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Do individuals' health preferences validate the decentralisation of the public health system in Spain?

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ABSTRACT

The objective of this paper is to estimate individuals' preferences about public health services in two Spanish regions, the Basque Country (BC) and Canary Islands (CI) and analyse whether they differ. This work was motivated by the actual economic situation, where it is necessary to obtain equilibrium between the needed health services and limited economic resources. With this limitation in mind, politicians have tried to design health policies that maximise individuals' welfare. Based on the theory of decentralisation, the devolution of public expenditure decisions and management to regional government maximises individuals' welfare more when individual preferences differ among regions. A discrete choice experiment was implemented with a survey designed to obtain data about individuals' choices. Using this data and discrete choice models, individual preferences for health services were estimated. Our findings indicate that these preferences differ among regions, so, for reasons of efficiency, decentralising decisions and management of public health policies to regional governments would be recommended. Once health policies are decentralised, our results provide a tool for identifying the health services most valued by the individuals in each region. This information would be useful policymakers designing health policies.

1. Introduction

In any health system – public or private – knowledge of potential users' preferences is a key issue for policymaking. Many other aspects such as epidemiological, technical, or human variables are at least as important as these preferences, but there is no doubt about the relevance of patients' (or potential patients') preferences in the design of health systems. Such information could be very relevant for policymakers in key issues, such as in which service to add (or detract) money, which is the main variable in the consumer decision to purchase private health insurance or the acceptability of co-payments in a public system. For some national health systems (NHS) such as in Great Britain or Spain, in which the purchasing of private insurance implies having duplicate health coverage, the knowledge of these preferences could shed light on private insurance demand, especially if the precise preference components are well specified.

The case of Spain is of particular interest because of the structure of its NHS. The Spanish system is divided into autonomous communities (ACs), which have a considerable amount of freedom to decide upon expenditure and management. This creates a scenario where there are different systems within a system; the result is a differential homogeneous framework with different perceived (and real) qualities in the NHS. This scenario seems quite appropriate for our objective (see the Appendix for a more detailed explanation about Spanish institutional structure). The justification for the decentralisation of expenditure policies lies in efficiency – that is, the decentralisation of public expenditure to the regions maximises the welfare of a greater number of individuals [4,12,13]. To confirm that the public health expenditure should be decentralised in Spain, it is necessary to know individuals' preferences about health policies. If individuals' evaluations differ among ACs and the objective is to maximise global welfare, then, it would be reasonable to decentralise health expenditure and implement different health policies among regions.

This study is an extension of previous research done by Sigüenza and Mariel [18]. They provide the reasoning for assigning a monetary valuation of the improvement in individual preferences caused by an improvement in health services. The lack of reference prices for public health systems (PHS) has been identified as a main problem, as this lack of prices makes the efficient allocation of public resources more difficult among different health policies, while taking into account these policies'

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effect on individual and social welfare [3],[15]. We agree with Sigüenza and Mariel [18] that having knowledge of the monetary value of an improvement in individual preferences caused by a specific improvement in health services may allow us to obtain helpful tools to prioritise NHS policies and increase their efficiency [5,9,14].

Sigüenza and Mariel [18] measured the economic valuation of individual preferences, considering the heterogeneity of observed and unobserved individual preferences. For that purpose, individual characteristics, such as educational level and income level are considered. They calculated the willingness to pay (WTP) for public health services to measure the economic valuation of individual preferences in the Basque Country (BC). While their main objective was to determine the value of health services in the BC, the main objective here isto analyse the differences in the valuation between two Spanish regions that have very different health policies and expenditure levels in public health and perceived quality, such as the BC and the Canary Islands (CI). Other issues also vary between these two regions, such as climatology, habits and customs. These differences may influence individuals' health service preferences. Considering that the Spanish NHS is divided into regions, differences may exist among their economic valuation for health services. Differences in the WTP of BC and CI may be caused by observed or unobserved individual characteristics. Once we control for individual characteristics and policy attributes, the differences between regional WTPs indicate that individuals in different ACs evaluate possible health policies differently. The main objective of this research is to determine whether or not the economic valuation of individual preferences about public health services are equal or not between regions. If we can report at least an example of two regions where individuals have different preferences about health services, then we can draw the conclusion that the initial hypothesis of equality of preferences is not satisfied. In this case, the decentralisation of health policies into regions would be justified for reasons of efficiency and welfare maximisation. Moreover, the identification of individual WTP for improvements in health services may be helpful for designing health policies to increase individuals' welfare.

