



A Discrete Choice Experiment Application to School Choice in the Basque Country*

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Abstract

The objective of this paper is to analyse which school characteristics parents prefer in the Basque Country when choosing a primary school for their children, by carrying out a Discrete Choice Experiment applied to parental school choice. After conducting the experiment and gathering the answers, responses have been analysed using a Random Parameter Logit. Results indicate that, in stark contrast to other countries and regions, the most relevant school characteristics are the main language of instruction and religious orientation of the school. The main contribution of this work is the quantification, in monetary units, of the parental preferences regarding school characteristics in the Basque Country; as well as the first application of this methodology to School Choice in Spain.

Keywords: School choice, Discrete choice experiment, Mixed logit model.

JEL Classification: I20, I28, I29, C25

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1. Introduction

The goal of this paper is to analyse parental school preferences in the Basque Country (Spain). These preferences are studied by carrying out a Discrete Choice Experiment (DCE) in the metropolitan area of Bilbao. Conducting this experiment allows us to quantify, in monetary units, exactly how much parents are willing to pay for certain school characteristics, i.e., which characteristics they value more when choosing a school for their children. This choice is studied in relation to the family's socio-economic characteristics, such as income, educational level and, given the bilingual nature of the area, language spoken at home.

Choosing a school for their children is undoubtedly one of the hardest decisions parents face. Empirical evidence shows that in Spain, the school you attend accounts for around a fifth of the variation of students' grades; the number is even higher in other PISA countries (Cebolla-Boado *et al.*, 2014; Chiu, 2010). This is also true even when we take into account that upper-middle class families self-select into certain schools. Schools' socio-economic composition (i.e. the school-average socio-economic level of families) is widely considered in the literature as one of the most important factors of academic performance (Hanushek, 2008). In the case of Spain, this effect has also been confirmed by Di Paolo and Choi (2014) using PISA data from 2012.

The majority of the quantitative empirical papers on parental school choice focus their attention on the school type, usually private or public; and on how the socio-economic characteristics of the families that choose one or the other differ (Burgess *et al.*, 2015; Goldring and Phillips, 2008; Hanushek *et al.*, 2007; Schneider *et al.*, 2006). The evidence in these studies points towards the fact that parents who choose a certain school are actually different –have different socio-economic characteristics– than those who do not choose (i.e. those that stick to the assigned school). The most prevalent conclusion in the literature is that low-income families cannot actually exercise a choice, but rather, they send their children to the (public) school that is assigned to them according to where they live. This, in turn, results in segregation by income and/or social class. On top of that, once they choose a school, parents of higher socioeconomic status are able to induce changes in the school in an easier way than low-income parents, resulting in even more segregation (Woods, 1993).

Furthermore, these studies suggest that parents who do choose are not basing their choice on objective test score indicators such as the ones released by public institutions; instead, families mention a number of complex reasons for choosing a particular school (Bosetti, 2004; Geske, 2003; Reay and Lucey, 2003). This questions the traditional rational choice theory, which postulates that families decide base on clear value preferences (Ball and Vincent, 1998; Hastings *et al.*, 2005).

An important point that distinguishes our work from the empirical literature mentioned is that, since data on actual cost is seldom available, other studies do not usually analyse how much parents are actually willing to pay for certain school characteristics. These studies are able to offer insights such as 'the top three reasons for choosing a school among non-reli-

gious private school parents are smaller class size, shared beliefs, and teaching style' or 'proximity to home and academic reputation are the most important factors for the majority of families' (Bosetti, 2004); 'preferences for school test scores increase with student income and ability' (Hastings *et al.*, 2005); 'involvement is valued by active choosers' (Goldring and Phillips, 2008), to name a few. They are not able to discern exactly how much, in monetary units, parents value those characteristics: they can only say if they value them, and whether they do so in a negative or positive way.

By using a DCE approach, however, we are able to surpass this obstacle; since we obtain an economic valuation of school characteristics designed specifically to calculate a quantitative measure of parental preferences. Whereas traditional survey-based studies can glean insights such as "*parents prefer schools that are closer to home and offer instruction in multiple languages*", the DCE carried out allows us to conclude exactly *how much* parents are willing to pay for characteristics such as a school that is closer to home, and for multilingualism. This economic valuation of school characteristics will be the main contribution of the present study.

In this vein, we should take into account that the school choice in Basque Country is centralized; parents are asked to rank their three most preferred schools, and then a set of rules is applied to obtain the final allocation. As evident from the literature (Abdulkadiroğlu and Sönmez, 2003) ranking the schools according to their true preferences is rarely optimal for families (parents avoid listing overdemanded schools, even if they might prefer them). Therefore, failing to consider that the assigned school might not align with the parents' true preference may result in biased estimates.

Calsamiglia and Güell (2018) also state that one of the main empirical challenges is that the true preferences are not observable. The DCE applied in this paper based on SP data allows us to estimate individuals' preferences and, therefore, it offers an alternative approach not common in the school choice literature. With regards to analysis of the actual school assignment, Calsamiglia *et al.* (2010) focus on the effect of constraints on the school allocation mechanism; specifically, that families are allowed to submit a list consisting of a limited number of schools. They show that this can reduce efficiency and stability of the allocation process and increase segregation.

