Joint parental school choice: exploring the influence of individual preferences of husbands and wives

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Abstract

The objective of this paper is to study school choice as a deliberate joint parental decision. This decision is affected by the underlying preferences of the husband and wife. We use survey data from a sample of parents in the metropolitan area of Bilbao (Spain) to estimate a bargaining discrete choice model. The collected data set contains hypothetical school choices gathered in the form of a typical discrete choice experiment (stated preferences) and the actual school choice (revealed preferences). Stated preference data are obtained separately for husbands and wives, but the revealed preference choice is taken jointly. Our findings show, firstly, that the husband's and wife's stated preferences regarding school choice do not differ markedly. Secondly, the results obtained for the revealed preferences deviate from the stated preferences for some school characteristics. Finally, we find that neither the husband's nor the wife's preferences prevail in the actual joint school choice decision.

Keywords: discrete choice modeling, joint choice, parental choice, school selection.

JEL: C35.

1. Introduction

One of the hardest decisions that parents face is that of choosing a school for their children. The implications are far reaching, and there is much at stake in terms of the prospects for future education, the selection of a learning environment, the quality of companionship, exposure to shared moral values, access to sports and post-school activities and the cost of access, as well as the effects on the family's daily routines, among others. It is widely accepted that the variation in school type explains much of the variation in students' educational achievements, as measured by their grades (Cebolla-Boado et al., 2014; Chiu, 2010) and that the school decision directly affects the social environment to which children are exposed daily.

Therefore, differences in preferences between mothers and fathers, as well as knowing which — if any — of the two opinions prevails, or whether they compromise when making the actual choice, could be relevant for both policymakers (if, for example, the government wants to reinforce attendance to a subsidized private network, it might focus on the mothers because they care more about a solid bus system and extracurricular activities) and schools themselves (should they target mothers and fathers differently when looking to attract new students?).

Differences in parenting styles or preferences between mothers and fathers have already been found to influence children's sports achievements (Amorose et al., 2016), healthy versus non-healthy diets (Fielding-Singh, 2017; Marette et al., 2016), and most notably, on educational attainment (Blau and Hameiri, 2012; Davis and Brazil, 2016; Marissa and Ishaaq, 2012; McBride et al., 2005). Furthermore, mother's and father's schooling has also been found to affect their children's schooling in different ways. Typically, regarding intergenerational transmission of schooling levels, twin-based studies have found that father's schooling matters the most, whereas instrumental

variable based studies usually confirm the opposite (for overviews of this literature, see for example Black and Devereux, 2011; Holmlund et al., 2011). Contrasting with the previous literature, Amin et al. (2015), using a twin-based design, found that mother's schooling is more important than father's schooling for daughters' schooling; but the overall effect is that mother's schooling is equally as important as father's schooling.

Given the difficulty of carrying out a real-life experiment in which students are randomly assigned to schools in order to measure the importance schools have on children, one prominent line of research uses a quasi-experimental approach to tackle this issue: by exploiting the randomness of high school lottery winners in the Chicago Public School system. Cullen et al. (2006) found that lottery winners benefit on several non-traditional outcomes like self-reported disciplinary incidents and arrest rates. Angrist et al. (2011) were also able to conclude, using the randomness of charter school lottery winners, that Massachusetts charter schools boost students' achievement above the level attained by traditional urban public schools. Other school lotteries prove that winners in the Charlotte-Mecklenburg middle and high school district are less likely to be arrested and incarcerated for serious crimes as adults (Deming, 2011), whilst an improvement in terms of school attainment for high school lottery winners in the same school district is observed only for girls (Deming et al., 2014). In order to bypass the inherent self-selection of exploiting the randomness of school lotteries (only the effects on lottery applicants are captured), Abdulkadiroglu et al. (2016) used grandfathered enrollment in charter takeovers in Boston and New Orleans with an instrumental variable approach, finding that grandfathered students see substantial achievement gains.