A discrete choice experiment (DCE) was implemented to assign a monetary valuation to different health system services. A DCE can consider the multidimensional nature of health services [10] and provide information about marginal changes in service. The DCE method is thus a helpful tool to obtain and analyse information about individual preferences and for designing health policies [20]. The rest of the paper is organised as follows. The next section describes the structure of the survey and the data. The third section explains the implemented methodology, followed by the results in section four. Finally, sections five and six present the discussion and conclusions.

2. Survey structure and data

2.1. Survey structure

The survey structure used to evaluate the health services from the CI is the same used by Sigüenza and Mariel [18] to evaluate the same services in the BC so the results should be comparable. The survey is divided into four sections: basic information, information about attributes, choice cards and sociodemographic variables (see the Appendix for more information about the survey).The most important part of the survey are the 12 choice cards that represent hypothetical choice scenarios presenting three different alternatives: A, B and C. These hypothetical scenarios are defined by different attributes representing different health coverage options about which the respondent must take a choice. The relevant health service attributes and provision levels were selected using the qualitative technique of focus groups. The attributes were *Specialist Waiting List* (*Specialist*), *Surgery Waiting List* (*Surgery*), *Hospital Comfort* (*Comfort*), *Medical Attention* (*Attention*), *Dental Coverage* (*Dental*) and *Cost*.

Table 1 reports the five attributes of the selected service and the corresponding cost of each possible combination of attributes – that is, the cost of each alternative – as set out by the experts in the focus group. Alternative A represents the actual situation, while alternatives B and C present different values of each of the attributes as a result of a specific level of change. These two alternatives have an associated cost that the individual would pay monthly.

Table 1
Attributes and levels considered in the DCE

Label	Description	Levels			
Specialist	Average waiting time for specialist attention and complementary medical tests.	1 month	2 months	3* months	—
Surgery	Average waiting time for no urgent surgical intervention.	2 months	3 months	5 months	8* months
Comfort	Offered facilities, such as single room equipped with TV and internet, presence of a companion and free access for the family.	Low*	Medium	High	—
Attention	Personalised, close and professional medical attention.	Low*	Medium	High	—
Dental	Low: tooth extraction. Medium: tooth extraction, dental hygiene and dental fillings. High: tooth extraction, dental hygiene, whitening and dental fillings.	Low*	Medium	High	—
Cost	Monthly premiums paid by the individual who wants to benefit from coverage offered in each choice option.	€0*	€30	€60	€90

Source: compiled by authors
Notes: *Current status (*no action* level)

2.2. Data

The surveyinterviews were carried out with 235 and 255 selected individuals in the BC and CI, respectively, using simple random sampling in the years 2012 in the BC and 2016 in CI. Two dummy variables are defined to estimate the model. *University* is a dummy variable that takes the value 1 if the individual has university studies. *HighIncome* measures the monthly income level and takes the value 1 if the family's monthly net income is more than €3,000.Two filters are applied to the data to obtain higher reliability in the results [2]. The first filter is a rationality test, which provide an additional choice card for which respondents faced a higher marginal improvement in alternative C than in alternative B, but with a lower cost, so we expected respondents always to choose alternative C because a choice of alternative B is considered irrational. Of the total 235 and 255 respondents in BC and CI, respectively, 12 and 14 individuals chose the irrational option and were excluded from the final sample.

The second filter sought to identify protest respondents: we asked individuals who chose alternative A for any of the 13 cards the reason for their choice. Those respondents who answered that this initiative should be financed entirely by the government and that they already pay too much tax are identified as protest respondents, because they are considered to be unwilling to indicate their WTP for improvements in health services in CI. We can conclude that these individuals are against making any payments to improve the analysed service.

Once these filters were applied, the estimations were made exclusively with valid data, which should yield more reliable results. The data analysis used, in total, 150 and 146 completed questionnaires from BC

and CI, respectively, yielding 1,800 and 1,752 observations. As Sigüenza and Mariel [18] concluded, the BC sample is representative. For the CI, the sample is also representative in terms of gender, income and age. (See the Appendix for more information about the data and sampling).

