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The demand for health services in Spain: does having private insurance matter?

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Abstract

The purpose of this thesis is to explore the question of whether there exists any difference in the use of the Spanish healthcare services between privately and publicly insured individuals. The analysis is carried out using two different estimation techniques, matching on the propensity score and inverse probability weighting, using the 2017 National Health Survey. Twelve different outcomes are taken into account in assessing the difference in the use of preventive health controls between individuals with private health coverage and individuals with public health coverage only. Results revealed that privately insured individuals take preventive health checkups more frequently in comparison to individuals with public coverage, despite finding no differences in their self-assessed health status.

Keywords: Health care utilization, preventive health, private health insurance, average treatment effect on the treated.

1 Introduction

In recent years, the study of health care systems and their use has reached a great dimension in the field of health economics, since there is a direct relationship between health, the economy and the development of a society. As a result, there is a growing concern about the situation of health resources, given the complexity and high cost of their services.

The Spanish case is no exception and even more interesting for the analysis because of the structure of the Spanish health care system and the lingering effects of the 2008 crisis.

The first aspect has motivated several authors to analyse the relationship between the private and public health sectors. Since the Spanish health care system offers public universal coverage, contracting private health insurance results in double coverage. In that sense, there appear to be no evident reasons as to why individuals would hire private health insurance, which has led numerous researchers to study its determinants and effects on the health care system.

As a consequence of the crisis, the Spanish government has been looking for ways to cut the excessive healthcare expenditure, resulting in a series of austerity measures affecting the quality of the public health care system. The difficulties that patients have to endure are mainly reflected in the long waiting list for consultations with specialists or specific examinations and the increase of co-payments. As expected and according to Kentikelenis et al. 2011, this expenditure reduction led users to have a worse perception of the quality of the public health care system.

However, these emerging problems are not taking place in the private health sector, resulting in an increase in the number of private healthcare policies [(Sigüenza and Mariel 2015)]. Furthermore, one of the solutions proposed to reduce both cost and the waiting lists is to use and finance private health care [Cantarero et al. 2017)]. Nevertheless, some authors expressed that this fiscal policy is regressive and unfair since it subsidises the capacity to pay and not the service itself [Freire (1999), Rodríguez (2001), Simó (2009)].

Within this framework, the relevance of studying the Spanish health care system and how individuals make use of it arises. Identifying whether there are differences in the use of the health care system between publicly and privately insured individuals contributes to a better understanding of the problems of the Spanish health care system and more importantly to seek more sustainable solutions for it.

The literature about the Spanish health care system has centred mainly on two points. On one hand, the study of the demand and determinants of private health insurance. Generally, the studies coincided on the relevance of socio-economics, socio-demographic and some health variables that influence the decision of having double-coverage [González (1995), Jofre (2000), Costa and García (2002 and 2003), López-Casasnovas and Sáez (2005), Ordaz et al. (2005), Rodríguez and Stoyanova (2008), Sigüenza and Mairel (2015)]. On the other hand, other authors have studied the effects of double-coverage on the utilisation of the health care system, such as, the number of consultations, hospital services and the use of emergency rooms [Szabó (1997), Vera-Hernández (1999), Propper (2000), Harmon and Nolan (2001), Rodríguez and Stoyanova (2004), Sigüenza and Mairel (2015), Cantarero et al. (2017)].

The objective of this work is to analyse the effects of having private health insurance on the utilisation of the Spanish health care system trying to identify if there are differences between privately and publicly insured individuals. The contribution of this work relies on the focus of the analysis on preventive health, particularly on the correct follow-up of general medical checks and oncology tests.

Preventive health care is crucial as public health policy. It encourages healthy habits and regular medical checks in order to prevent and detect diseases. As Esperato and García (2007) expressed, some studies have shown the importance of preventive health, denoting the importance of early treatment and detection of disease, and remarking the efficiency of investing in preventive policies.

Within this context of service quality, it would be expected that one of the areas most affected by public budget cuts on health would be the preventive services. As Sigüenza and Mariel (2015) explained, preventive health would have a high time cost when performed under public coverage (taking into account the large number of tests that would have to be performed) and a high monetary cost if done privately. Then, having private health insurance helps to control and reduce these costs, and it would be expected that those individuals under this coverage could make use of health services more intensively.

When the use of the healthcare system is analysed, it is important to determine whether there are differences in the use of preventive health services between individuals with public coverage and individuals with double coverage. Should there be significant differences, it would be interesting to study whether these differences are due to insurance type characteristics (say, waiting time on the waiting list) or to individual characteristics (say, income). Finally and more importantly, it is worth examining if these differences could imply differences in individuals´ health status.

To carry out this analysis, the latest microdata of the Spanish National Health Survey (SNHS 2017) is used. Causal inference techniques, namely, matching on the propensity score and inverse probability weighting are applied, to compare the use of preventive health services between privately and publicly insured individuals.

This work is structured in four sections. The first one corresponds to the introduction of the project. The second part presents the methodology and the data used on the estimations. The third shows the results obtained from the estimations, and finally, the conclusions derived from the analysis conducted through this research are presented.

2 Methodology and data description

2.1 Methodology

In order to identify the effect of holding private health insurance on the use of the Spanish health care system, causal inference methods are used. For that, it is necessary to define the treatment and control group. The treatment group is defined as the group that has been exposed to a certain change, in this case, having private health insurance. Then this group will be compared on the outcomes related to the correct follow-up of medical checks, with individuals with similar characteristics but who have not been exposed to treatment. This last group is called the control group and is composed of individuals who only have public health coverage.

Following this methodology, it would be possible to compare both groups and assess the influence of holding private insurance. In other terms, the mean difference in potential outcomes for those exposed to treatment is estimated. This is defined as the Average Treatment Effect on the Treated (ATET). Mathematically,

$$ATET = \mathbb{E}(Y_{1i} - Y_{0i}|D_i = 1), \qquad (1)$$

where D_i denotes the treatment indicator, being one for treated individuals and zero for individuals in the control group, and $Y_{1\mathrm{i}}$ and $Y_{0\mathrm{i}}$ the potential outcomes, that is, the outcomes individual i would obtain under private health insurance and under just public coverage, respectively. Notice that, for the treated, I can observe the potential outcome under treatment but fail to observe the potential outcome under no treatment.

The methodologies implemented in the analysis are explained below. Defining a model that characterizes and distinguishes individuals who are more likely to have private health insurance, that is, identifies the probability of being treated, is the first step. Once the model is properly defined, and it is possible to identify the characteristics that determine contracting private health insurance, I compare the outcomes of those with private insurance with the outcomes of those who only have public coverage. The idea is to compare individuals in the treatment group with those who have similar observable characteristics in the control group. The techniques used to make this comparison are matching on the propensity score and inverse probability weighting.

Since this is an observational study, the selection into treatment is not random; some individuals choose to have private health insurance. Thus, it has to be assumed that, conditional on individual characteristics, potential outcomes are independent of this treatment assignment. This is known as unconfoundedness and it will allow us to compare similar individuals in terms of pre-treatment variables.

Moreover, the probability of treatment depends on the individuals observable characteristics. Therefore, the probability of being exposed to treatment, known as the propensity score, is given by,

$$p(\boldsymbol{x}_i) = \Pr(D_i = 1 \mid \boldsymbol{x}_i) = F(\boldsymbol{x}_i\beta_i|\boldsymbol{x}_i), \qquad (2)$$

where D_i the dependent binary variable as,

$$D_i = \begin{cases} 1 \; if \; individual \; i \; has \; private \; insurance \\ 0 \; otherwise \end{cases},$$

$\boldsymbol{x}_i$ is a vector of covariates that helps to explain and control the variability of the dependent variable. Following Imbens and Rubin (2015), it is considered in this set variables that could not be affected by treatment and as many as possible to control and explain the variability of having private health insurance.