More recent papers on the school choice include Agarwal and Somaini (2018), who use a regression discontinuity approach to show that Cambridge families do not reveal their true preferences when listing their top school choice, that is, they respond to the strategic incentives inherent to the Boston mechanism. Related to that, Calsamiglia and Güell (2018) prove that even when families can seemingly choose a school for their children, the school finally assigned is largely determined by the administration, due to the Boston mechanism and the way priority points are awarded in Barcelona. Moreover, Chen and He (2018) provide evidence that two common school choice mechanisms, the Immediate Acceptance (or Boston) mechanism and the Deferred Acceptance mechanism result in parents over-informing themselves when making a school choice for their children, which is of course inefficient.

The same dataset used in the present paper and obtained by the use of a DCE has been analysed in Mariel *et al.* (2018), in that case focusing on the differences in school preferences between wives and husbands. The authors achieve this using a bargaining discrete choice model that should capture the deliberate joint parental decision on school choice. The present paper, however, is based on a pooled data set including both wives and husbands because the goal is not the bargaining process couples face, but the effect of socio-demographic variables on individual's preferences regarding school choice. The methodological approach also differs significantly from Mariel *et al.* (2018) because the present paper applies a classical Mixed Logit Model (MXL) with sociodemographic variables as so called meanshifters whereas the former paper focuses on a bargaining discrete choice model with non-random parameters. Analysing school choice preferences in terms of socio-demographic variables such as family wealth and language spoken at home is a key issue to enforce new public policies that affect the school allocation process.

The paper proceeds as follows. Section 2 details the case study, starting with the particular characteristics of the Basque region and its school choice system, and following with the actual description of the DCE. Section 3 continues with the explanation of the sampling procedure and descriptive statistics. Section 4 covers the econometric methodology used to analyse the data gathered in the DCE. Section 5 follows with a discussion of the results obtained, and section 6 offers some concluding remarks.

2. Case Study

The educational system in the Basque Country suffers from several peculiarities, mostly stemming from the existence of two co-official languages, Spanish and Basque. The fact that two co-official languages exist has allowed parents and students to choose the main language of instruction in which they are taught, ever since the Basque Government regulated the so-called language models (Basque Government, 1982).

After the 1982 law passed, families were able to choose between three main language models based on the language(s) of instruction: Spanish, Bilingual, or Basque; known in the Basque Country as language models A, B, or D. Model A corresponds to Spanish, i.e., all subjects are taught in Spanish except for other language subjects, such as Basque or English. Model D corresponds to Basque; everything is taught in Basque except for other languages. Model B is a mixture of the two; some subjects are taught in Basque, some in Spanish. The percentage of subjects that are taught in each language varies across schools. A single school can offer instruction in more than one language model. With these different language models, parents have in theory a certain degree of freedom when choosing schools. Furthermore, together with the law that passed the different language models, a solid network of Government-dependent private schools joined the existing network of public schools. Only a handful of private-independent schools remained.

Government-dependent private schools (around 59% of the schools in the Basque Country) are of private ownership, but receive most of their funding from the Basque Government. Families who send their children to such schools also pay monthly fees that cover part of the school budget. The proportion of funding that comes from the Government and from fees can vary; however, the Basque Government typically covers the salaries of the minimum number of teachers required given the enrolled students, and families cover the remaining costs such as additional teachers' salaries (for a higher teacher to student ratio) and infrastructure. On the other hand, public schools (approximately 39% of the schools in the area) are fully funded by the Government and of public ownership. Hence, they are completely free of any charge.

The school network in the Basque Country can therefore be classified into three different types: public schools, Government-dependent private schools, and fully independent private schools, which are the most expensive ones for parents. This last type only accounts for around 2% of the schools in the Basque Country.

Although the three language models previously mentioned were the ones offered initially, nowadays families have two additional choices available to them: Trilingual, where subjects are taught in Basque, Spanish, or English; and International Schools, private-independent schools that usually follow the education system in another country (e.g. German, English, French) and hence teach in that language.

A Discrete Choice Experiment (DCE) is an economic valuation method based on stated preferences. More specifically, a DCE consists of different alternatives among which subjects have to choose just one. The alternatives are grouped in so-called independent choice cards, and each alternative presents different attributes. The attributes are the same for each alternative: what varies among alternatives is the specific "level" or state that the attribute is assigned. Given the school choice in the Basque Country described above, parents are presented with three different alternatives – a public school, a Government-dependent private school, and an independent private school. Each of these alternatives has different attribute levels – the public school might be closer to home and free, but not offer any extracurricular activities and is not recommended; whereas the Government-dependent private one is a bit more expensive and farther out, but has a good reputation and extensive extracurricular options. Parents would therefore have to choose, inherently signalling which attributes levels are more important and how much they are willing to pay for them.

The DCE questionnaire that was carried out had the following sections: basic information, information regarding attributes and their levels, choice cards, and socio-demographic questions.

The basic information provided at the beginning of the questionnaire describes its objective –studying parental preferences over school characteristics in the Basque Country– as well as a way to contact the authors and indications on how to send the completed form, via a pre-stamped envelope.

The second part explains the different hypothetical scenarios that exist, for which the respondent will have to make a choice in the third part. The different characteristics, or attributes, that conform the hypothetical scenarios are the key to the proper application of the DCE, since its correct identification and levels condition the results.

The attributes susceptible to being relevant characteristics that parents consider when choosing a school for their children (e.g. cost, distance to home, language of instruction, extracurricular activities, etc.) as well as each of those attributes' levels (e.g. 1km, 5km, 20km; Spanish, Basque, English; limited or extensive extracurricular) were chosen using qualitative discussion focus groups.