2.3. Model

The random utility theory (RUT) assumes that individuals' utility is determined by some observable factors and an unobservable random parameter. To convert individual's choice responses in DCE into estimated parameters, we employed the behavioural framework of the RUT. It is assumed that the utility individual i obtains when choosing alternative j in the tth choice occasion, $U_{it,j}$, is given by:

$$U_{it,j} = V_{it,j} + \varepsilon_{it,j}$$

where $V_{it,j}$ is the deterministic part of the utility function that contains observable factors and $\varepsilon_{it,j}$ is an error term.

Multinomial logit (MNL) is the basic model used to analyse the choices in DCE to estimate the effect that observable factors have on the utility. MNL assumes that the deterministic part of the utility, $V_{it,j}$, is shaped by observable covariates and unknown parameters (to be estimated) and the random error $\varepsilon_{it,j}$ is Type I extreme value distributed [11]. Thus, given a set of alternatives, the utility individual i obtains in the tth choice occasion from alternative j, $U_{it,j}$, is given by

$$U_{it,j} = V_{it,j} + \varepsilon_{it,j} = X_{it,j}{}'\beta + \varepsilon_{it,j} \quad (1)$$

where $X_{it,j}$ is a vector of covariates of alternative j in choice occasion t for individual i and β is a vector of parameters. The vector $X_{it,j}$ may include a constant term to allow for alternative-specific constants (ASC). In our special case, we consider two ASC.

Under the standard assumptions, the probability that individual i chooses alternative j in the tth choice is as follows:

$$P(j|X_{it,j}) = \frac{e^{X_{it,j}{}'\beta}}{\sum_j e^{X_{it,j}{}'\beta}} \quad (2)$$

MNL assumes that parameters are constant among individuals. Thus, if only alternative attributes are introduced in the deterministic part, the effect that these attributes have on utility is homogenous among individuals. When the effects of individual-specific characteristics need to be accounted for, these are introduced in the model as interaction terms with alternative attributes. This procedure allows us to introduce observed preference heterogeneity caused by these individual-specific variables – that is, by different groups of individuals. In our case, the effect of education and income is introduced in the utility function (1) as follows:

$$\begin{aligned} U_{it,j} \;=\; & X'_{it,j}\beta + \varepsilon_{it,j} = ASC_j + \beta_1 Specialist_{it,j} + \beta_{12}\, Specialist_{it,j} \times University_i + \beta_{13}\, Specialist_{it,j} \times HighIncome_i + \beta_2 Surgery_{ixat,j} \\ & + \beta_{22}\, Surgery_{it,j} \times University_i + \beta_{23}\, Surgery_{it,j} \times HighIncome_i + \beta_3 Comfort_{it,j} + \beta_{32}\, Comfort_{it,j} \times University_i \\ & + \beta_{33}\, Comfort_{it,j} \times HigIncome_i + \beta_4 Attention_{it,j} + \beta_{42}\, Attention_{it,j} \times University_i + \beta_{43}\, Attention_{it,j} \times HighIncome_i \\ & + \beta_5 Dental_{it,j} + \beta_{52}\, Dental_{it,j} \times University_i + \beta_{53}\, Dental_{it,j} \times HighIncome_i + \beta_6\, Cost_{it,j} + \beta_{62}\, Cost_{it,j} \\ & \times University_i + \beta_{63}\, Cost_{it,j} \times HighIncome_i + \varepsilon_{it,j} \end{aligned} \quad (3)$$

Because the samples are relatively small, more robust model estimation methods such as MNL are recommended, while more complex models such as random parameter logit (RPL) should be avoided, because they may lead to instability in the estimations. MNL with interactions between attributes and sociodemographic characteristics for preference heterogeneity was therefore chosen as the estimation method. The WTP for a unit of change in a given attribute of the product can be computed as the marginal rates of substitution between the quantity expressed by the attributes and the cost of the choice. In the MNL, for example, the WTP for attribute *Specialist* is expressed as follows:

$$WTP_{Specialist} = -\frac{\beta_1 + \beta_{12} University + \beta_{13} HighIncome}{\beta_6 + \beta_{62} University + \beta_{63} HighIncome} \quad (4)$$

The WTPs for the remaining attributes are defined accordingly.