Equation (2) is estimated by Maximum Likelihood and a logistic distribution is assumed.

Once the propensity score is defined, different techniques to estimate the average treatment effect on the treated are applied. First, matching on the propensity score is used, considering different levels of matching: one to one matching (m=1), and also one to four matches (m=4). This method matches individuals in the treatment group with those in the control group with similar characteristics, based on the probability of having private health insurance. More precisely, each treated individual i will be matched with individual j on the control group when the difference in the propensity score is minimized. As such, it is necessary to assume common support or overlap condition, which ensures that there would be sufficient overlap in the characteristics of individuals between both treated and control groups to find adequate matches.

Inverse probability weighting is the other method applied. It calculates the average treatment effect on the treated, weighting the difference in means by the probability of being exposed to treatment, that is, having private health insurance. Recalling that D_i is the treatment indicator, Y_{i} the observed outcomes, and $p(\boldsymbol{x}_i)$ the propensity score, the average treatment effect on the treated would be,

$$ATET = \frac{1}{p(D_i = 1)} \mathbb{E}\left(D_i Y_i - (1 - D_i) \frac{p(\boldsymbol{x}_i)}{1 - p(\boldsymbol{x}_i)} Y_i \right).$$

Inverse probability weighting weights up untreated units, that have a low probability of receiving treatment, and weights down untreated units with a large probability of receiving treatment.

2.2 Description of the data

The analysis of this work is performed with the latest micro-data from the Spanish National Health Survey 2017 (SNHS). It is conducted by the National Statistics Institute (INE) and it provides not only statistical information on the health of the population and its determinants but also socio-economics aspects.

The SNHS consists of three microdata files: Household, Adult and Minor files. The Household file includes variables regarding the socio-economics and demographic status of the reference individual such as age, sex and income. While the Adult and Minor files contain variables referring to the health status and the use of the national health care system.

Since the information is collected for the reference individual of the household, and the objective is to analyse the use of health services distinguishing those individuals who have private insurance from those who have not, only the Household and Adult files are used. After merging both data sets, it ends up with 23.089 observations for the reference individual of the household.

The outcomes to be considered as a proxy of the utilisation of the health care system in the preventive area, taken from the SNHS, are summarised in Table 1. They were divided into two main groups, the correct follow-up of general medical checks and on the other hand, oncological check-ups. Following Cantarero et al. (2017), the number of visits to a general practitioner and specialist in order to measure the use of the healthcare system, are also considered.

Under the Spanish health care system, oncological examinations are part of a screening strategy depending on individual or family antecedents and on the age of the individuals. If there are no previous conditions, the stool test should be performed once every two years for males and females between 50 and 69 years old. Mammogram screening is composed of females between 50 and 69 years old, and the examination should be performed once every two years. Finally, cervix cytology screening targets females between 25 and 65 years old. For the age group between 25 and 34, the test should be done once every three years and for those older than 34, the frequency changes with previous test results. If it is negative, the test will be done once every five years. In case that the test is positive, it would be done every year.

Table 1: *Definition of the outcomes for health service utilisation*

Correct follow-up of general medical checks	**Oncology check-ups**
General exam done in last twelve months	Stool test analysis done in last two years
Blood pressure checked in last twelve months	Mammography done in last two years
Cholesterol checked in last twelve months	Cervix cytology test done in last two years
Level of sugar in the blood checked in last twelve months	

Table A.1 in the appendix section shows explanatory variables used in the estimations and their corresponding definition. Two big groups of variables were created in order to specify the main characteristic of the individuals. The first group provides information regarding the socio-demographic characteristics, whereas the second group collects information about the health status and health activities of the individual.

Next, variables used to characterize the sample population in the socio-demographic aspect are presented. Gender is represented by a dummy variable; *FEMALE* that takes values equal to one for females and zeroes for males. 54% of the sample are women.

Age was considered a continuous variable, ranging from 15 to 103. To distinguish a non-linear functional form, a quadratic polynomial of this variable is included. *TOWN_SIZE* is a categorical variable that shows the size of the municipality where the individual lives, and for the analysis, dummy variables for each category were created to determine whether the size of the municipality has any influence on the decision of holding private health insurance.

It could be expected that the structure of the household could influence the decision to purchase private health insurance. In this line, I created dummy variables for each of the different cases from the categorical variable *HOUSEHOLD_TYPE*, which shows how the household is composed. Almost 27% live in a house composed of a couple and a child under 25 years old. Finally, in order to capture regional heterogeneity, 19 regional dummy were created, one for each autonomous community.

On the socio-economics aspect, the level of education and income of the individuals were accounted for. In the SNHS, income is reported as a categorical variable with 12 categories, and for the analysis, I created dummy variables for each of them. The median lies between those individuals earning 1300-1550 euros per month.

The educational level is reflected by dummy variables created from the categorical variable *EDUC*, which shows the maximum level of education achieved by the individual. Half of the individuals in the sample have attained less than secondary school as their maximum educational level. The occupation status is also considered and is collected by dummy variables from the categorical variable *OCCUP*. 43% of the individuals have reported being employed, while almost 11% are unemployed. Finally, to show the civil status of the individuals, different dummy variables were created from the categorical variable *CIVIL_STATUS*. The majority of the population reported being married.

With the purpose of analysing how individuals choose their health coverage, dummy variables were created to distinguish each case. For example, *PUBLIC_INSURANCE* takes values equal to one when the individual has public health coverage and zero in other cases. As it could have been expected because of the universal coverage, 95% of the sample has reported being under this type. However, as explained before, inside this population, there could also be individuals who decided on private health insurance. The variable *DOUBLE_COVERAGE*, takes values equal to one when this is the case and zero otherwise. 13% of the sample has double-coverage, holding public and private health insurance at the same time.

As mentioned before, the SNHS provides a large variety of questions related to the health status of individuals. To consider previous or existing pathologies that the individual may have or have had; thirty dummy variables were generated. The most common ones are

osteoarthritis, chronic lumbar pain and high cholesterol. Moreover, variables concerning healthy and unhealthy habits were created. For unhealthy habits, it has dichotomous variables as *DRINK*, which is equal to one if the individual consumes alcohol regularly and zero otherwise. Another example is *SMOKE*, which takes values equal to one if the individual smokes and zero if the individual does not. 21% and 23% of individuals reported that they drink or smoke regularly.

On the other hand, variables to characterize healthy habits are dummy variables created from the categorical *EXERCISE,* which reflects an individual's sports practice frequency. Most of them, 38% and 39% report doing no exercise at all or some exercise occasionally. For nutrition information, dummy variables showing whether individuals consume fruit, vegetables and legumes regularly were considered. A large part of the individuals said that they consume fruit and vegetables one or more times a day. While for legumes, almost 63% consumes it once or twice a week. In order to determine if the level of exercise performed at work has any influence in this sense, dummy variables were created from the categorical *EXERCISE_ACTIVITY*. 40% of the respondents reported that during their working hours they do not exert any relevant physical effort, since they remain seated for most of their labour.

The last group of variables to be described are generated as the outcomes to be measured. Relating to the correct medical follow-up checks, it has two groups, general exams and oncology-related ones. Some examples for the first group are the correct follow-up of the blood pressure and the cholesterol level. These are represented by the binary variables *CORRECT_BLOOD_PRESSURE* and *CORRECT_CHOLESTEROL* respectively, which take values equal to one if the individuals have done this type of test at least once in the last 12 months. Around 79% of the individuals in the sample have done these tests during this period.