We gathered a group of 25 people that included all the relevant agents: parents, teachers, principals, and administrators. The objective of this focus group was to gather opinions regarding which attributes do parents actually consider when choosing a school for their children. The members of the focus group anonymously rated, on a scale from one to ten, the importance of several characteristics. Ultimately, the following attributes were considered the most relevant: cost, language of instruction, religious orientation, whether the school offers schooling through college (between ages 2-18), presence of immigration, extracurricular activities, and recommendations from family and/or friends. Attributes discarded as marginally relevant or difficult for parents to know prior to enrolment included academic results, quality of school's infrastructure, dress code, and political orientation.

Another attribute initially considered but discarded during the focus group was a measure of the quality of the school such as the average grades obtained in the university entrance exam. However, the Basque Government has a strict non-disclosure policy on the average grades obtained by the schools; therefore, this information is not publicly available and parents do not have access to it when choosing a school. Participants of the focus group pointed out that the quality of the school basically spreads through word of mouth and that recommendations can therefore be very important and a proxy for the quality of the school.

Once the participants of the focus group had decided on the most important attributes, they debated on possible "levels" for each one of them, according to the features and idiosyncrasies of the Basque school system. Table 1 presents the different levels associated with the selected attributes and the cost associated for each possible combination of them in each alternative. A "sibling" attribute that takes into account where other siblings go to school was not considered because parents were asked to answer the questionnaire regarding their oldest child's school. That is, the questionnaire focuses on the first school choice parents make.

Note that, although all the attributes appear in each of the three alternatives of the choice card, some of the attribute levels are alternative-specific as debated in the focus group. More precisely, the levels of cost are fixed per alternative as shown in Table 1. Furthermore, for the linguistic model attribute, international school could only appear in the independent private alternative; and the higher levels of immigration (40% and 60%) only showed up in the public school alternative.

Table 1
ATTRIBUTES AND LEVELS OF THE DISCRETE CHOICE EXPERIMENT

Attributes	Levels
<i>Cost</i>	Public: 0€/month Government Private: 50€, 100€, 150, 200€/month Independent Private: 300€, 400€, 500€, 600€/month
<i>Distance to home</i>	1km, 3km, 5km, 10km, 20km, 30km
<i>Linguistic model</i>	All Spanish, All Basque, Bilingual (Basque & Spanish), Trilingual (Basque, Spanish & English), International School
<i>Religious orientation</i>	Secular, Religious
<i>Schooling through college</i>	Yes, No
<i>Presence of immigration</i>	0%, 10%, 20%, 40%, 60%
<i>Extracurricular activities</i>	Standard, Extensive
<i>Recommended by family and/or Friends</i>	Yes, No

The third part of the questionnaire was the most important part because it consisted of the actual choice cards. In this part, each individual had to respond to twelve different hypothetical choice cards. In each of the twelve choice cards, the parent is presented with three different alternatives –public, Government-dependent private, and independent private schools. Each of those three alternatives is characterized by certain levels of each of the attributes listed in Table 1.

In order to configure the different alternatives, with varying attribute levels, in each choice card, we have generated a D-optimal factorial fractional design for a Random Parameter Model. The sets of choice cards have been obtained using Ngene (Rose and Bliemer, 2013), consisting of four blocks of twelve rows each, taking into account that some of the attribute levels are alternative-specific as previously mentioned.

It is important to note that, prior to the twelve choice cards presented to each parent, they are clearly indicated that they must choose their preferred alternative (public, Government-dependent private or independent private) in each of the twelve hypothetical scenarios presented in the choice cards. They are also aware that the choices are independent between them and that there are no right or wrong answers: the goal is simply to use their responses to obtain a quantitative measure of preferences for each of the attribute levels.

After deciding on the attributes and levels with the help of the focus group and generating the design, we ran a pilot phase to see how a small set of parents responded to the whole questionnaire. This was done prior to the actual DCE and it allowed us to confirm that the wording in the survey was correct as well as unambiguous; and that the experimental design worked properly, allowing for the estimation of the coefficients in the Logit-type model that would determine the willingness to pay.

Lastly, the fourth and final part of the questionnaire was dedicated to gathering socio-demographic information on the parents: information on age, language spoken at home, highest degree of studies achieved, employment status, earnings, and number of children. More details about the case study can be found in Mariel *et al.* (2018)

3. Sampling and Data. Descriptive Statistics

The questionnaires were handed out in paper format between October 2015 and January 2016 to 300 families in the Metropolitan area of Bilbao that had children between ages three and eight in the Basque school system. The questionnaires were distributed together with a pre-stamped envelope and, therefore, filled by the parents at home during their spare time. The 300 families were selected using a simple random sample. For each family, the mother and the father were asked to answer the questionnaire separately.

We asked parents to fill out the questionnaire separately because our initial idea was to compare the decisions mothers and fathers made on their own, however, after analysing the data we obtained very similar results for both mothers and fathers. Therefore, we pooled them together so we could have a bigger sample and better precision in our estimations.

The response rate was quite poor (111 families, 222 parents, responded), probably due to the fact that the families were unsupervised during the response, and they were responsible for filling and sending out the responses themselves. However, although we must certainly be cautious when interpreting the results of the estimations due to the small sample and the response rate, the gathered data appears to be representative of the schools in the area.