The distribution of the WTP is obtained by Bootstrap [7], drawing on a large number of samples of size N (with replacements) from the estimation sample. In our case, 600 samples of size 150 and 146 are drawn (with replacements) from the estimation samples of BC and CI, respectively. Each of the samples is used to estimate the model and each corresponding WTP, using equation 4. We thus obtain the estimated distribution of the WTP in BC and CI. The method proposed by Poe et al. [16,17] is used to test the difference between the distributions of WTP in the two regions.

3. Results

This paper analyses the differences in WTP for PHS services in the BC and CI. Once we control for individual characteristics, we can analyse the factors determining the differences in WTP between regions, as well as identifying the factors that influence WTP and differences in WTP among individuals of each region.

As the main objective of this study is to compare the WTP between two ACs, the same model specification is assumed for BC and CI. The most general specification is thus considered, where all possible interactions between the attributes and dummy variables are introduced.

Table 2 reports the estimations for the MNL model with interactions between attributes and individual sociodemographic characteristics. The first set of parameters (columns 2, 3, and 4) shows the estimates for the BC. The expected signs are obtained for the attributes parameters. The positive sign for *ASC1* and *ASC2*, which are associated with alternative B and alternative C, respectively, indicate that individuals prefer alternative B and C to the status quo –, that is, they would prefer the improvements proposed in alternative B and C (assuming their costs) to the actual situation. Furthermore, a negative effect in *Specialist* indicates that individual utility decreases with an increase in waiting lists. The same effect on individual utility is obtained with an increase in *Surgery* waiting lists. On the other hand, positive and significant estimates of parameters for the attributes *Comfort, Attention,* and *Dental* reflect that increases in hospital comfort, medical attention and dental coverage increase BC individuals' utility. A negative and significant effect of the interaction *Comfort* × *HighIncome* indicates that an increase in *Comfort* increases individual utility more for individuals with a low income than for individuals with a high income level. The same effect can be seen for the interaction *Attention* × *HighIncome*, which indicates that the increase in utility caused by an improvement in *Attention* is higher for individuals with low income than for individuals with a high income. An increase in cost implies a higher utility decreases among low-educated individuals.

The second set of parameters (columns 5, 6 and 7) reports the estimates of the MNL model for CI. As in the case of the BC, for CI, the positive sign of *ASC1* and *ASC2* also indicates that individuals prefer

Table 2
MNL estimates

			Basque Country			Canary Islands		
			Coef.		std. dev.	Coef.		std. dev.
Attributes								
	ASC1		0.50	***	0.17	1.07	***	0.17
	ASC2		0.28	*	0.07	0.81	***	0.06
	Specialist		-0.16	*	0.08	-0.08		0.06
	Surgery		-0.15	***	0.03	-0.13	***	0.02
	Comfort		0.31	***	0.09	0.07		0.07
	Attention		0.65	***	0.09	0.34	***	0.07
	Dental		0.41	***	0.11	0.15	*	0.08
	Cost		-0.03	***	<0.01	-0.02	***	<0.01
Interactions								
	Specialist ×							
		University	0.01		0.09	-0.08		0.09
		HighIncome	-0.01		0.09	0.05		0.12
	Surgery ×							
		University	-0.05		0.03	0.01		0.03
		HighIncome	-0.04		0.03	-0.02		0.04
	Comfort ×							
		University	-0.05		0.09	0.22	**	0.09
		HighIncome	-0.18	**	0.09	0.04		0.12
	Attention ×							
		University	0.17	*	0.09	0.41	***	0.09
		HighIncome	-0.36	***	0.09	0.11		0.12
	Dental ×							
		University	-0.05		0.12	0.09		0.12
		HighIncome	-0.16		0.11	-0.06		0.16
	Cost ×							
		University	-0.01	*	<0.01	-0.01	**	<0.01
		HighIncome	7.37E-05		<0.01	-6.79E-04		<0.01
Number of observations		1800	1752					
Sample size		150	146					
loglik.			-1621.40			-1579.40		
AIC			3282.83			3198.76		
BIC			3392.74			3308.16		

*,**, *** indicate 10%, 5%, 1% significance level respectively
Coef: coefficient estimate; Std.dev.: standard deviation

alternatives B and C to the status quo – that is, they would prefer the improvements proposed in alternatives B and C (assuming their costs) to the actual situation. Moreover, an increase in *Surgery* decreases individual utility, while an improvement in *Attention* increases utility. This increase is higher for individuals with university studies. Nevertheless, an increase in *Cost* decreases individual utility, and this decrease is also higher for individuals with *University* studies. This set of individuals, those with *University* studies, also show increased utility with improvements in *Comfort*.

