods, 2008, 2011, 2014, from the beginning of the economic crisis until its end. Spain is a particularly interesting country because of the virulence and depth of the economic crisis. To have a broader context, in this article we also work with the previous waves (2002 and 2005) for the descriptive calculations, although the models with microdata focus on the three years for which there is longitudinal information.

We estimate income and wealth semi-elasticities of private insurance in Spain, taking account of personal and family characteristics (age, sex, level of health, education, composition of the household). We estimate cross-sectional models for each wave of the survey and longitudinal models for families that remain at least two years in the panel, taking account of possible selection bias due to attrition. We consider income and absolute and relative wealth in the population distribution in each year (quintiles).
In the following two sections, the data and methods are presented, followed by the results and a discussion section. The article ends with a brief conclusion.

**Data**

We use microdata from the Survey of Household Finances (EFF in Spanish), conducted by the Bank of Spain with detailed longitudinal information about households, including income, wealth, debt and expenditure as well as a rich set of socioeconomic variables, attitudes to risk, and insurance behaviour. For details on the definitions of the variables, see methodological notes of the survey [13]. Self-assessed health is recorded for each member of the household. There are five waves, for years 2002, 2005, 2008, 2011 and 2014, with about 6,200 households per wave. A fundamental characteristic of its sample is the over-representation of high-wealth households. A subset of households is followed over time. We use longitudinal information for 2008, 2011 and 2014, corresponding to those households that remained in the study at least twice between 2008 and 2014. We also use cross-sectional information about all the individuals in each wave of the survey.

By analysing Spanish households longitudinally, we can use the variations in income and wealth during the economic crisis to estimate the effects of income and wealth on the probability to buy a VPHI.

The cross-sectional sample has 18,423 households (47,238 individuals), of which 6,197 households (15,850 individuals) relate to 2008, 6,106 households (15,852 individuals) to 2011 and 6,120 households (15,536 individuals) to 2014. The longitudinal sample is composed of the 5,247 households that remained in the sample for at least two years between 2008 and 2014. Of these, 809 changed their insurance status during the period of study.

**Methods**

Descriptive statistics (mean, median) of net income and wealth of Spanish households from 2002 to 2014 and 95% confidence intervals. For each wave, we calculate crosstabs and bivariate tests (Chi-squared) between insurance cover and relative income and wealth, defined by quintiles of equivalent income/wealth. Equivalent income/wealth is calculated using the modified OECD scale [14]. For those households with zero income and for those households with negative or zero wealth the corresponding logarithm was set equal to zero. Households are weighted according to their sampling weights.

Independent cross-section logit models for the 2008, 2011 and 2014 waves (t=1.2 and 3 respectively) are used to estimate the probability of buying VPHI and to calculate cross-sectional income and wealth semi-elasticities and their 95% confidence intervals:

$$P(Y_{it} = 1|X_{it}) = \mathrm{F}(\beta_0 + \beta_1 \log(income_{it}) + \beta_2 \log(wealth_{it}) + \boldsymbol{\beta}_3 \boldsymbol{Z}_{it}) \quad (1)$$

where $Y$ is the binary variable for having VPHI, and $X$ includes log of income, log of wealth and a set of control variables ($Z$) measured for household $i$ in year $t$: age, sex and educational level of the head of family, percentage of members of the household with bad or very bad health, number of people in the household younger than 14. Lambda F(.) is the logistic cumulative probability function (cpf). The models use the sample weights defined by the sampling method.

These models check the observable variables in the survey ($\boldsymbol{Z}$) which are likely to influence private insuring. The causation is through different mechanisms. For instance, premium influences negatively, *ceteris paribus*, the probability of buying VPHI, but premiums are expected to vary with age, state of health and size of household.

Some relevant determinants of the decision about insurance, such as the place of residence (associated with availability of VPHI, prices and penetration of private insurance), are excluded from the survey, and there may also be unobservable characteristics of the household correlated with random error, such as risk aversion. So cross-sectional models applied independently to the three waves provide biased estimates. A priori, the sign of the bias is unclear. Omitting risk aversion from the equation would probably lead to a downward bias if risk aversion is positively related to the ownership of VPHI and negatively related to average income and wealth. If risk aversion is independent from income and wealth, the bias is positive. It is plausible that these omitted variables are positively correlated with income and wealth and that the bias of the cross-sectional estimates is therefore positive, so the models overestimate the effects of income and wealth on the probability of buying VPHI. On the other hand, these cross-sectional models have the advantage of their large sample sizes.