The second group consists of oncology check-ups, including the examination of colon, breast, and cervical cancer. The dummy variables *CORRECT_STOOLTEST*, *CORRECT_MAMMOGRAPHY* and *CORRECT_PAP*, take values equal to one when the individual has done these corresponding examinations at least once in the last two years, and zero otherwise. According to Table A.1 in the appendix, on average, almost 65% of the population of interest have done the stool test properly in the last two years, 62% is the case of the mammography test and around 70% for the cervix cytology test.

Finally, in order to see whether holding private health insurance influences health status, binary variables *GOOD_HEALTH* and *BAD_HEALTH* were created. *GOOD_HEALTH* takes values equal to one when the individual perceives a good or very good health status, while *BAD_HEALTH* takes values equal to one if the individual perceives bad or very bad health status. The proportion of individuals that perceives good health status is bigger than a bad one, being 66% against almost 10% for a bad or very bad situation.

3 Estimation and results

3.1 Propensity Score

Individual characteristics are considered to specify and determine the decision of having private insurance or not, in particular, the socio-demographic and economics ones, such as, gender, age, the size of the population where the individual lives, income, civil status, the level of education and labour market status. In addition, dummy variables regarding the health habits and status of individuals are also considered. These variables accurately represent if individuals have a healthy diet, drink, smoke or practice some exercise regularly, and if they had some pathology in the past.

Table A.2 in the appendix shows the results of the mentioned estimation. The first column shows the name of the variable, followed by the coefficient and its level of significance, and the last one shows the standard error. Table A.2 ends with the number of observations and the pseudo R2 as a measure of the fit of the estimated model.

The results show that individuals who live in towns with a large population, live alone, with high income and high level of education, have a high probability to have private health insurance.

The positive effect of education is widely known and consistent with the literature. It is explained that with a high level of education the standard for the goods consumed is higher [González (1995)]. If this standard is not met in the public health sector, it would be expected that highly educated individuals demand better services, thus, having a higher probability of contracting private health insurance (Sigüenza and Mariel 2015).

The positive influence of a higher level of income on the probability of purchasing private health insurance also corresponds to what has been expressed in the literature of the demand for private health insurance. In the Spanish case, as a consequence of universal health coverage, individuals who opt for private health coverage have to face a double cost for their health services. One direct cost, the insurance premium, and another indirect cost through taxation for public health services. It is therefore consistent that those with higher income are more likely to choose the extra coverage.

The negative relationship shown between the type of household and the probability of having private health insurance is linked to the costs of the insurance prime. Individuals who live alone face cheaper insurance policies compared to households with more family members, increasing their probability to have private health coverage. In that sense, the negative relationship obtained for those who live in small towns could be explained as the lack of infrastructure of private insurance companies in such populations [Urbanos (2000), Sigüenza and Mariel (2015)].

Gender is not statistically significant in order to explain the probability of having private health insurance. Only the coefficient of the square of age was negative and statistically significant at 10% of significant level. This would give a slight indication that the older the individual, the less likely he or she is to engage private coverage. This is consistent with the fact that the older the individual, the more expensive the insurance premium, discouraging the purchase of insurance.

Regarding the autonomous community where the individuals live, the results show that in the majority of the communities individuals are less likely to have private health insurance in comparison with those from Andalucia. It is only in Balears, Cataluña and Madrid where it is more likely to have double coverage than the baseline category. To finish with the socio-economic characteristics of individuals, being unemployed or not being able to work reduces the probability of having private health insurance in comparison with those who are employed, showing that, as it would be expected, the uncertainty or the lack of income discourages the purchase of private health insurance.

None of the thirty health status dummy created to reflect any kind of possible pathologies that the individual may present, seem to have an influence on the decision of having private health insurance individually. Moreover, in order to extend the analysis, a test of the joint hypothesis that all these dummy variables are jointly significant was performed. The result from the test indicates a chi-squared value of 30.95 and a p-value of 0.42, denoting that all these dummy variables are jointly insignificant. These results indicate that the individual health status does not have any influence on contracting private health insurance.

Furthermore, neither of the unhealthy habits that were considered nor the regular consumption of fruit, vegetables or legumes seem to have a significant effect on having private health insurance. Altogether, these results lead to take heed of, as Szabó (1997) expressed, the absence of adverse selection in the health insurance market in Spain.

Having been hospitalized in the last twelve months and doing exercise regularly are the factors that contribute positively to having private health insurance under this aspect. Moreover, those whose main work activity is done seated are more likely to have private health insurance than those who exert some level of exercise or physical effort on their work. This could be related to the fact that due to a lack of exercise, individuals may seek more streamlined and more convenient health care in private health insurance.

3.2 Average Treatment Effect

The definition of the propensity score allows us to apply different techniques to estimate the average treatment effect on the treated. The structure of the estimations is the same, despite the outcome being analyzed change, that is, the average treatment effect on the treated is estimated for each outcome using matching on the propensity score and inverse probability weighting.

The estimates are reported in Tables 2, 3, 4, 5, 6 and 7. Each table is divided into subtables, and each subtable considers different outcomes. The first column of each subtable reports the implemented estimation methods, that is, one to one matching on the propensity score (m=1), one to four matching on the propensity score (m=4) and inverse probability weighting (IPW). The second column of each subtable, reports the average treatment effect on the treated estimates (ATET), while the third and fourth columns report the standard error (Std. Err) and the p-value of the estimation (P> |z|). Finally, the number of observations used on the estimation is reported in the last row (n).

Following Cantarero et al. (2017) Subtables 2.1 and 2.2, shows the estimations of the average treatment effect on the treated for the number of consultations to a general practitioner or a specialist.

Results in Table 2 are consistent with the ones found by the authors cited above. Considering the number of visits to a general practitioner, results in Subtable 2.1 show that, there is no statistical difference on the average of consultations of this kind between those individuals who have private health insurance and those who do not. However, a difference is found in the average number of visits to a specialist doctor. Results in Subtable 2.2 depict that double-coverage individuals, on average, visit a specialist 10% more times than those who only have public health coverage.

Table 2: *Average Treatment Effect estimates on general practitioner and specialist visits*

Table 2.1: *Number Visit General Practitioner*

	ATET	**Std. Err**	**P>|z|**
m=1	0.003	0.034	0.936
m=4	0.017	0.028	0.548
IPW	0.020	0.027	0.454
n = 13.659			

Table 2.2: *Number Visit Specialist*

	ATET	**Std. Err**	**P>|z|**
m=1	0.100	0.034	0.003
m=4	0.109	0.027	0.000
IPW	0.099	0.026	0.000
n = 9.718			

Source: Author's elaboration from SNHS

To identify whether there are differences in the preventive health services, I first considered the correct follow-up of general medical checks. Table 3 is divided into Subtables 3.1, 3.2, 3.3 and 3.4 each one showing the estimation of the average treatment effect on the treated for general exams done in the last twelve months, blood pressure and level of cholesterol and sugar in blood checked in the last twelve months, respectively.

It can be inferred that, on average, having extra health coverage promotes a more intensive use of general medical checks. The results show that, on average, those who have private health insurance have taken a general exam 4% more times than those who only have public health coverage.

Concerning the correct follow-up of the cholesterol level, it is obtained that, on average, those individuals who have private health insurance take this test 5% more times than those who have only public health coverage.

Finally, individuals with double coverage have checked the level of sugar in the blood, on average, about 6% more times than those who only have public health coverage.

The results are ambiguous considering the outcome that measures the correct follow-up of the blood pressure in the last twelve months, it varies depending on the estimation method implemented and the significance level considered.