The higher absolute value coefficient estimates for the BC imply that the effect of the unobserved factors represented in the error term is lower than in CI, and thus that BC individuals are more deterministic – that is, the attributes have more importance relative to an unobserved factor, in the BC than in the CI.

The WTP estimates reported in Table 3, with each corresponding 95% confidence interval, were obtained using the MNL estimates from Table 2. Four different subgroups of individuals (based on sociodemographic characteristics) were considered to calculate the WTP. The first subgroup (upper left block of Table 3) comprises individuals with no education, primary education, and secondary education (*University*=0), along with low income (*HighIncome*=0). The second subgroup (upper right block) consists of individuals with university education (*University*=1) and low income (*HighIncome*=0). The individuals with high income (*HighIncome*=1) and primary and secondary education (*University*=0) are in the third subgroup (lower left block), while the individuals with high income (*HighIncome*=1) and university education (*University*=1) are in the fourth subgroup (lower right block). The first column of each estimate subgroup contains the attributes, and the second and third columns report the WTP for each attribute in the BC and CI, respectively, with the corresponding 95% confidence interval. The WTP of each attribute in the BC is compared with each corresponding WTP in the CI, using the Poe et al. [16,17] equality test. The fourth column of each estimate subgroup reports the p-value of the null hypothesis that the two coefficients are equal.

The WTP of the *Specialist* and *Surgery* attributes are negative due to their definition, so these values must be interpreted as a WTP to avoid a marginal increase in the waiting lists. However, the WTPs of *Comfort, Attention* and *Dental* are interpreted as a WTP for a marginal increase in the levels of hospital *Comfort*, medical *Attention* and *Dental* coverage, respectively.

When low income (*HighIncome*=0) individuals with primary and secondary education (*University*=0) are considered (upper left block), a significant difference is observed between the WTP in the BC and in the CI for the attributes *Comfort, Attention* and *Dental*, with BC individuals having a higher WTP for an improvement in *Comfort, Attention* and *Dental* coverage. However, the WTP for a decrease in the waiting lists is equivalent for both groups. If the analysis is centred on the set of individuals with high income (*HighIncome*=1) and primary and secondary education (*University*=0; upper right block), the WTPs of the BC and CI individuals are equal for most attributes, except for *Surgery*, where BC individuals are willing to pay a higher amount to reduce the waiting lists.

The set of individuals with the biggest differences between the BC and CI regions consists of individuals with high income (*HighIncome*=1) and university studies (*University*=1; lower right block). Individuals with these characteristics are willing to pay more for an improvement in *Comfort* and *Attention* in the CI than in the BC. However, BC individuals are willing to pay more than individuals in the CI to decrease *Surgery* waiting lists. These differences between the WTP of individuals in the BC and CI may be due to the fact that BC and CI individuals' WTP are influenced by different individual characteristics – that is, the factors that influence BC individuals' valuation of health services differ from