There is little information on the literature of DCEs regarding the required sample size for the experiment, if not for the exception of Louviere *et al.* (2000). Note that a DCE analyses at the desired precision level the proportion with which a certain alternative is chosen. The true proportions are unknown; but the proportion corresponding to each of the three alternatives in our sample is between 0.2 and 0.5, meaning that under the 10% precision and with probability $\alpha=0.95$ we would require a sample size of 66 individuals (Louviere *et al.*, 2000). Therefore, our sample size of 222 individuals (111 families) clearly satisfies this condition.

Table 2 reports the proportion of actual and sampled public, Government-dependent private and independent private schools in the area. Note that the sampled schools are from the Greater Bilbao area, and actual data is only available for the Basque Country as a whole, which might explain part of the discrepancy.

Table 3 shows the descriptive statistics of the socio-economic characteristics of the sampled families. Notice that for the dummy-coded variables, the average represents the proportion of the sample that actually has that characteristic.

Table 2
PROPORTION OF PUBLIC, GOVERNMENT-DEPENDENT PRIVATE AND
INDEPENDENT PRIVATE SCHOOLS, ACTUAL AND SAMPLED

	Public	Government- dependent Private	Independent Private
Actual	39.3%	58.3%	2.4%
Sampled	26.5%	70.6%	2.9%

Sources: Own data and Eustat (2016).

Table 3
DESCRIPTIVE STATISTICS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS

Socio-demographic	Average	S.D.	Min.	Max.
Medium or high income	0.64	0.48	0	1
Basque spoken at home	0.13	0.33	0	1
Mother has University degree	0.38	0.48	0	1
Father has University degree	0.26	0.44	0	1
Mother is employed full time	0.44	0.50	0	1
Father is employed full time	0.46	0.50	0	1
Number of children	1.84	0.61	1	3
Mother's age	40.02	4.21	26	48
Father's age	41.26	4.75	28	58

Although there are no official statistics for the variables included in Table 3 that are directly comparable to ours because our sample is restricted to families with children ages 3-8, the Basque Institute for Statistics - Eustat has the following data available: regarding the income variable, the average family rent was 3,448 euros per month for the year 2011 (the last year for which data on the population of the Greater Bilbao area is available). This falls in line with the fact that more than 60% of our families have medium or high income (i.e. more than 3,000 euros per month). With respect to the language, the percentage of Basque speakers between the ages of 20-64 was 8.81%. This population proportion is slightly lower than our sample proportion. Lastly, the percentage of people between ages 20-64 with a higher education degree was 37.23%. Moreover, the average number of children for two-parent families in the province of Vizcaya in 2011 was 1.54. In spite of the fact that not all population figures are directly comparable, the collected sample seems represent the target population of the metropolitan area of Bilbao correctly.

4. Methodology

We use a specific variation of a MXL (Hensher and Greene, 2003; McFadden and Train, 2000), also called Random Parameter Logit Model (RPL), to analyse the responses obtained

from the DCE. Its use is prevalent in the literature because it is based on random utility theory (McFadden, 1974), but it relaxes the assumption of independence of irrelevant alternatives that the classic Multinomial Logit (MNL) poses. The MXL therefore allows us to model the heterogeneity of individual preferences, by assuming that the parameters follow a certain distribution. Under the random utility model framework, the utility U_{ikj} respondent i obtains from alternative j in each choice (card) situation k can be expressed as:

$$U_{ikj} = V_{ikj} + \varepsilon_{ikj}, \text{ with } V_{ikj} = \sum_{r=1}^R (\beta_{ir} x_{ikjr}) + ASC_j, \quad (1)$$

for a total of J alternatives, N individuals and K choice cards. In our case, and without loss of generality, we have that $J=3$, $N=222$ and $K=12$. We assume that the deterministic part of the utility V_{ikj} is a linear combination of R observable explanatory variables, attributes x_{ikjr} and attribute parameters β_{ir} . These parameters vary randomly, usually following a standard distribution, between individuals in the MXL; or are constant ($\beta_{ir} = \beta_r \forall i$) in the classic multinomial logit model (MNL). We will use the MNL as a benchmark for our MXL estimation.

All attribute parameters are, therefore, specified as random parameters following a normal distribution except the cost coefficient that is assumed to be lognormally distributed with negative sign. Since we assume that parents could value the proposed attribute changes either positively or negatively, the normal distribution for the non-cost attributes is justified. The assumed lognormal distribution (with a sign change) for the cost parameter, assures finite moments for the WTP distributions (Daly *et al.*, 2012). Furthermore, we will consider that some of the attributes' effect depends on a certain individual characteristic. Hence, the utility derived from choosing either one of the three school types (alternative j) –public, Government-dependent private and independent private– will have the following form:

$$U_{ikj} = ASC_j + (-\beta_{i1})Cost + \beta_{i2}x_{ikj2} + \dots + \beta_{ir}x_{ikjr} + \varepsilon_{ik}, \quad (2)$$

where β_{i1} follows a lognormal distribution and the remaining parameters $\beta_{i2}, \beta_{i3}, \dots, \beta_{ir}$ follow a normal distribution. The following four attributes are not interacted with any socio-demographic variable: Distance, Schooling 2 to 18, Extracurricular activities, and Recommended. In these four cases, only the mean and standard deviation of the corresponding normal distribution are estimated. The remaining three non-cost attributes are interacted with some socio-demographic variables; this allows us to disentangle part of the preference heterogeneity. In these cases the mean parameter of the corresponding normal distribution is defined as:

$$\bar{\beta}_s = \alpha_s + \delta_s IndivCharacteristic_{is}. \quad (3)$$

The three interacted attributes are the linguistic models (interacted with language spoken at home, i.e. Basque or Spanish), immigration (interacted with on high or low income) and religious orientation (interacted with the number of children).