Table 3: *Average Treatment Effect estimates on the correct follow-up of general medical checks*

Table 3.1: *General Exams in last twelve months*

	ATET	**Std. Err**	**P>|z|**
m=1	0.044	0.016	0.005
m=4	0.049	0.012	0.000
IPW	0.052	0.011	0.000
n = 16.511			

Table 3.2: *Checked Blood Pressure in last twelve months*

	ATET	**Std. Err**	**P>|z|**
m=1	0.033	0.015	0.027
m=4	0.018	0.012	0.119
IPW	0.028	0.011	0.009
n = 16.011			

Table 3.3: *Checked Cholesterol in last twelve months*

	ATET	**Std. Err**	**P>|z|**
m=1	0.063	0.015	0.000
m=4	0.056	0.012	0.000
IPW	0.054	0.010	0.000
n = 15.969			

Table 3.4: *Checked Sugar in Blood in last twelve months*

	ATET	**Std. Err**	**P>|z|**
m=1	0.070	0.016	0.000
m=4	0.057	0.012	0.000
IPW	0.058	0.011	0.000
n = 15.826			

Source: Author's elaboration from SNHS

As a second approach for the analysis for preventive health services, the correct follow-up of oncological examinations was considered. Table 4 shows ATET estimates for the follow-up on oncologist checks.

Due to the fact that these types of exams are under a health screening policy, two estimates for each outcome were computed: one for the entire population and another for the specific gender and age group where the screening policy is implemented.

The subtables in the left-hand side of Table 4 (Subtable 4.1, Subtable 4.3 and Subtable 4.5) report the results considering the entire sample, while the estimates reported in the subtables on the right-hand side (Subtable 4.2, Subtable 4.4 and Subtable 4.6) are obtained only considering the individuals under the screening target population.

Again, for those under the screening target population, results show that there is no statistical difference in the average use of oncology checks between those who have private health insurance and those who do not. In other words, when the estimates are restricted for the specific gender and age group, none of the coefficients of the ATET estimates are statistically significant.

However, when the entire population is considered, statistical differences are found on average, in the use of mammography and cervix cytology tests between treated and control groups. Particularly, females with private health insurance, on average, have taken at least a mammography check in the last two years around 13% more times than those females who only have public health coverage. Moreover, this difference is around 8% for the cervix cytology test.

Table 4: *Average Treatment Effect estimates on oncology check-ups*

Table 4.1: *Mammography test in last two years*

Entire sample	**ATET**	**Std. Err**	**P>|z|**
m=1	0.140	0.026	0.000
m=4	0.131	0.019	0.000
IPW	0.130	0.019	0.000
n = 5.747			

Table 4.2: *Mammography test in last two years*

Screening sample	**ATET**	**Std. Err**	**P>|z|**
m=1	0.010	0.028	0.711
m=4	0.016	0.020	0.442
IPW	0.026	0.022	0.237
n = 2.677			

Table 4.3: *Stool test in last two years*

Entire sample	**ATET**	**Std. Err**	**P>|z|**
m=1	-0.010	0.031	0.749
m=4	-0.003	0.024	0.898
IPW	0.003	0.029	0.930
n = 3.172			

Table 4.4: *Stool test in last two years*

Screening sample	**ATET**	**Std. Err**	**P>|z|**
m=1	-0.018	0.035	0.600
m=4	0.002	0.015	0.877
IPW	0.005	0.038	0.892
n = 1.716			

Table 4.5: *Cervix cytology test in last two years*

Entire sample	**ATET**	**Std. Err**	**P>|z|**
m=1	0.080	0.017	0.000
m=4	0.081	0.012	0.000
IPW	0.078	0.012	0.000
n = 6.547			

Table 4.6: *Cervix cytology test in last two years*

Screening sample	**ATET**	**Std. Err**	**P>|z|**
m=1	-0.021	0.028	0.450
m=4	0.004	0.023	0.876
IPW	-0.005	0.029	0.854
n = 730			

Source: Author's elaboration from SNHS

In order to corroborate these differences and add robustness to the analysis, following the same procedure the ATET was estimated for the same outcomes but excluding the age group of the screening target population. Table 5 is divided into Subtable 5.1, 5.2 and 5.3 showing the ATET estimate on mammography, stool and cervix cytology tests respectively. On average, statistical mean differences are found on the check of the mammography and cervix cytology test between those females who have double health coverage and those who only have public health coverage.

Table 5: *Average Treatment Effect estimates on oncology check-ups without screening age sample*

Table 5.1: *Mammography test in last two years*

	ATET	Std. Err	P>|z|
m=1	0.228	0.040	0.000
m=4	0.236	0.032	0.000
IPW	0.228	0.031	0.000
n = 3.069			

Table 5.2: *Stool test in last two years*

	ATET	Std. Err	P>|z|
m=1	-0.026	0.048	0.579
m=4	0.011	0.021	0.606
IPW	0.014	0.058	0.810
n = 1.402			

Table 5.3: *Cervix cytology test in last two years*

	ATET	Std. Err	P>|z|
m=1	0.110	0.025	0.000
m=4	0.113	0.016	0.000
IPW	0.107	0.015	0.000
n = 5.817			

Source: Author's elaboration from SNHS

It might be the case that the privately insured individuals make use of preventive health services more frequently because they perceive themselves to be less healthy. To see if this is the case, I estimated the effect of holding private health insurance on self-assessed health status, following the same methodology as before. Table 6 is divided into Subtables 6.1 and 6.2, reporting the average treatment effect on the treated for good and bad self-assessed health status, respectively.

The results of both Subtables 6.1 and 6.2 show that, on average, there are no statistical differences in individuals' self-perceived health status between the publicly and privately insured. Contrasting the previous idea, the results obtained indicate that having private insurance does not improve self-assessed health status.

Table 6: *Average Treatment Effect estimates on Self-Assessed Health Status*

Table 6.1: *Self-Assessed Good Health*

	ATET	Std. Err	P>|z|
m=1	0.006	0.014	0.687
m=4	0.004	0.010	0.716
IPW	0.006	0.009	0.483
n = 16.524			

Table 6.2: *Self-Assessed Bad Health*

	ATET	Std. Err	P>|z|
m=1	-0.011	0.009	0.198
m=4	-0.008	0.006	0.229
IPW	-0.006	0.005	0.246
n = 16.524			

Source: Author's elaboration from SNHS

Finally, to analyze whether individuals with public health coverage suffer longer waiting lists, ATET was estimated for the outcome that captures no medical attention due to the long waiting list in the last twelve months, following the same procedure as before. Table 7 depicts that the frequency with which individuals with double coverage have experienced no medical attention due to the long waiting list is, on average, between 4 and 5% lower compared to those with only public health coverage.

Table 7: *Average Treatment Effect estimates on long waiting list*

No attention due to long waiting list in last 12 months			
	ATET	**Std. Err**	**P>|z|**
m=1	-0.047	0.013	0.000
m=4	-0.050	0.010	0.000
IPW	-0.043	0.009	0.000
n = 16.518			

Source: Author's elaboration from SNHS

Last but not least, for the results obtained to have internal validity, it is necessary to have a balance on the characteristics between control and treatment groups, that is, covariate balance. Table A.3 in the appendix shows the results of the covariate balance analysis that was performed by computing the standardized mean difference of the covariates used in the estimations. Covariate balance was achieved since these differences lay around zero for the matched sample, and more so for the weighted sample. Figure A.1 in the appendix, depicts the propensity score distribution of the treatment and control groups. As covariates balance was achieved, the propensity score distributions for the matched sample is very similar between control and treatment groups.