We then estimated conditional fixed effects logit models for the longitudinal sample, checking for the same variables as in the cross-sectional models (1) and additionally including the inverse Mills ratio to account for the possibility of a selection bias associated with attrition from the panel.

Only 1,524 of the 18,423 households in the cross-sectional database were surveyed in three waves, and 5,247 households remained in the panel for at least two of the three years. We discounted the type of sample design (which was by random selection, so without problems) so the loss of individuals might be due to attrition. In order to explore that possibility, we estimated for each wave a probit selection equation for the probability of belonging to the longitudinal sample, with a set of explanatory variables that might cause attrition. We include in the list all the explanatory variables in equations (1):

$$P(panel_{it}|X_{it}) = \Phi(X_t\gamma_t) \qquad (2)$$

where $\Phi$ is the cpf of a standard normal and $\gamma_t$ is a vector of coefficients for year t (t=1,2,3).

From (2) we predict the probability of each household remaining in the study in each year, and we calculate the inverse Mills ratio (IMR), i.e. the standard normal density function evaluated in the estimated score $(X_{it}\gamma_t)$ of the household divided by the estimated probability of remaining in the study. We use that new variable IMR as an additional regressor in the longitudinal equation, that is, a logistic model with the same *X* variables as in (1). The IMR derived from a first step probit selection equation has been used to correct for attrition bias. This procedure has been extensively used in panel models (see for instance Leigh, Ward and Fries [15] and Wooldridge [16]). In the original model proposed by Heckman [17] and in most applications, the second stage equation is linear, and it is estimated consistently by ordinary least squares, or alternatively both equations are jointly estimated by maximum likelihood, particularly when the second stage equation is nonlinear.

We estimate it with the sample of the households that were observed for at least two of the three years. The model includes fixed effects $(\alpha_i)$ of the household to cancel out the unobserved individual heterogeneity that might bias the cross-sectional estimates:

$$P(Y_{it} = 1|X_{it}, \alpha_i, IMR_{it}) = \mathrm{F}(\beta_0 + \beta_1 \log(income_{it}) + \beta_2 \log(wealth_{it} + \boldsymbol{\beta}_3 \boldsymbol{Z}_{it} + \beta_4 IMR_{it} + \alpha_i)) \quad (3)$$

In order to estimate the longitudinal model, the households that did not change their insurance status while participating in the study do not provide information to the likelihood function, as in this case there is no variability within a subject, and therefore there is nothing to examine. They are automatically excluded from the estimation sample. The final sample is composed of the 809 households (1,928 observations) that bought or cancelled health insurance at least once during the observation period.

In both cross-sectional and longitudinal logistic models, we estimate the marginal effects of income and wealth on the probability of buying VPHI as the Average of Partial Effects (APE) or semi-elasticities. The expression for income in the cross-sectional models is:

$$\frac{\partial \mathrm{P}(Y_{it}|X_{it})}{\partial \log(\mathrm{income_{it}})} = \beta_1 f(\beta_0 + \beta_1 \log(income_{it}) + \beta_2 \log(wealth_{it}) + \boldsymbol{\beta}_3 \boldsymbol{Z}_{it}) \quad (4)$$

where $f(.)$ is the density function of the logistic evaluated as the family's estimated score. The expression (4) is evaluated for each family and averaged over families. In the conditional fixed effect logit models for longitudinal data it is not possible to estimate the semi-elasticities in the usual way as they depend on the fixed- effects, which in turn vary among individuals. We applied the transformation and method proposed by Kitazawa [18] to estimate the average semi-elasticities of $P(Y_{iy} = 1|X_{it}, \alpha_i)$ with respect to the regressors, and the corresponding standard errors and t-statistics. We used the routine developed by Santos Silva [9].

Models (1)-(3) are estimated using relative income and wealth (quintiles) instead of the corresponding logarithms. For these models we compute odd-ratios of each level of income and wealth with reference to the first quintile (4). Estimates were made using the software package Stata 15.1 [20].