The ASC_j term is included only in the utility of Government-dependent private and Independent-private alternatives and in both cases it is interacted with the following individual

characteristics: whether they speak Basque or not at home, whether they have high or low income, whether either parent has University-level education, if either parent works full time, and the number of children. These interactions of socio-demographics with the constant term indicate whether it is more likely that a subgroup of population chooses one of the three alternatives more frequently than the others. All interactions included in the final model have been chosen according their corresponding robust t-statistics; the estimation of the final model is a result of numerous trials on different model variations.

Let us now denote j_{ik} as the chosen alternative by individual i in choice situation k , such that $P_{ik}(j_{ik})$ represents the logit probability of the observed election for individual i in choice card k . The MNL probability of individual i choosing alternative j in his or her k -th choice card is defined as

$$P_{ikj} = \frac{\exp(\sum_{r=1}^R (\beta_{ir} x_{ikjr}) + ASC_j)}{\sum_{j=1}^J \exp(\sum_{r=1}^R (\beta_{ir} x_{ikjr}) + ASC_j)} \quad (4)$$

The logit probability of the observed sequence of choices for each individual i is therefore $P_i = \prod_{k=1}^K P_{ik}(j_{ik})$. If we assume that β_i is distributed over individuals with density $g(\beta)$, then $P_i = \int_{\beta} \prod_{k=1}^K P_{ik}(j_{ik}) g(\beta) d\beta$ and the log-likelihood function of the observed choices that is maximised in the estimation procedure is:

$$LL = \sum_{i=1}^N \ln(P_i) \quad (5)$$

Another important point of consideration in our analysis is how the categorical variables are coded. Using dummy-coded (0/1) variables implies that the effect of the reference group is muddled with the ASC_k term and one would not be able to test whether parents derive a significant utility from different types of school. Therefore, we have chosen to use effect coding for our analysis. This results in an ASC_k that represents the grand mean, instead of the reference group's mean. It also implies that we can identify the effect of the reference group (e.g. families who choose the All Basque language model and speak Spanish at home) with respect to the grand mean.

The MNL model is estimated by maximum simulated likelihood and the RPL model by maximum simulated likelihood in PythonBiogeme (Bierlaire, 2003, 2008) using 2000 Halton draws.

5. Results

Table 4 presents the coefficients obtained from the benchmark MNL and the RPL estimation. The columns corresponding to the RPL estimation show the means and standard deviations of the random parameter distributions as well as their significance. The signs of the estimated coefficients are the expected ones. Focusing on the fixed MNL coefficients and the estimated means in the RPL model, we observe for example that distance reduces the derived utility for an individual. Having extensive extracurricular activities and being recommended increases the individual's

utility. The utility of the language models, immigration and religious orientation is captured through the individual characteristics. Offering schooling ages two through college does not seem to have a significant effect on utility in MNL and its effect in RPL is controversial, as its significant wide standard deviation indicates that it can affect positively or negatively parents' utilities. The interaction coefficients also present the expected signs. For example, the disutility of the "All Spanish" linguistic model is even more intensified in the negative interaction coefficient with the variable "Basque at home" indicating the language spoken at home.

Table 4
RESULTS OF THE MNL BENCHMARK AND THE RPL ESTIMATIONS

Attributes	MNL	RPL			
		Mean	Std. Dev.		
Cost	-0.268 ***	-0.905 ***	0.686 ***		
Distance to home	-0.046 *	-0.090 **	0.351 ***		
Linguistic model					
All Spanish	-0.933 ***	-1.240 ***	0.607 ***		
<i>Basque at home</i>	-0.183 *	-0.230 *			
Bilingual	0.396 **	0.483 ***	0.009		
<i>Basque at home</i>	0.048	0.039			
Trilingual	0.359 ***	0.479 ***	0.474 ***		
<i>Basque at home</i>	-0.021	-0.046			
International	-0.038	-0.069	0.692 ***		
<i>Basque at home</i>	-0.194	-0.233			
Religious orientation					
<i>Number of children</i>	-0.456 ***	-0.588 ***	0.358 *		
	0.163 ***	0.201 ***			
Schooling 2-18	-0.027	-0.046	0.231 **		
Immigration					
<i>Medium or high income</i>	-0.112 ***	-0.159 ***	0.169 ***		
	-0.068 ***	-0.098 ***			
Extracurricular activities	0.072 **	0.060 **	0.089 *		
Recommended	0.083 ***	0.106 **	0.150 **		
ASC Gov. dependent private					
University education	0.921 ***	1.260 ***			
<i>Basque at home</i>	0.054	-0.012			
<i>Medium or high income</i>	-0.234 ***	-0.345 ***			
Number of children	-0.034	-0.055			
Working parent	-0.208 **	-0.178			
ASC Independent private					
University education	-0.017	0.006			
<i>Basque at home</i>	0.050	0.364			
<i>Medium or high income</i>	0.123	0.037			
Number of children	-0.401 ***	-0.505 ***			
Working parent	0.075	0.055			
	-0.291 ***	-0.208			
	0.608 *	0.749 *			

* $p < .10$; ** $p < .05$; *** $p < .01$.