Table 3
WTP estimates and regional comparison

	LOW EDUCATION (*University*=0)				UNIVERSITY EDUCATION (*University* =1)			
LOW INCOME (*HighIncome*=0)	SET 1	WTP(BC)	WTP(CI)	p-value	SET 2	WTP(BC)	WTP(CI)	p-value
	Specialist (Conf.Int.)	-6.32 (-11.19,-0.83)	-3.51 (-6.89,0.22)	0.18	*Specialist* (Conf. Int.)	-4.41 (-7.70,-1.13)	-4.76 (-9.83,0.12)	0.46
	Surgery (Conf.Int.)	-6.09 (-9.70,-3.22)	-5.75 (-8.30,-3.61)	0.45	*Surgery* (Conf. Int.)	-6.32 (-8.13,-4.62)	-3.79 (-5.97,-2.11)	0.03
	Comfort (Conf.Int.)	12.59 (5.09,21.87)	3.17 (-2.61,9.52)	0.03	*Comfort* (Conf. Int.)	8.54 (3.00,14.86)	9.11 (4.01,15.23)	0.45
	Attention (Conf.Int.)	25.73 (17.13,36.63)	15.18 (8.17,24.11)	0.04	*Attention* (Conf. Int.)	25.39 (17.95,33.07)	24.06 (16.96,33.32)	0.40
	Dental (Conf.Int.)	16.22 (8.33,24.59)	6.66 (0.08,13.48)	0.03	*Dental* (Conf. Int.)	11.09 (4.21,17.23)	7.74 (1.73,13.53)	0.23
HIGH INCOME (*HighIncome*=1)	SET 3	WTP(BC)	WTP(CI)	p-value	SET4	WTP(BC)	WTP(CI)	p-value
	Specialist (Conf.Int.)	-6.99 (-12.47,-1.99)	-1.06 (-12.04,8.85)	0.14	*Specialist* (Conf. Int.)	-4.95 (-8.68,-1.15)	-3.23 (-8.93,1.86)	0.31
	Surgery (Conf.Int.)	-7.63 (-11.44,-4.49)	-6.49 (-11.56,-2.81)	0.33	*Surgery* (Conf. Int.)	-7.57 (-9.84,-5.53)	-4.22 (-6.14,-2.39)	0.01
	Comfort (Conf.Int.)	4.90 (-3.91,12.67)	5.58 (-8.52,19.59)	0.47	*Comfort* (Conf. Int.)	2.56 (-2.27,7.36)	10.71 (3.22,19.96)	0.04
	Attention (Conf.Int.)	11.34 (3.69,19.73)	19.92 (4.46,42.53)	0.19	*Attention* (Conf. Int.)	14.13 (9.36,19.43)	26.65 (16.61,38.79)	0.02
	Dental (Conf.Int.)	9.51 (0.99,18.77)	4.32 (-13.09,19.81)	0.29	*Dental* (Conf. Int.)	5.94 (0.09,10.89)	6.06 (-2.91,14.66)	0.49

Source: compiled by authors

those that influence the valuation of CI individuals.

Table 4 presents a comparison of WTP estimates, not between the two analysed regions, but between subgroups of individuals in each region under study. Table 4 is divided in two sub-tables, Table 4.1 and Table 4.2, for the BC and CI, respectively. The first set of results (upper left block of Table 4.1.) shows the WTP of BC individuals with low income and different educational levels (columns 2 and 3) and the equality tests between the WTP of low-educated individuals and high-educated individuals (column 4). BC individuals with no university education and with university education appear to be willing to pay the same amount for PHS improvements. Thus, education level is not a significant factor for either low- or high-income BC individuals.

In the lower left block of Table 4.1, where the WTP equality test is reported between low- and high-income BC individuals, it appears that low-income BC individuals are willing to pay more than high-income individuals for improvements in *Comfort* and *Attention*. It can therefore be concluded that given an educational level, there is an income-level influence on BC individuals' WTP.

The equality tests reported in the left blocks of Table 4.2 conclude that given, CI individuals with low income, those with university studies are willing to pay more than those with no university studies for improvements in Surgery, Comfort and Attention (upper left block of Table 4.2). Educational level is thus a redundant factor in the WTP for CI individuals with low income. However, the WTP among high-income CI individuals for improvements is the same, regardless of educational level (lower left block of Table 4.2). Given the educational level, there are no differences between the WTP of high- and low-income CI individuals (right blocks of Table 4.2). Thus, income level does not appear to be a significant factor for CI individuals when determining WTP for PHS service improvements.

4. Discussion

In this study, we considered possible marginal improvements for implementation in the Spanish PHS, which is decentralised by regions. The Spanish central government does not provide health services directly to the regions (except for Ceuta and Melilla); its work is purely to coordinate between the different regions. Thus, the responsibility for the health system has devolved to the regions, and regional governments decide the expenditure level, as well as the health policies to be implemented. In the analysis of the best assignment of economic resources, it is necessary to consider the specific characteristics of each AC [8], so a national-level analysis would not be useful. However, our study considers region-specific characteristics for two ACs, emphasising which policies to implement at a regional level.