4 Conclusions

The latest micro-data from the Spanish National Health Survey 2017 revealed differences in the use of the Spanish health care system between publicly insured individuals and those with double coverage. Thus, making it possible to assess the effect of having private health insurance on the use of the healthcare system.

In line with other works, e.g. González and Clavero (2009), Cantarero et al. (2017), the differences in the number of visits to a general practitioner and visits to a specialist in the Spanish health care system were analysed. However, as a distinguishing feature of this work, the analysis of the use of the health care system was focused on the preventive health care services, particularly, on the correct follow-up of general medical checks and preventive oncology checks.

This was achieved by applying causal inference analysis, estimating the average treatment effect on the treated, by means of matching on the propensity score and inverse probability weighting.

The results have shown that individuals with double coverage do better in the area of preventive health monitoring.

On average, privately insured individuals have general medical check-ups more frequently than those individuals who only have public health coverage. As previously discussed, one possible reason to justify this result could be that the budget cuts on public health services may have deteriorated these services, mainly represented by the long waiting lists that users face.

In contrast, individuals with private health insurance face long waiting lists to a lesser extent to obtain consultations with a specialist or any general exam. In line with this idea, it was found that the frequency with which individuals without private insurance receive no medical attention due to the long waiting list is between 4 and 5% higher than individuals with private insurance.

Regarding the oncology checks, when the screening sample is considered, there was no statistical difference in means between those who have private health insurance and those with only public coverage. Nevertheless, when the analysis was extended to the entire population, it was found that individuals with private health insurance do this type of exam more often than those with public health coverage. This difference is quantitatively large for mammograms and cervix cytology tests.

When the oncology checks are not under the screening target population, individuals covered by the public health sector do not have direct access to these kinds of exams. This could be the reason for the existing differences in the use of oncology checks between the treated and untreated groups. When, as a robustness check, the individuals in the age group of the screening population were not considered in the analysis, it was obtained that females with private health insurance check more often on mammography and cervix cytology test, in comparison with those females with only public health coverage. This result reinforces the idea that females without private health insurance have had fewer preventive check-ups due to the lack of coverage by the public system.

It could be expected that those individuals that hire private health insurance and use health services more often, would have a different perception about their health status. That is, that those individuals with a worse self-assessed health status could have a higher probability to hire private insurance and use health services more frequently.

Considering the results from the self-assessed health status, it could be said that there are no differences between treated and control groups. In that sense, those who have private health insurance do not perceive themselves healthier than those with public health coverage.

However, self-assessed health status is not an objective outcome in order to address the actual wellbeing of an individual's health. Therefore, this analysis should be complemented by focusing on whether there are differences in the actual health status between individuals who have private health insurance and those who do not.

Preventive checks are one of the main resources to prevent future diseases, so, differences in the use of preventive checks may influence differences in future health status. Since differences in the correct follow-up of general and oncology checks were found, it is inescapable to question whether private health coverage could lead to the polarization of health status.

Finally, when assessing the effect of tax benefit on private health insurance holders, bear in mind that this could not only be an unfair and regressive measure in terms of resources but also in terms of individuals health status, since there are indeed differences in the use of the health care system between privately and publicly insured individuals.

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Appendix

Table A.1: *Variable definitions and descriptive statistics using the SNHS*

Name	Definition	Mean	Std. Dev.
FEMALE	1 if female, 0 otherwise	0.541	0.498
AGE	Individual´s age	53.436	18.895
AGEQ	Age Square	3212.423	2059.37
NATIONALITY	1 if Spanish, 0 otherwise	0.903	0.296
Autonomous Communities			
Andalucia	1 if lives in Andalucia, 0 otherwise	0.127	0.333
Aragon	1 if lives in Aragon, 0 otherwise	0.045	0.208
Asturias	1 if lives in Asturias, 0 otherwise	0.036	0.187
Balears	1 if lives in Balears, 0 otherwise	0.040	0.196
Canarias	1 if lives in Canarias, 0 otherwise	0.049	0.215
Cantabria	1 if lives in Cantabria, 0 otherwise	0.035	0.183
Castilla y Leon	1 if lives in Castilla y Leon, 0 otherwise	0.056	0.229
Castilla y La Mancha	1 if lives in Castilla y La Mancha, 0 otherwise	0.049	0.215
Cataluña	1 if lives in Cataluña, 0 otherwise	0.102	0.303
Valencia	1 if lives in Valencia, 0 otherwise	0.079	0.27
Extremadura	1 if lives in Extremadura, 0 otherwise	0.041	0.199
Galicia	1 if lives in Galicia, 0 otherwise	0.058	0.233
Madrid	1 if lives in Madrid, 0 otherwise	0.088	0.283
Murcia	1 if lives in Murcia, 0 otherwise	0.044	0.206
Navarra	1 if lives in Navarra, 0 otherwise	0.034	0.180
Pais Vasco	1 if lives in Pais Vasco, 0 otherwise	0.065	0.246
Rioja	1 if lives in Rioja, 0 otherwise	0.029	0.168
Ceuta	1 if lives in Ceuta, 0 otherwise	0.011	0.105
Melilla	1 if lives in Melilla, 0 otherwise	0.012	0.110
TOWN_SIZE	Municipality Size		
> 500.000		0.117	0.321
Municipality Capital		0.217	0.413
100.000-500.000		0.08	0.271
50.000-100.000		0.086	0.281
20.000-50.000		0.156	0.362
10.000-20.000		0.112	0.315
< 10.000		0.232	0.422
HSIZE	Household Size	2.472	1.235
HOUSEHOLD_TYPE	Household Type		
One-person household		0.248	0.432
Single couple		0.24	0.427
Couple with a child under 25		0.270	0.444
Couple with all children aged 25 or over		0.066	0.249
Father or mother alone, with a child under 25		0.052	0.221

Single parent, with all children 25 or over		0.050	0.218
Couple or father or mother alone, with a children under 25 and other people		0.029	0.169
Another type of home		0.045	0.207
MINOR	1 if there are at least one minor in the household, 0 otherwise	0.238	0.426
CIVIL_STATUS	Civil Status		
Single		0.255	0.436
Married		0.541	0.498
Widow		0.129	0.335
Separated		0.024	0.154
Divorced		0.051	0.219
EDUC	Max Education Level		
Less than Primary School		0.119	0.324
Primary School		0.193	0.395
Less than Secondary School		0.240	0.427
Secondary School		0.191	0.393
Superior or University		0.258	0.437
OCCUP	Occupation Status		
Employed		0.430	0.495
Unemployed		0.108	0.31
Retired		0.286	0.452
Student		0.057	0.231
Not able		0.025	0.157
Domestic Chores		0.093	0.291
Others		0.001	0.035
INCOME	Household Income		
< 570		0.062	0.240
570-800		0.126	0.332
800-1050		0.161	0.368
1050-1300		0.124	0.329
1300-1550		0.120	0.325
1550-1800		0.066	0.248
1800-2200		0.126	0.331
2200-2700		0.092	0.289
2700-3600		0.079	0.270
3600-4500		0.026	0.159
4500-6000		0.015	0.120
> 6000		0.004	0.064
PUBLIC_INSURANCE	1 if individual has public insurance, 0 otherwise	0.956	0.205
PRIVATE_INDIVIDUAL	1 if individual has private insurance taken out by himself, 0 otherwise	0.109	0.311
PRIVATE_COMPANY	1 if individual has private insurance taken out by the company, 0 otherwise	0.031	0.175
PRIVATE_INSURANCE	1 if individual has private insurance, 0 otherwise	0.140	0.347
ONLY_PUBLIC	1 if individual has only public insurance, 0 otherwise	0.829	0.376
ONLY_PRIVATE	1 if individual has only private insurance, 0 otherwise	0.008	0.089
DOUBLE_COVERAGE	1 if individual has public and private insurance, 0 otherwise	0.131	0.338