The Willingness to Pay (WTP) for a marginal change in the level of provision of each school attribute is obtained by dividing the coefficient of the school attribute by the coefficient of the cost attribute (Haab and McConnell, 2002). We present the unconditional simulation of the WTP results derived from out-of-sample populations by randomly sampling each individual from the full distribution (Krinsky and Robb, 1986). Figure 1 and Table 5 describe the simulated WTPs distributions with quartiles, because the simulated distribution is non-standard (Daly *et al.*, 2012).

The WTP calculations must take into account both the effect of socio-economic variables and the possible randomness of the parameter. A baseline scenario was first specified with all the socio-economic dummy variables set to zero. By setting the socio-economic variables to a specific value, their effect can be examined. Hence, for example, the WTP for a unit increase (1%) in the Immigration attribute (x_{ikj6}), with its parameter distributed as normal and the Cost attribute parameter as lognormal, and taking into account the interaction with the effect coded variable for medium or high income, is specified as:

$$WTP_{Immigration} = - \frac{(\widehat{\beta}_6 + \widehat{\delta}_6 \cdot Highincome + \widehat{\sigma}_6 \cdot v_6)}{-\exp(\widehat{\beta}_1 + \widehat{\sigma}_1 \cdot v_1)} \quad (6)$$

where $\widehat{\beta}_1$ and $\widehat{\beta}_6$ are the estimated mean parameters of the Immigration and Cost attribute, respectively, $\widehat{\sigma}_1$ and $\widehat{\sigma}_6$ are their corresponding estimated standard deviation parameters, $\widehat{\delta}_6$ is the estimate of the interaction coefficient associated with medium or high income variable and v_1 and v_6 are random draws from $N(0,1)$ distribution allowing for simulation of the WTP values. The WTP values presented below are simulated using 10,000 random draws of these random variables.

Figure 1 plots the WTP distributions obtained using the estimations of the RPL coefficients presented in Table 5. The same WTP distributions are presented, for easier quantitative reference, in Table 6. The spread of the simulated distribution representing the parents' heterogeneity is relatively wide due to the fat tail of the lognormal distribution (which is the denominator of the WTP formula) assumed for the cost coefficient as well as due to the limited sample size. Nevertheless, one can still draw interesting conclusions by focusing on the first and third quartile together with the median values. The WTP distributions allow for the quantification, in Euros, of how much are parents willing to pay for each of the characteristics. For example, median value for the distance attribute is equal to -18€ for each additional 10 km from home.

However, as it can be observed in Figure 1, the spread of the first and third quartile includes zero and there is also a sizeable portion of families not willing to pay for an additional km of distance from home, since their WTP is negative. These negative values can be interpreted as discounts expected by the families in monthly payments for each additional 10 km of distance. Still, the median value of -18€ is relatively small in comparison to median values of other attributes such as the language of instruction. This indicates that parents assign a low importance to distance, probably due to well-organized school bus services offered by the majority of schools and their wide acceptance among the Basque community.

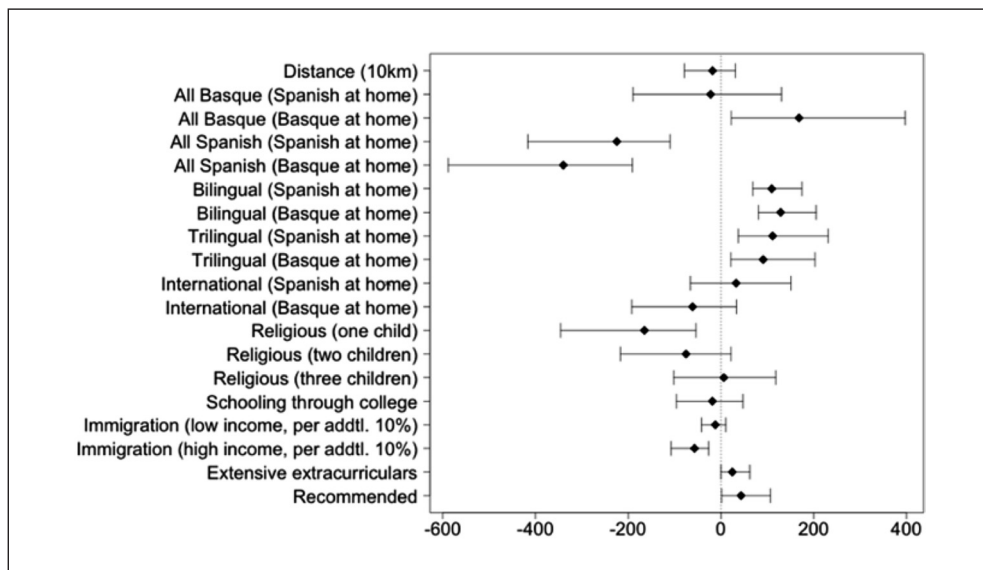


Figure 1: Willingness to Pay distributions using RPL estimations

Regarding the language of instruction, we can see in both Figure 1 and Table 5 that it is one of the characteristics with the highest median values, meaning that it is one of the most important characteristics for the parents, as well as the characteristic with the highest heterogeneity. If we take a look at the All Basque model for Spanish speaking families, we can see that the interval between the first and third quartile of the WTP distribution includes both positive and negative values, indicating that there exists preference heterogeneity for this language model and that it can be a controversial characteristic for these families. The slightly negative WTP for Spanish speaking families suggests that they prefer other models (probably Bilingual or Trilingual). However, median Basque speaking families are willing to pay a very high amount compared to the grand mean in order to have their children attend an All Basque school. This is not surprising, considering the strong sense of pride and cultural identity that stems from the Basque language, which has already been proven to exist in different fields by the existing literature (Hoyos *et al.*, 2009; Ortiz-Osés and Mayr, 1981). The relevance of the Basque identity in its education system has also been the focus of recent newspaper articles, in which education experts in the Basque Country sustain that “there is a strong sense of identity [in the Basque Country] which helps create a common sense of purpose and collective commitment, from schools, families and policymakers” (BBC, 2016).