**Results**

From 2008, median income and median wealth of Spanish households decreased sharply (figure 1). The decrease in income was due to unemployment (the unemployment rate increased from 7.93% in the second quarter of 2007 to 24.47% in the second quarter of 2014), the general reduction of wages in the public sector in 2011 and the internal deflation through wages in the private sector. Net wealth decreased

even more abruptly than income because of the property crisis after the bursting of the property bubble. The assets of many families lost value quickly during the years of economic crisis.

[Figure 1 around here]

Table 1 shows descriptive univariate statistics for the cross-sectional samples. The figures in the table have been calculated using the sampling weights corresponding to each family and year. The distributions are similar for the three waves. Unweighted descriptive analyses (not reported) show older families (average age is approximately 60), with fewer women as heads of family and fewer children. As expected, owing to the oversampling of rich families, net income and wealth are, on average, quite a lot higher in the unweighted sample than in the weighted sample. The same applies for the prevalence of VPHI.

[Table 1 around here]

Table 2 shows the insurance status by quintiles of income and wealth for the whole sample each year (full cross-sectional samples). The association between insurance and both relative income and relative wealth is clear from this table. For instance, only 3.4% of the households in the poorest income quintile have VPHI in 2014, while 49.6% of the richest quintile do have insurance. In Table 2 we can also observe that the largest difference is from the third to the fourth quintile. The two most affluent quintiles, in income and in wealth, show far more proclivity to buy VPHI in Spain.

[Table 2 around here]

Income and wealth semi-elasticities for each wave and for the panel (longitudinal model) are shown in Table 3**,** together with their respective 95% confidence intervals. Cross-sectional models suggest that the income effect on the probability to buy a VPHI increased from 2008 to 2014, while wealth's impact decreased. The effect of income is larger than that of wealth. In 2008 a 1% increase in income is associated with an increase in the probability of having VPHI of 0.06 - on the probability scale (0.1) - while in 2014 that effect is 0.114. In 2008 an increase of 1% in wealth caused an increase of 0.015 in the

probability of buying health insurance. In 2011 and 2014 the wealth effect is not significant at 5%. The estimation of the longitudinal model leads to different results. Income and wealth are not significant. The estimated income semi-elasticity (0.07) is similar to the cross-sectional estimates. An increase in income of 1% causes an increase of 0.07 in the probability of buying VPHI. Wealth elasticity in the panel model (0.04) is higher than the cross-sectional estimates, and as in the cross-sectional models, the effect of wealth is smaller than the effect of income. The Mills ratio is not significant, suggesting that there is no attrition bias. The other covariates included in the model (table available on request) are not significant, with the exception of the percentage of members of the family declaring bad or very bad health (positive sign, significant at 10% but with a small coefficient) and the study level of the head of the family. The large variances obtained in the panel model are a consequence of the small sample and lack of within-family variations in most of the covariates such as sex, educational level and family composition.

[Table 3 around here]

It may happen that income and wealth do not have (log) linear effects on the probability; the relevant explanatory variable could be the relative rather than the absolute levels of wealth. In Table 4 we show the results of the models that include as independent variables the dummies for the quintiles of income and wealth (excluding the first quintile as reference) for the cross-sectional samples and for the panel model. The effect of income increases over time (according to the cross-sectional models) and it is much more intense for the two top quintiles Q4 and Q5 than for the bottom quantiles. The same result is derived from the panel model, though the odd-ratios are somewhat smaller than in the cross-sectional models. The Odd-Ratio (OR) for the two top income quintiles is 1.9 and 1.7 respectively. For the families in the fourth quintile of income, the relative probability of buying VPHI is almost double that of the poorest families.

[Table 4 around here]

With regard to wealth, something similar happens. According to the panel model, the ORs for the two wealthiest families are respectively 1.8 and 2.5. The families in the top 20% by wealth have a probability of getting insured that is two-and-a-half times greater than that of the families in the bottom 20%. As with

income, the gap relates to the two top quintiles, while the three quintiles at the bottom of the wealth distribution do not differ significantly.

**Discussion**

The study covers the years of economic crisis, which imposed major changes in domestic economies in Spain. The richness of the longitudinal data has allowed the possibility of analysing the behaviour of families by comparing transversal and longitudinal models.