WITHOUT_INSURANCE	1 if individual has not insurance, 0 otherwise	0.001	0.030
HEALTH_CONDITIONS	Previous Health Conditions		
High Pressure	1 if have had high pressure, 0 otherwise	0.276	0.447
Heart Attack	1 if have had heart attack, 0 otherwise	0.024	0.152
Coronary Heart Disease	1 if have had coronary heart disease, 0 otherwise	0.022	0.148
Other Heart Disease	1 if have had other heart disease, 0 otherwise	0.069	0.253
Osteoarthritis	1 if have had osteaoarthritis, 0 otherwise	0.237	0.425
Chronic Cervical Pain	1 if have had chronic cervical pain, 0 otherwise	0.179	0.384
Chronic Lumbar Pain	1 if have had chronic lumbar pain, 0 otherwise	0.234	0.423
Chronic Allergy	1 if have had chronic allergy, 0 otherwise	0.170	0.376
Asthma	1 if have had asthma, 0 otherwise	0.061	0.24
Chronic Bronchitis	1 if have had chronic bronchitis, 0 otherwise	0.051	0.221
Diabetes	1 if have had diabetes, 0 otherwise	0.099	0.298
Stomach Ulcer	1 if have had stomach ulcer, 0 otherwise	0.047	0.211
Urinary Incontinence	1 if have had urinary incontinence, 0 otherwise	0.063	0.244
High Cholesterol	1 if have had high cholesterol, 0 otherwise	0.240	0.427
Waterfalls	1 if have had waterfalls, 0 otherwise	0.130	0.337
Chronic Skin Problems	1 if have had chronic skin problems, 0 otherwise	0.064	0.244
Chronic Constipation	1 if have had chronic constipation, 0 otherwise	0.050	0.218
Cirrhosis	1 if have had cirrhosis, 0 otherwise	0.015	0.122
Depression	1 if have had depression, 0 otherwise	0.116	0.32
Chronic Anxiety	1 if have had chronic anxiety, 0 otherwise	0.099	0.298
Other Mental Problems	1 if have had other mental problems, 0 otherwise	0.022	0.147
Ictus	1 if have had ictus, 0 otherwise	0.022	0.147
Migraine	1 if have had migraine, 0 otherwise	0.113	0.317
Hemorrhoids	1 if have had hemorrhoids, 0 otherwise	0.085	0.279
Malignant Tumors	1 if have had malignant tumors, 0 otherwise	0.051	0.221
Osteoporosis	1 if have had osteoporosis, 0 otherwise	0.053	0.224
Thyroid Problems	1 if have had thyroid problems, 0 otherwise	0.071	0.258
Kidney Problems	1 if have had kidney problems, 0 otherwise	0.051	0.220
Injuries Accident	1 if have had injuries accident, 0 otherwise	0.065	0.246
SMOKE	1 if smoker, 0 otherwise	0.234	0.423
REGULAR_SMOKE	1 if smoke regularly, 0 otherwise	0.212	0.409
DRINK	1 if consumes alcohol regularly, 0 otherwise	0.213	0.41
OBESE	1 if obese, 0 otherwise	0.169	0.375
CHRONIC	1 if have chronic condition, 0 otherwise	0.693	0.461
LIMIT	1 if individual has a limitation, 0 otherwise	0.294	0.455
EXERCISE_ACTIVITY	Exercise In Main Activity		
Seated		0.386	0.487
Standing up		0.431	0.495
Walking-carrying weight		0.121	0.327
Great physical effort		0.025	0.156
Not applicable		0.037	0.188
EXERCISE	Exercise Frequency		
None		0.385	0.487

Occasionally		0.392	0.488
Several times a month		0.110	0.313
Several times a week		0.113	0.317
REGULAR_EXERCISE	1 if exercise regularly, 0 otherwise	0.224	0.417
REGULAR_FRUIT	1 if consumes fruit regularly, 0 otherwise	0.790	0.407
REGULAR_VEGETABLE	1 if consumes vegetables regularly, 0 otherwise	0.699	0.459
REGULAR_LEGUME	1 if consumes legume regularly, 0 otherwise	0.261	0.439
SELF_ASSESSED_HEALTH	Self-Assessed Health		
Very_good		0.181	0.385
Good		0.483	0.500
Regular		0.240	0.427
Bad		0.075	0.263
Very_bad		0.022	0.145
GOOD_HEALTH	1 if good or very good SAH, 0 otherwise	0.664	0.472
BAD_HEALTH	1 if bad or very bad SAH, 0 otherwise	0.096	0.295
GENERAL_PRACTITIONER	1 if have visited general practitioner in last 4 weeks, 0 otherwise	0.373	0.484
VISITS_PRACTITIONER	Number of visits to general practitioner in the last 4 weeks	0.484	0.834
SPECIALIST	1 if visited specialist in last 4 weeks, 0 otherwise	0.238	0.426
VISITS_SPECIALIST	Number of visits to specialist in the last 4 weeks	0.328	0.787
EXAMS	1 if have done health exam in last 12 months, 0 otherwise	0.762	0.426
HOSPITALIZATION	1 if have been hospitalized in last 12 months, 0 otherwise	0.089	0.285
NUMBER_HOSPITALIZATION	Number of hospitalization in last 12 months	1.351	1.039
EMERGENCY	1 if have used emergency, 0 otherwise	0.299	0.458
NUMBER_EMERGENCY	Emergency use in last 12 months	1.806	3.022
PRESCRIPTION	1 if have taken prescription medicine in the last 2 weeks, 0 otherwise	0.605	0.489
BLOOD_PRESSURE	1 if have checked blood pressure, 0 otherwise	0.971	0.167
CORRECT_BLOOD_PRESSURE	1 if have checked blood pressure in last 12 months, 0 otherwise	0.789	0.408
CHOLESTEROL	1 if have checked cholesterol, 0 otherwise	0.969	0.174
CORRECT_CHOLESTEROL	1 if have checked cholesterol in last 12 months, 0 otherwise	0.789	0.408
BLOOD_SUGAR	1 if have check blood sugar, 0 otherwise	0.962	0.192
CORRECT_BLOOD_SUGAR	1 if have check blood sugar in last 12 months, 0 otherwise	0.785	0.411
STOOLTEST	1 if have done stool test, 0 otherwise	0.190	0.392
CORRECT_STOOLTEST	1 if have done stool test in last 2 years, 0 otherwise	0.655	0.475
MAMMOGRAPHY	1 if have done mammography, 0 otherwise	0.645	0.479
CORRECT_MAMMOGRAPHY	1 if have done mammography in last 2 years, 0 otherwise	0.626	0.484
PAP	1 if have done PAP, 0 otherwise	0.754	0.431
CORRECT_PAP1	1 if have done PAP in last 3 years, 0 otherwise	0.695	0.46
CORRECT_PAP2	1 if have done PAP in last 5 years, 0 otherwise	0.790	0.407
WAITING_LIST	1 if no attention due to long waiting list, 0 otherwise	0.163	0.369
ECONOMIC_PROBLEMS	1 if no attention due to economic problems, 0 otherwise	0.023	0.149