On the other hand, quantitative empirical research on the subject of parental school choice usually focuses on the relationship between the family's socio-economic

characteristics and the type of school selected (e.g., Burgess et al., 2015; Goldring and Phillips, 2008; Hanushek et al., 2007; Rubinfeld and Shapiro, 1989). Generally, the conclusion of these studies is that certain schools are chosen by parents with specific socio-economic characteristics. As segregation by income and/or social class frequently exists, low-income families tend to have a restricted choice and often send their children to the (public) school assigned to them by the authorities in charge. The middle- and upper-income segments, however, have a larger choice set.

Furthermore, despite the increased public availability of objective test score indicators measuring school performance, many studies suggest that these scores are of limited guidance to parents when making their school choice decision. Instead, surveyed families state a wide array of complex reasons for choosing a particular school. For instance, the reasons that are most frequently mentioned for choosing a school among non-religious private schools include access to a smaller class size, shared beliefs, teaching style, proximity to home and academic reputation (Bosetti, 2004).

School selection is likely to be a participative decision in which both parents share their views, yet the literature pays little attention to the joint nature of this decision. The aim of this study is to analyze school choice as a joint deliberate parental decision and to relate such a decision to the individual preference of the mother and the father. We see this joint choice as being determined by the underlying preferences of the husband and wife. We estimate these preferences by means of both stated and revealed choice data collected via a specifically tailored survey administered in the metropolitan area of Bilbao, Spain, amongst parents of primary school age children. Several other studies have analyzed the differences between individual and household preferences in the context of stated preference methods in various fields, such as transport (Hensher et al., 2007, 2008; O'Neill and Hess, 2014), marketing (Adamowicz et al., 2005) and

environmental economics (Dosman and Adamowicz, 2006; Lindhjem and Navrud, 2009; Scarpa et al., 2012).

More specifically, we propose and apply an approach that is innovative in the school choice literature. It consists of a modified bargaining discrete choice model first proposed by Dosman and Adamowicz (2006) and later modified by others (Beharry-Borg et al., 2009; Rungie et al., 2014). These models are extended with specific scale parameters to handle the different natures of the stated preference from individual data and the revealed preference from household data. The specific contribution of this paper to this field of enquiry is thus to report the first application of a bargaining discrete choice model of school choice. The notion of joint deliberation by a party, even if it is comprised of only two individuals, as happens in a couple, being a fusion of the original individual preference, is intuitive. The bargaining term is used loosely here to denote that the joint decision is never completely explained by the preference of one party; rather, it is the result of a preference fusion or a bargaining process. The approach is used to identify formally which one of the individual preferences tends to prevail in the joint decision: in this case which member of the couple has more bargaining power when it comes to choosing a school.

The rest of the paper is organized as follows. The next section describes the case study. Then, section 3 presents the methodology, followed by the results in Section 4. The last section concludes.

2. Case Study

The educational system in Basque Country contains public schools, private independent schools and a solid network of government-dependent private schools. These government-dependent private schools are privately owned but receive public funding (Vega-Bayo and Mariel, 2015). The system is heavily influenced by the existence of

two co-official languages, Spanish and Basque. Families can choose between three main language models based on the language(s) of instruction: Spanish, Basque or bilingual. The bilingual language model is a mixture of the two; some subjects are taught in Basque, while others are taught in Spanish. The percentage of subjects that are taught in each language is not regulated by the Government and therefore can vary between schools. Besides those three original language models, currently two novel alternatives exist. The first is a trilingual language model, in which subjects are taught in Basque, Spanish or English, and the second is an international school model, a private independent school that usually follows the education system in another country and hence teaches in that language (e.g., German, English or French).