In the case of the All Spanish language model, however, both Spanish speaking and even more so, Basque speaking families reject it. That is, Basque speaking families heavily favour the All Basque language model, but Spanish speaking families do not systematically choose the All Spanish model. This asymmetry corroborates the findings in Vega-Bayo and Mariel (2015) and is probably due to a mixture of several reasons: the sense of pride and cultural

identity inherent in Basque society, and the high unemployment rate combined with the language policy regarding civil servants in the Basque Country. Most of them are required knowledge of Basque at the C1 level in the Common European Framework of Reference for Languages, i.e. advanced or proficient users.

Table 5
MEDIAN AND FIRST AND THIRD QUANTILES OF WILLINGNESS TO PAY

Attribute	Willingness to Pay	
	Median	1st, 3rd quartile
Distance to home (per addtl. 10km)	-18€	(-78€, 31€)
Linguistic model (vs. grand mean)		
All Basque		
<i>Spanish at home</i>	-22€	(-188€, 124€)
<i>Basque at home</i>	168€	(23€, 398€)
All Spanish		
<i>Spanish at home</i>	-224€	(-416€, -110€)
<i>Basque at home</i>	-340€	(-588€, -191€)
Bilingual		
<i>Spanish at home</i>	110€	(69€, 175€)
<i>Basque at home</i>	129€	(81€, 205€)
Trilingual		
<i>Spanish at home</i>	112€	(38€, 231€)
<i>Basque at home</i>	91€	(22€, 203€)
International		
<i>Spanish at home</i>	33€	(-65€, 151€)
<i>Basque at home</i>	-61€	(-192€, 34€)
Religious schooling (vs. secular)		
<i>1 child</i>	-165€	(-346€, -54€)
<i>2 children</i>	-75€	(-217€, 22€)
<i>3 children</i>	6€	(-102€, 118€)
Schooling through college (vs. not having it)	-18€	(-96€, 47€)
Immigration (per addtl. 10%)		
<i>Low income families</i>	-12€	(-42€, 11€)
<i>Medium or high income families</i>	-57€	(-107€, -26€)
Extensive extracurricular (vs. standard)	25€	(0€, 62€)
Recommended (vs. not recommended)	43€	(2€, 107€)

Indeed, if we check the results for the remaining language models, they coincide with the idea that Basque-speaking parents favour All Basque, whereas Spanish-speaking ones

prefer other models, but not All Spanish. For example, the median value of willingness to pay of Spanish-speaking parents for a bilingual language model is 110€/month and 112€/month for a trilingual one. The median values for Basque-speaking families are 129€/month and 91€/month respectively; although they are comparable figures to the Spanish-speaking families, they are considerably lower than what they are willing to pay for the All Basque language model (168€/month). That is, Basque-speaking families much prefer, in general, All Basque; they prioritize a high level of Basque language above the command of other languages, even though some of the Basque-speaking families still recognize their importance. On the other hand, Spanish-speaking ones want their children to learn the Basque language giving them the possibility to access the public labour market in the Basque Country, but they find other languages (Spanish and English) very important as well.

The willingness to pay distribution for a religious school instead of a secular one is, as expected, very heterogeneous and clearly related to the number of children. As the number of children a family has increases, so does the willingness to pay for a religious education versus a secular one. The relationship between how religious the parents are and the number of children is a widely studied topic and this dependence can be seen across the entire modern world. Berghammer (2010), for example, found that people in Austria following a “traditional” lifestyle were more likely to have three or more children than those following a “modern” lifestyle. Then, as traditionalist individuals were more likely to be religious, the positive correlation between number of children and parents’ religiousness was created. The choice of life trajectory seems to be, therefore, one of the critical factors in determining fertility and religiousness and creates a positive correlation between them.

The relatively narrow distribution of the WTP value related to the presence of immigration indicates that it does not seem to be an important issue for Basque families. This is probably due to a low percentage of immigrants in the majority of the schools in the metropolitan area of Bilbao (around 9% for public schools and 3% for Government-dependent ones according to Eustat, 2016). However, the simulated values are clearly negative for families with higher income indicating that these families reject the presence of immigration in school more strongly than lower income ones. As these families usually choose Government-dependent private schools and independent private schools, this result is in line with previous findings in the empirical literature, which suggest that there is evidence of segregation in schools (e.g. Bifulco and Ladd, 2007; Denessen *et al.*, 2005; Elacqua 2012; Saporito, 2003).

On the other hand, other characteristics such as extracurricular activities and recommendations are more homogeneous in nature: the median value for extensive extracurricular activities is 25€/month and for a recommendation from friends and/or family 43€/month. The relatively and surprisingly high values for extracurricular activities are related to the widely discussed problem of longer working hours in Spain than in other European countries which makes it difficult to reconcile work and family life (Sánchez, 2016).