Source: Author's elaboration from SNHS

Table A.2: *Logistic estimation*

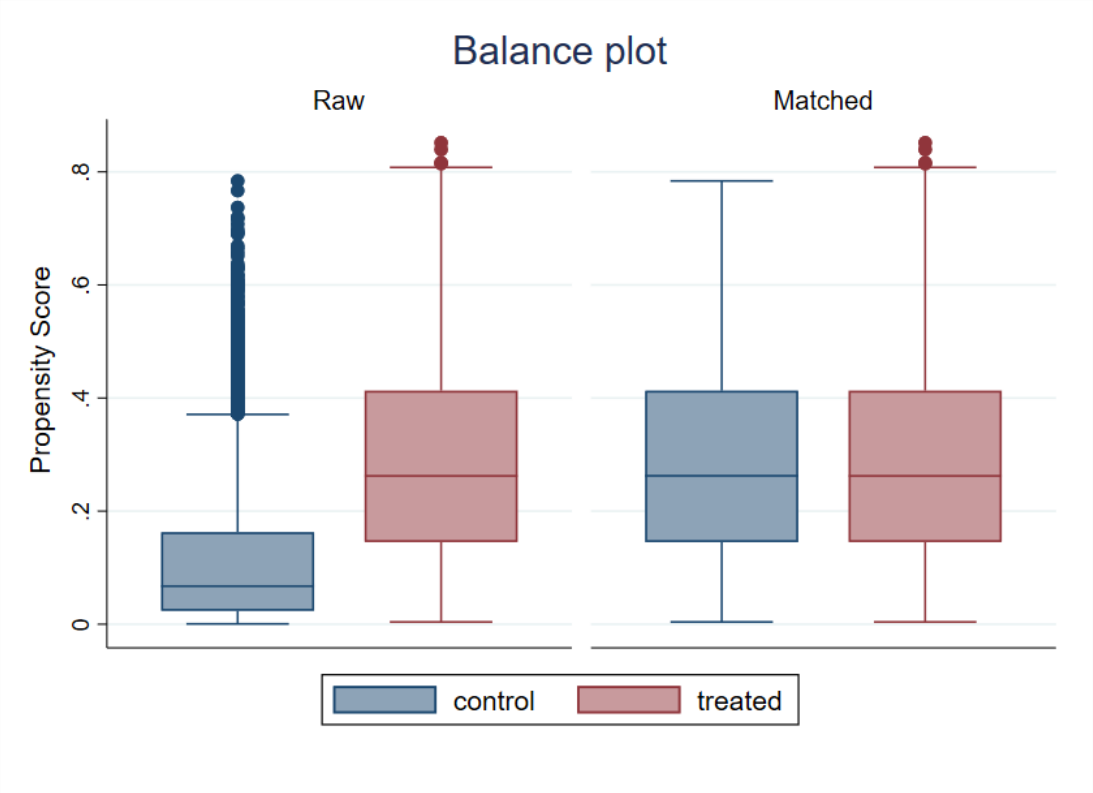
Name	Coef.		St.Err.
FEMALE	0.037		0.062
AGE	0.010		0.013
AGESQ	-0.000	*	0.000
TOWN_SIZE			
Municipality Capital	0.051		0.108
100.000-500.000	-0.272	**	0.116
50.000-100.000	-0.017		0.117
20.000-50.000	-0.159		0.108
10.000-20.000	-0.118		0.116
< 10.000	-0.285	***	0.108
HOUSEHOLD_TYPE			
Single couple	-0.484	***	0.119
Couple with a child under 25	-0.631	***	0.134
Couple with all children aged 25 or over	-0.911	***	0.158
Father or mother alone, with a child under 25	-0.277	*	0.148
Single parent, with all children 25 or over	-0.507	***	0.160
Couple or father or mother alone, with a children under 25 and other people	-1.412	***	0.245
Another type of home	-0.484	***	0.172
NATIONALITY	0.160	*	0.096
MINOR	0.164	*	0.094
INCOME			
< 570	-0.799	***	0.213
570-800	-0.922	***	0.185
800-1050	-0.156		0.125
1300-1550	0.339	***	0.118
1550-1800	0.416	***	0.132
1800-2200	0.577	***	0.113
2200-2700	0.729	***	0.119
2700-3600	0.988	***	0.122
3600-4500	1.344	***	0.152
4500-6000	1.626	***	0.174
> 6000	2.357	***	0.281
AUTONOMOUS COMMUNITIES			
Aragon	-0.176		0.149
Asturias	-0.434	***	0.164
Balears	0.714	***	0.136
Canarias	-0.617	***	0.214
Cantabria	-1.316	***	0.336
Castilla y Leon	-0.524	***	0.149
Castilla y La Mancha	-0.423	**	0.172
Cataluña	0.478	***	0.103
Valencia	-0.412	***	0.121
Extremadura	-1.568	***	0.270

Galicia	-0.378	**	0.156
Madrid	0.718	***	0.111
Murcia	-0.938	***	0.165
Navarra	-0.833	***	0.179
Pais Vasco	-0.206	*	0.121
Rioja	-0.470	**	0.189
Ceuta	-0.173		0.245
Melilla	-0.682	**	0.288
CIVIL_STATUS			
Married	0.156		0.106
Widow	0.262	*	0.144
Separated	-0.367		0.225
Divorced	0.081		0.135
EDUC			
Less than Primary School	-0.784	***	0.205
Less than Secondary School	0.524	***	0.113
Secondary School	0.808	***	0.112
Superior or University	0.831	***	0.113
OCCUP			
Unemployed	-0.356	***	0.120
Retired	-0.019		0.120
Student	-0.279		0.171
Not able	-0.849	***	0.276
Domestic Chores	-0.128		0.140
HIGH_PRESSURE	-0.034		0.080
HEART_ATTACK	-0.175		0.240
CORONARY_HEART_DISEASE	0.340		0.209
OTHER_HEART_DISEASE	0.116		0.129
OSTEOARTHRITIS	-0.019		0.090
CHRONIC_CERVICAL_PAIN	0.141		0.086
CHRONIC_LUMBAR_PAIN	0.038		0.080
CHRONIC_ALLERGY	0.079		0.072
ASTHMA	0.008		0.115
CHRONIC_BRONCHITIS	-0.156		0.153
DIABETES	-0.145		0.125
STOMACH_ULCER	-0.097		0.150
URINARY_INCONTINENCE	-0.070		0.151
HIGH_CHOLESTEROL	-0.061		0.075
WATERFALLS	0.078		0.118
CHRONIC_SKIN_PROBLEMS	-0.022		0.110
CHRONIC_CONSTIPATION	0.062		0.142
CIRRHOSIS	0.079		0.235
DEPRESSION	-0.047		0.116
CHRONIC_ANXIETY	0.138		0.111
OTHER_MENTAL_PROBLEMS	-0.386		0.296

ICTUS	-0.298		0.262
MIGRAINE	-0.025		0.089
HEMORRHOIDS	0.060		0.099
MALIGNANT TUMORS	-0.185		0.143
OSTEOPOROSIS	0.271	*	0.142
THYROID_PROBLEMS	0.125		0.104
KIDNEY_PROBLEMS	-0.097		0.142
INJURIES_ACCIDENT	0.155		0.104
HOSPITALIZATION	0.358	***	0.099
REGULAR_SMOKE	-0.114	*	0.069
DRINK	0.078		0.067
OBESE	-0.067		0.081
CHRONIC	0.061		0.075
LIMIT	-0.026		0.078
PRESCRIPTION	-0.041		0.068
EXERCISE_ACTIVITY			
Standing up	-0.255	***	0.061
Walking-carrying weight	-0.324	***	0.09
Great physical effort	-0.304	*	0.172
REGULAR_EXCERCISE	0.178	***	0.062
REGULAR_FRUIT	-0.036		0.070
REGULAR_VEGETABLES	0.055		0.067
REGULAR_LEGUME	-0.016		0.062
Constant	-2.431	***	0.361
Number of obs	16.524		
Pseudo R2	0.180		
Significance 1%*** 5%** 10%*			