The three main contributions of this study are:

1) We have shown that cross-sectional estimates of income and wealth semi-elasticities of VPHI may be biased upwards (although panel estimates may have an upward bias too due to the small T problem [21]. As the large majority of studies published in the literature are based on cross-sectional data, our result is very important.
2) Wealth is an economic determinant, together with income, for analysing the decisions to buy VPHI in developed countries. However, studies of elasticities of wealth are very scarce. Wealth has been neglected in studies of health insurance for developed countries, although it is usually considered in empirical studies for low- and middle-income countries. In them, wealth, absolute or relative, is usually introduced as a substitute for the economic situation because it is easier to measure than income [22-25]. Some previous studies for the United States (US) and Europe have drawn attention to the importance of wealth when analysing the use of health services, regarding it as an even more sensitive indicator than income for older adults [26]. For the US it has been shown that assets, rather than income, are an important determinant of effective affordability of medical insurance [27]. However, as far as we know, ours is the first empirical study that quantifies the semi-elasticity of voluntary private health insurance with respect to wealth with panel data. Wealth is closely correlated with income, but they are not measured in the same way. A study for 13 European countries estimates that each additional percentile in income distribution is associated with about 0.4 net wealth percentiles [28].
3) The effects of income and wealth on the probability of buying VHPI are neither linear nor log-linear. The position in the distribution is more important than the absolute level to explain the behaviour of families in the contracting of health insurance. There are no significant differences between the 60% of the less well-off families, while the families of the two upper quintiles show clearly differentiated behaviour, with a higher probability of insurance.

One possible reason for the estimates in the categorical models (table 4) to be much lower when exploiting longitudinal information of the data is measurement error in income and wealth quantiles. The bias due to measurement error in explanatory variables tends to be exacerbated in fixed effects model.

Our estimates of income semi-elasticities are larger than those calculated for the UK, which were based on data for 10,729 individuals corresponding to five cross-sectional surveys between 1986 and 1991 [29]. These authors estimate the marginal effect of income at 0.0037, much lower than our estimates. In their model they do not adjust income by household composition, so it is possible that other explanatory variables of the household are also partially capturing the effect of income. On the other hand, the income semi-elasticities estimated by us are not comparable with previous studies for Spain estimating elasticities. The study for 1999 of Costa and García [9], with a cross-sectional sample size, estimates high income elasticities of approximately 1.22 for the total set of families in Catalonia, and even more for those that perceive low quality in the public sector. Our estimators using relative income and wealth data suggest non-linear effects, unlike a study for Taiwan in which the effect of successive quintiles was monotonous [12]. Numerically, the ORs that were estimated in the Taiwan study for the most well-off quintile (OR = 2.5) are similar to ours.

As for the other explanatory variables, it should be noted that, unlike other studies, ours did not find any significant relationship between the age of the head of the family and the probability of buying private insurance. In the panel models this could be due to little intrafamilial variability in the age of the head of family between waves.

This study contributes to the current debates about tax exemptions for private insurance and about the possible change of the public insurance model. VPHI has been considered equitable as the double-insured rich opt out to the private sector, leaving resources available to the poor, and at the same time the rich contribute to subsidising public services through income taxes [30].The underlying economic concept is that the opportunity cost of using public health services is reduced thanks to the opting out to VPHI. In some countries, employer-paid health insurance is subsidised under that opportunity cost argument. Several studies show that double cover causes an increase in private utilization that may overcompensate

for the utilization of the public providers. In Italy the wealthier replace public consumption with private (*opt out*) [31], but in other countries it may happen that the double insured just consume private services without reducing the use of the public ones (*top up*) or at least consume more than comparable citizens with only the public cover. This seems to be the case for the elderly in Italy, Spain, Denmark and Austria [32]. In Spain, those with double insurance cover use more primary care visits and specialist consultations than the general population [33]. Our study shows that in Spain the richest (the fourth and especially the fifth income quintile) have a very high prevalence of private voluntary insurance. A tax exemption for health spending under the opportunity cost argument would have a regressive effect on the distribution of income.