We focus the analysis on two regions that have very different health service systems, BC and CI. The WTP among BC and CI individuals were calculated by controlling for income and education level individual characteristics, and significant differences were found between analysed regions. While the income level significantly influenced BC individuals' WTP, educational level did not seem to influence their payment decisions. In the BC, individuals with a higher income were willing to pay significantly less for marginal improvements in *Comfort* and *Attention*. To interpret this result, we considered two ideas. First, those who consider comfort and attention are more likely to pay for private health insurance, as do people with a high income level [1]. Second, prior research [6,19] has shown that, in the BC, individuals are more likely to pay for private health insurance, so we would expect that BC individuals with a high income that want improvements in comfort and medical attention would invest in private insurance. It is thus understandable that these individuals would be less willing to pay for marginal

Table 4
Effect of individuals characteristics on WTP

Table 4.1: BASQUE COUNTRY

EFFECT OF EDUCATION				**EFFECT OF INCOME**				
		Low education	University education	p-value			Low income	High income	p-value
LOW INCOME	*Specialist*	-6.32	-4.41	0.26	LOW EDUCATION	*Specialist*	-6.32	-6.99	0.44
	Surgery	-6.09	-6.32	0.43		*Surgery*	-6.09	-7.63	0.26
	Comfort	12.59	8.54	0.22		*Comfort*	12.59	4.90	0.09
	Attention	25.73	25.39	0.49		*Attention*	25.73	11.34	0.01
	Dental	16.22	11.09	0.15		*Dental*	16.22	9.51	0.13
		Low education	University education	p-value			Low income	High income	p-value
HIGH INCOME	*Specialist*	-6.99	-4.95	0.28	UNIVERSITY EDUCATION	*Specialist*	-4.41	-4.95	0.42
	Surgery	-7.63	-7.57	0.49		*Surgery*	-6.32	-7.57	0.19
	Comfort	4.90	2.56	0.31		*Comfort*	8.54	2.56	0.07
	Attention	11.34	14.13	0.28		*Attention*	25.39	14.13	0.01
	Dental	9.51	5.94	0.28		*Dental*	11.09	5.94	0.12

Table 4.2: CANARY ISLANDS

EFFECT OF EDUCATION				**EFFECT OF INCOME**				
		Low education	University education	p-value			Low income	High income	p-value
LOW INCOME	*Specialist*	-3.51	-4.76	0.34	LOW EDUCATION	*Specialist*	-3.51	-1.06	0.31
	Surgery	-5.75	-3.79	0.10		*Surgery*	-5.75	-6.49	0.39
	Comfort	3.17	9.11	0.08		*Comfort*	3.17	5.58	0.36
	Attention	15.18	24.06	0.06		*Attention*	15.18	19.92	0.34
	Dental	6.66	7.74	0.41		*Dental*	6.66	4.32	0.59
		Low education	University education	p-value			Low income	High income	p-value
HIGH INCOME	*Specialist*	-1.06	-3.23	0.34	UNIVERSITY EDUCATION	*Specialist*	-4.76	-3.23	0.34
	Surgery	-6.49	-4.22	0.17		*Surgery*	-3.79	-4.22	0.37
	Comfort	5.58	10.71	0.24		*Comfort*	9.11	10.71	0.38
	Attention	19.92	26.65	0.25		*Attention*	24.06	26.65	0.36
	Dental	4.32	6.06	0.44		*Dental*	7.74	6.06	0.62

Source: compiled by authors

improvements in these public health services. Above a certain income level, those who can afford private health insurance prefer to invest in private health than in the PHS. Sigüenza and Mariel [18] similarly found that BC individuals with a high income have a lower WTP for marginal improvements in the *Specialist* category; they conjecture that this is because individuals with a high income solve their health problems by resorting to private health services.

However, in the CI, education (rather than income) level influences individuals' payment decisions. The WTP for marginal improvements in *Comfort* and *Attention* was higher for those with university education. González [6] concluded that highly educated individuals have more information and greater capacity to manage the knowledge, so they have higher requirements when demanding goods and services. Highly educated CI individuals thus want a higher quality health system and are willing to pay more for marginal improvements in certain health services in their region. Unlike the BC individuals, income level does not influence CI individuals' WTP.