Source: Author's elaboration from SNHS

Figure A.1: *Boxplot: propensity score distributions*



Source: Author's elaboration from SNHS

Table A.3: *Covariate balance*

	Standardized Mean Differences		Standardized Mean Differences	
	Raw Data	**Matched Sample**	**Raw Data**	**Weighted Sample**
FEMALE	-0.017	-0.014	-0.017	-0.006
AGE	-0.532	0.002	-0.532	0.001
AGESQ	-0.564	0.001	-0.564	-0.001
TOWN_SIZE				
Municipality Capital	0.016	-0.037	0.016	-0.013
100.000-500.000	0.014	0.016	0.014	0.007
50.000-100.000	0.055	-0.003	0.055	0.004
20.000-50.000	-0.052	0.006	-0.052	-0.001
10.000-20.000	-0.034	-0.002	-0.034	0.001
< 10.000	-0.294	-0.013	-0.294	-0.005
HOUSEHOLD_TYPE				
Single couple	-0.112	0.030	-0.112	-0.008
Couple with a child under 25	0.372	0.028	0.372	0.028
Couple with all children aged 25 or over	-0.103	-0.026	-0.103	-0.009
Father or mother alone, with a child under 25	0.046	-0.007	0.046	0.000
Single parent, with all children 25 or over	-0.122	0.005	-0.122	-0.004
Couple or father or mother alone, with a children under 25 and other people	-0.100	-0.049	-0.100	-0.024
Another type of home	-0.040	0.000	-0.040	0.002
NATIONALITY	-0.021	-0.017	-0.021	-0.010
MINOR	0.317	0.000	0.317	0.022
INCOME				
< 570	-0.241	-0.029	-0.241	-0.001
570-800	-0.450	-0.005	-0.450	0.001
800-1050	-0.291	0.029	-0.291	0.002
1300-1550	-0.054	0.005	-0.054	-0.001
1550-1800	0.018	-0.026	0.018	-0.009
1800-2200	0.116	-0.022	0.116	-0.008
2200-2700	0.226	-0.014	0.226	0.002
2700-3600	0.336	0.020	0.336	-0.001
3600-4500	0.266	0.043	0.266	0.005
4500-6000	0.230	-0.058	0.230	0.011
> 6000	0.187	-0.019	0.187	0.017
AUTONOMOUS COMMUNITIES				
Aragon	0.013	-0.029	0.013	-0.003
Asturias	-0.091	-0.018	-0.091	-0.001
Balears	0.128	0.035	0.128	0.001
Canarias	-0.104	-0.016	-0.104	0.002
Cantabria	-0.170	-0.018	-0.170	-0.002
Castilla y Leon	-0.077	0.042	-0.077	-0.014
Castilla y La Mancha	-0.117	0.009	-0.117	-0.008
Cataluña	0.210	0.040	0.210	-0.009

Valencia	-0.104	-0.033	-0.104	0.008
Extremadura	-0.214	0.037	-0.214	-0.001
Galicia	-0.143	0.000	-0.143	0.008
Madrid	0.342	-0.023	0.342	0.014
Murcia	-0.114	0.037	-0.114	0.005
Navarra	-0.069	0.000	-0.069	0.001
Pais Vasco	0.049	-0.011	0.049	-0.005
Rioja	-0.027	-0.053	-0.027	-0.008
Ceuta	-0.040	-0.022	-0.040	-0.002
Melilla	-0.005	0.000	-0.005	-0.005
CIVIL_STATUS				
Married	0.124	0.017	0.124	0.010
Widow	-0.306	-0.026	-0.306	0.007
Separated	-0.090	-0.038	-0.090	0.000
Divorced	0.028	0.026	0.028	-0.002
EDUC				
Less than Primary School	-0.538	0.000	-0.538	0.000
Less than Secondary School	-0.139	0.041	-0.139	0.005
Secondary School	0.181	0.036	0.181	0.003
Superior or University	0.616	-0.054	0.616	-0.009
OCCUP				
Unemployed	-0.115	-0.034	-0.115	0.011
Retired	-0.432	0.006	-0.432	-0.001
Student	0.077	0.021	0.077	0.004
Not able	-0.184	-0.014	-0.184	-0.006
Domestic Chores	-0.231	-0.017	-0.231	0.007
HIGH_PRESSURE	-0.360	0.009	-0.360	0.003
HEART_ATTACK	-0.127	0.051	-0.127	-0.004
CORONARY_HEART_DISEASE	-0.085	0.027	-0.085	-0.001
OTHER_HEART_DISEASE	-0.170	0.051	-0.170	-0.002
OSTEOARTHRITIS	-0.374	-0.006	-0.374	-0.004
CHRONIC_CERVICAL_PAIN	-0.132	0.033	-0.132	-0.002
CHRONIC_LUMBAR_PAIN	-0.185	-0.002	-0.185	0.004
CHRONIC_ALLERGY	0.101	0.059	0.101	0.009
ASTHMA	-0.032	0.018	-0.032	0.005
CHRONIC_BRONCHITIS	-0.159	-0.016	-0.159	-0.003
DIABETES	-0.280	0.022	-0.280	-0.004
STOMACH_ULCER	-0.137	-0.020	-0.137	-0.015
URINARY_INCONTINENCE	-0.225	0.019	-0.225	-0.002
HIGH_CHOLESTEROL	-0.244	0.041	-0.244	0.009
WATERFALLS	-0.329	-0.016	-0.329	0.005
CHRONIC_SKIN_PROBLEMS	-0.017	0.017	-0.017	0.005
CHRONIC_CONSTIPATION	-0.088	0.055	-0.088	0.003
CIRRHOSIS	-0.054	0.048	-0.054	0.001
DEPRESSION	-0.250	0.019	-0.250	-0.009

CHRONIC_ANXIETY	-0.096	0.020	-0.096	0.008
OTHER_MENTAL_PROBLEMS	-0.165	-0.055	-0.165	-0.003
ICTUS	-0.146	-0.013	-0.146	-0.004
MIGRAINE	-0.052	-0.011	-0.052	-0.001
HEMORRHOIDS	-0.023	-0.007	-0.023	-0.005
MALIGNANT TUMORS	-0.140	0.048	-0.140	0.008
OSTEOPOROSIS	-0.118	0.007	-0.118	0.002
THYROID_PROBLEMS	0.004	0.026	0.004	0.006
KIDNEY_PROBLEMS	-0.155	0.039	-0.155	0.003
INJURIES_ACCIDENT	0.006	0.014	0.006	-0.002
HOSPITALIZATION	-0.088	-0.023	-0.088	0.008
REGULAR_SMOKE	-0.034	-0.039	-0.034	-0.016
DRINK	0.056	-0.037	0.056	0.001
OBESE	-0.195	0.009	-0.195	0.004
CHRONIC	-0.304	0.050	-0.304	-0.004
LIMIT	-0.335	0.002	-0.335	0.012
PRESCRIPTION	-0.389	0.021	-0.389	-0.008
EXERCISE_ACTIVITY				
Standing up	-0.076	-0.005	-0.076	-0.008
Walking-carrying weight	-0.046	0.008	-0.046	-0.006
Great physical effort	0.025	-0.010	0.025	-0.012
REGULAR_EXCERCISE	0.377	-0.013	0.377	0.003
REGULAR_FRUIT	-0.051	0.024	-0.051	0.003
REGULAR_VEGETABLES	0.180	0.009	0.180	-0.017
REGULAR_LEGUME	-0.090	0.009	-0.090	0.013

Source: Author's elaboration from SNHS