The study has limitations. Although the conditional fixed effects control for household heterogeneity, there is still a risk of omitted variables bias, specially coming from supply side characteristics. Changes in the public health insurance coverage and quality of public health services (waiting times, access) are likely to be strong determinants of the decision to take out private insurance. This prevents from stablishing a causal link between income, wealth and insurance choice. Conditional fixed effects logit model for panel data faces the small T upward bias [21]. That might be a limitation, although for small number of time periods (like in this study) it is preferred over the unconditional estimate as the bias is smaller. We have no data about the geographical location of the people surveyed, nor, therefore, about the offer or waiting times of the public healthcare network in their areas of residence, this being an important explanatory factor of private insurance [9, 10]. The sample size for the panel data logistic models is rather small because a considerable number of households did not change insurance status and were consequently removed from the estimation sample. Although our panel estimators are imprecise due to the small sample size, they have the advantage of avoiding bias due to unobservable heterogeneity.

**Conclusion**

The effect of income and wealth on VPHI is non-linear. Only the top 40% of households show a greater proclivity to buy insurance, particularly the top quintile. Cross- sectional studies might bias the real effect upwards. Wealth is a relevant variable to explain insurance decisions, but its effect is smaller than the effect of income.

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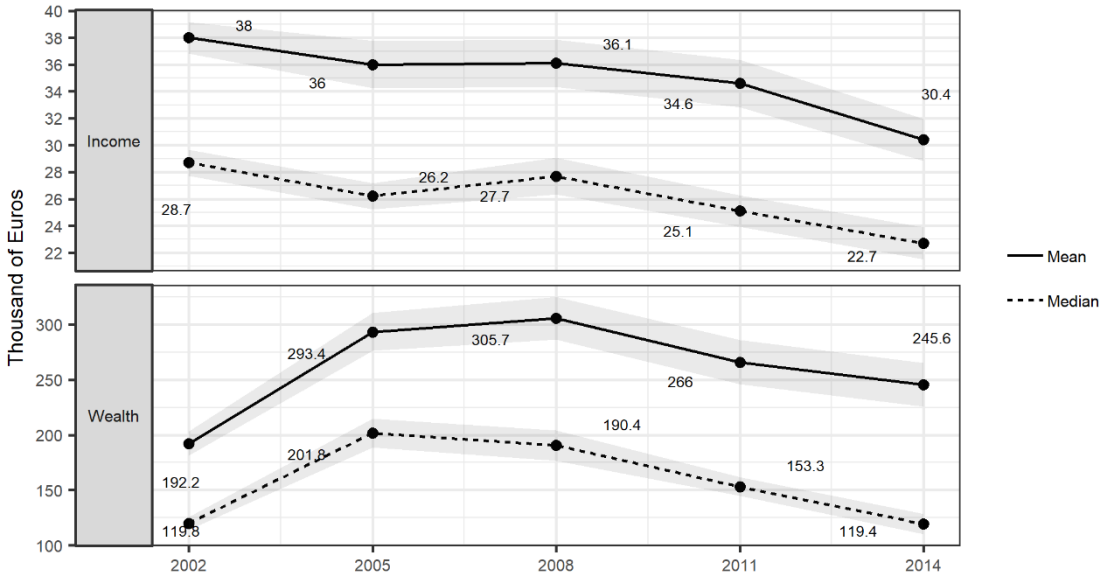
**Figure 1.** Median income and wealth Spanish households, 2002-2014




Source: The Spanish Survey of Household Finances

**Table 1.** Descriptive statistics cross-sectional samples

| Variable | Categories | 2008 | 2011 | 2014 |
|---|---|---|---|---|
| Sex of the head of family | Female | 49.6% | 45.1% | 46.4% |
| Age of the head of family | | 52.9(52.2-53.6) | 53.9(53.2;54.7) | 54.5(53.8-55.2) |
| Self-Assessed health (SAH) of the head of family | Bad or very bad | 7.6% | 8.7% | 8.2% |
| % Members of the family with bad or very bad SAH | | 7.7(6.9-8.6) | 8.5 (7.5-9.5) | 7.6 (6.7-8.5) |
| Number of children (<14 years) in the family | No children | 73.3% | 73.1% | 73.4% |
| | 1 child | 15.2% | 16.0% | 16.0% |
| | 2 children | 10.0% | 9.2% | 9.0% |
| | >2 children | 1.5% | 1.7% | 1.6% |
| Educational level of the head of family | No studies or primary unfinished | 38.8% | 39.6% | 37.3% |
| | Primary | 17.0% | 13.2% | 13.6% |
| | Secondary | 26.5% | 27.5% | 26.3% |
| | University | 17.7% | 19.7% | 22.8% |
| Equivalent Income (in euros) | | 18,582 (17,846;19,317) | 19,766 (18,923;20,609) | 18,398 (17,550;19,246) |
| Equivalent wealth (in euros) | | 170,012 (159,715;180,308) | 161,904 (151,921;171,886) | 158,903 (143,670;174,136) |
| Health Insurance | The family has health insurance | 13.2% | 14.5% | 14.3% |

For continuous variables the table reports mean and linearized standard error. For categorical variables, % in each category. Calculations made with sampling weights.