A recommendation from friends and/or family, which in our case also represents quality, is an important attribute frequently treated in the literature, since it is one of the key factors

affecting parental decisions in school choice (Goldring and Phillips, 2008; ISCA, 2008.). This is, probably, the reason for a relatively high median value of the corresponding WTP distribution.

The importance of the language spoken at home is also noticeable in the ASC terms in Table 6. In the case of the RPL estimation, the interaction of Basque-speaking families is basically the only relevant attribute. According to the results obtained, Government-dependent private schools are valued positively by non-Basque-speaking families compared to public ones, but not as much by Basque-speaking families. This is probably because public schools are more prone to offering the All Basque language models than Government-dependent private ones.

6. Discussion and Conclusions

The present study provides an economic valuation of school characteristics in the metropolitan area of Bilbao, Spain. By carrying out a DCE and estimating a RPL model using the gathered data, we are able to obtain parents' willingness to pay for certain school attributes.

In line with Vega-Bayo and Mariel (2015) we find that, in the Basque Country, the language spoken at home dictates much of the school choice. Again, there is an asymmetry in terms of the language spoken at home: whereas Basque-speaking families prefer to send their children to All Basque schools, Spanish-speaking families do not send their children to All Spanish schools. Instead, they prefer Bilingual (Basque and Spanish) or even Trilingual (Basque, Spanish and English).

More than likely, this is done by parents in order to widen their children's job options in the future in spite of the fact that they may have difficulties when helping children with their homework. Moreover, the Spanish economic situation still suffers from consequences of the abrupt end of Spain's construction boom and severe economic recession, which left thousands of labourers without work and caused one of the highest youth unemployment rate among European Union countries (Eurostat, 2016). A correct knowledge of Basque is an unavoidable requirement for a very specific public labour market in the Basque Country with a high percentage of civil servants (10%-16% depending on the region), for whom knowledge of the language is required.

This peculiarity of the region helps reduce class stratification, which is also corroborated by the fact that Basque-speaking families favour public schools more so than Government-dependent private ones when we compare them to Spanish-speaking families. However, our findings still suggest that there is some form of segregation occurring: higher levels of income are associated with higher rejection levels of immigration, as shown in the lower WTP values for immigration that medium or high income families have. This is consistent with a

long line of evidence in the literature regarding class segregation in schools (e.g. Archbald, 2004; Hsieh and Urquiola, 2006; Kahlenberg, 2004; McEwan *et al.*, 2008).

Recent literature has shown that distance from home is a very important attribute with regards to the actual school choice parents make (Calsamiglia and Güell, 2018). However, our stated preferences data indicate that distance is not considered by parents as one of the most important attributes. As indicated in and Mariel *et al.* (2018), the SP nature of the data can be an explanation of that finding, though more research on this topic based on big samples of SP and RP data sets is needed.

Parents are also found to have a positive WTP for extensive extracurricular activities. This aligns with previous evidence, such as Echols and Willms (1995), Hoxby (1999) and Maddaus (1990). Although they do not provide an economic valuation, they all agree that some parents value extracurricular activities even more so than academic performance: they appear to be used as a way to prolong the child's day without having to resort to a babysitter.

The Spanish workday is often split in half by a two-hour lunch break that prolongs the number of hours spent at the workplace even more so. The reason for this situation dates back to the rigid Franco dictatorship and is related to the adoption of the central European time zone, which resulted in the non-adoption of flexible schedules. Almost half of the Spaniards are still at work at 6pm (Sánchez, 2016). The extracurricular activities artificially make parents' and children's schedules more compatible as the children spend more time in school and can be picked up later. It is especially useful for families who have two working parents that work long hours. It is, probably, one of the main reasons why the extracurricular activities are generally accepted and demanded by the parents.

The idea that parents prefer schools that come recommended is also in line with findings in the literature, most notably with Ball and Vincent (1998) who argue that 'hot' or 'grapevine' knowledge, which is obtained through social networks, is of the utmost importance for parents when choosing a school.

In terms of school-oriented recommendations, the present study provides several: besides offering a couple of language models, e.g. schooling in All Basque and Trilingual, schools should focus their efforts on expanding their extracurricular activities, and getting their students' parents to recommend the school to their acquaintances and family members.

To our best knowledge, this is the first time a DCE has been applied to primary school choice in Spain. Even though it is an experimental methodology applied extensively in other areas it has not been applied in the area of education. The results of our analysis must be taken with caution due to the limited sample, and definitely more research in this field is needed, though, the results clearly show the applicability of that methodology to school choice problem and its possible benefits.

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Resumen

El objetivo de este estudio es analizar qué características de los colegios prefieren los padres del País Vasco a la hora de escoger una escuela primaria para sus hijos, llevando a cabo un Experimento de Elección Discreta aplicado a la elección de colegios.

Tras realizar el experimento y recolectar las respuestas, éstas han sido analizadas utilizando un Logit de Parámetros Aleatorios. Los resultados indican, en contraste con otros países y regiones, las características de los colegios más relevantes son el idioma de instrucción y la orientación religiosa del colegio. La contribución principal de este trabajo es la cuantificación, en unidades monetarias, de las preferencias parentales respecto a las características de los colegios en el País Vasco; además de ser la primera aplicación de esta metodología a la elección de colegios en España.

Palabras clave: elección de colegios, experimento de elección discreta, modelo logit mixto.

Clasificación JEL: I20, I28, I29, C25