All of these results lead to the conclusion that, for some groups of individuals with certain characteristics, the WTP for marginal improvements in PHS services differs between regions. First, focusing on the group of individuals with low income and educational levels, the WTP among BC individuals is significantly higher than among CI individuals due to the combination of the two effects. Low-educated CI individuals do not value the PHS highly, while BC individuals with a low income highly appreciate the PHS. The opposite effect is obtained in the group of individuals with high income and educational levels. Highly educated CI individuals highly value their PHS, so the group of individuals with these characteristics are, in general, willing to pay more than comparable BC individuals for marginal improvements in PHS services.

We analysed the differences in the valuation of PHS services (WTP) among individuals in the BC and CI. Not only do differences exist in the WTP between regions, but the factors that influence these valuations also differ between regions. Considering that the maximisation of individuals' global welfare is an important objective of health policy, it seems useful to have a tool, such as the present analysis, that provides details about individuals' preferences. The theory of decentralisation indicates that, from the point of view of efficiency, it is advisable to decentralise decisions and management of public expenditure, especially when individuals' preferences about possible policies differ by region [4,12,13]. Our results verify this statement, because it does appear that individuals' utility differs between regions. If the main aim of policymakers is to provide health services that maximise individuals' utility – that is, global welfare – then the decisions about and management of these policies should be transferred to regions. However, if there is a shortage of resources to carry out improvement policies in any of the regions, then decentralisation may cause regional equity problems. In this case, the central government should implement income redistribution policies to guarantee public health services in the poorest regions.

Although the decisions are decentralised to regional governments, it is also likely that individuals in the same region have heterogeneous preferences, so the preferences of all individuals cannot be fully satisfied. In this case, the regional government should implement health policies that maximise the overall preferences of the region, thus obtaining an efficient allocation. Decentralisation of health policies to the local level, and even to the personal level, would not be cost-effective, because it would not be possible to take advantage of the benefits of economies of scale.

To sum up, when health policies are decentralised to the regions while the central government controls and guarantees the redistribution for reasons of equity, it would be possible to achieve a balance between the efficiency benefits of decentralisation and the advantages in terms of economies of scale that can be found in management, as well as avoiding possible equity problems. The results of this study could also be useful for regional governments to identify and reflect on the peculiarities of their regions. We have observed that, within each region, there are preferences for different services, and the identification of these preferences could guide regional governments in the distribution of economic resources that would increase global welfare.

5. Conclusions

One of the main problems that public institutions face is how to give an economic valuation of individuals' preferences about different possible policies and thus determine which policies maximise individuals' welfare. When a country is divided into regions (with a central government and regional governments for each region), if the preferences for possible policies differ between regions, it would (based on the theory of decentralisation) be more efficient to decentralise expenditure decisions to regional governments.

This study analysed whether there are differences in health preferences among individuals from two ACs with different characteristics – BC and CI – because if there are, we would be able to conclude that health policies and Spanish PHS should be decentralised into regions. We therefore sought to identify and quantify individuals' preferences in different regions. DCEs allowed us to measure the WTP of individuals for marginal improvements in health services, so we could give an economic valuation to different health policies. If the economic valuation of the possible health policies differs among regions, regional preferences regarding possible health policies also differ.

We therefore calculated the WTP of BC and CI individuals for different possible marginal improvements in PHS service, and we identified differences between individuals' health preference in the two regions. The income effect has a higher effect in the BC, while individuals' decisions are more likely to be determined by educational level in the CI. We thus observe that the higher the income of a BC citizen, the lower his or her valuation of the PHS. This result shows the preference that BC individuals with high income have for private health services. CI individuals' WTP, on the other hand, is higher when they have completed university studies. We conclude that a higher level of exigency among trained people could be a reason for this result.

Taking into account that in each region there are different preferences for health policies, health policies should be decentralised to regional governments while the central government controls for equity reasons, if maximising the welfare of individuals is a primary aim. There are also differences between the preferences of individuals in the same region, however, so once health policies are decentralised, we have provided a tool that makes it possible to identify the health policies that would maximise the welfare of the individuals in each region. Our research could thus allow regional governments to understand their citizens' health service preferences, which could be helpful in allocating economic resources to maximise the global welfare of the region.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.healthpol.2022.04.010.

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