**Table 2.** Percentage of households with private insurance by income quintiles and wealth quintiles in the three waves

| | Income | | | Wealth | | |
|---|---|---|---|---|---|---|
| | 2008 | 2011 | 2014 | 2008 | 2011 | 2014 |
| Q1 | 3.4 | 3.8 | 3.4 | 6.9 | 10.0 | 8.7 |
| Q2 | 6.9 | 9.2 | 7.1 | 9.6 | 10.0 | 9.8 |
| Q3 | 10.8 | 11.9 | 12.8 | 14.6 | 13.8 | 13.1 |
| Q4 | 25.4 | 29.6 | 27.7 | 22.6 | 29.6 | 30.3 |
| Q5 | 35.8 | 38.9 | 49.6 | 44.4 | 48.3 | 46.8 |
| Total | 13.2 | 14.5 | 14.3 | 13.2 | 14.5 | 14.3 |

Calculations use cross-section sampling weights of households derived from the sampling design. Income and wealth are corrected by family size and composition with the OECD scale of equivalent income.

**Table 3**. Cross-section and panel logit modes. Estimation of income and wealth semi-elasticities of VPHI

| Wave | Number of observations | Income | 95% CI Income | Wealth | 95% CI Wealth |
|---|---|---|---|---|---|
| 2008 | 6,197 | 0.064*** | (0.02;0.10) | 0.015*** | (0.005;0.02) |
| 2011 | 6,084 | 0.077*** | (0.05;0.11) | 0.007** | (0.00;0.01) |
| 2014 | 6,116 | 0.114*** | (0.09;0.14) | 0.001 | (-0.00; 0.00) |
| Panel | 1,928 | 0.07 | (-0.02; 0.16) | 0.04 | (-0.01; 0.01) |

The values in the table report the absolute change in the probability of having private voluntary health insurance if the income or wealth increases by 1%. All the models adjust by age, sex and education level of the head of the family, number of children under 14 years of age in the household, proportion of people in the household with bad or very bad health. The income and wealth of the household are in logarithms and adjusted by family composition according to the OECD scale. For the conditional fixed effects logit model (panel data) the estimates are average (semi) elasticities of $P(Y_{iy} = 1|X_{it}, \alpha_i)$, calculated following Kitazawa [18]. The last row contains the estimators of the panel model with household fixed effect.

*** significant at 1%; ** significant at 5%; * significant at 10%

**Table 4**. Cross-section and panel logit models. Estimates of Odd-Ratios (OR) of VPHI for relative income and wealth (by quintiles)

| | Income | | | | Wealth | | | |
|---|---|---|---|---|---|---|---|---|
| Wave | Q2 | Q3 | Q4 | Q5 | Q2 | Q3 | Q4 | Q5 |
| 2008 | 1.6* | 2.1*** | 4.5*** | 4.9*** | 1.3 | 1.8*** | 2.5*** | 5.5*** |
| 2011 | 1.9*** | 2.0*** | 4.5*** | 4.1*** | 1.0 | 1.1 | 3.0*** | 5.3*** |
| 2014 | 2.0*** | 2.6*** | 4.8*** | 8.7*** | 0.9 | 1.1 | 2.1*** | 3.1*** |
| Panel | 1.0 | 1.1 | 1.9** | 1.7* | 0.9 | 1.1 | 1.8* | 2.5** |

The values in the table are Odd-Ratios estimated with reference to the first quintile. All the models adjust by age, sex and educational level of the head of the family, number of children under 14 years of age in the household, proportion of people in the household with bad or very bad health. The income and wealth quintiles of the household have been calculated for each year.

*** significant at 1%; ** significant at 5%; * significant at 10%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