The questionnaire used in our study was purposely built to analyze the influence of individual (husbands' and wives') preferences regarding the joint choice of school by both parents. The first section was developed to provide basic survey information to the parents. It described the objective, its structure and instructions on how to return the survey form by mail after completion via a pre-stamped envelope. The second part was the revealed preference (RP) section, which was answered jointly by both parents; it collected information regarding the school attended by the children in the family and was used to characterize the actual school choice made jointly by the parents. Finally, the stated preference (SP) section focused on hypothetical choices based on an experimental stated choice design (discrete choice experiment or DCE). The husband and wife separately answered the hypothetical school choice. This SP section independently asked each parent to consider three alternatives: (*a*) public school, (*b*) government-dependent private school and (*c*) independent private school. Each alternative was described by means of different school attributes. Each member of the

couple had to choose his/her preferred alternative (public, government private or independent private) in a sequence of twelve hypothetical choice scenarios.

The different characteristics, or attributes, that define the hypothetical choice scenarios are crucial for the proper application of the DCE, given that their levels influence the results. We decided which attributes should be included in the DCE, that is, the school characteristics that are likely to be important for parents when choosing a school for their children, by means of a qualitative discussion focus group. During this exercise we also defined each attribute's levels. Specifically, we gathered a focus group of 25 people that included all the relevant agents: parents, teachers, head teachers, principals and school administrators. The goal of this focus group was to gather opinions regarding the attributes that parents actually consider when choosing a school for their children. The participants in the focus group rated, anonymously, the relevance of a number of school characteristics. The results obtained from the focus group led to the inclusion of the following school characteristics in our choice experiment: cost, language of instruction, religious orientation, schooling through college (between the ages of 2 and 18), the presence of immigration, extracurricular activities and recommended by family and/or friends.

Several other school characteristics were discarded as being only marginally relevant or difficult for parents to know prior to enrollment. These included the academic results, quality of the school's infrastructure, dress code and political orientation. The participants in the focus group also debated the possible values (levels) that the school characteristics can take, and these are presented in Table 1.

TABLE 1: Attributes and Levels of the Discrete Choice Experiment

Attributes	**Levels**					
Cost (tuition fees)	*Public* €0/month		*Gov. Dependent* €50/month €100/month €150/month €200/month		*Indep. Private* €300/month €400/month €500/month €600/month	
Distance from home	1 km	3 km	5 km	10 km	20 km	30 km
Linguistic model	All Spanish	All Basque	Bilingual (Basque and Spanish)	Trilingual (Basque, Spanish and English)	Interna-tional School	
Religious orientation	Secular			Religious		
Schooling through college	Yes			No		
Presence of immigration	0%	10%	20%	40%	60%	
Extracurricular activities	Standard			Extensive		
Recommended	Yes			No		

Note: Attributes and levels gathered by focus group to collect opinions regarding which attributes parents actually consider when choosing a school for their children.

One should note that, although all of the attributes appeared in each of the three alternatives on the choice card, certain attribute levels were alternative-specific. More precisely, the levels for tuition fees were fixed for each alternative, as shown in Table 1. Furthermore, for the linguistic model attribute, an international school could only appear in the independent private alternative; moreover, the higher levels of immigration (40% and 60%) were only included in the public school alternative. An example of the choice card (translated from Spanish) used in the survey is presented in Figure 1.

To configure the different alternatives with varying attribute levels on each choice card, we generated a D-optimal factorial fractional design for a random parameter model. The choice card sets were generated using Ngene (ChoiceMetrics, 2012) and consisted of four blocks of twelve rows each, taking into account that, as previously mentioned, some of the attribute levels were alternative-specific.

Ngene (ChoiceMetrics, 2012) is a software package that can generate the experimental designs typically used in stated choice experiments for the purpose of estimating choice models, particularly of the logit type. Ngene allows for the generation of orthogonal designs, optimal orthogonal designs and efficient stated choice designs. We use a D-optimal factorial fractional design which, in contrast to an orthogonal design, does not minimize the correlation in the data, but aims to generate parameter estimates with as small as possible standard errors.

FIGURE 1: Example of a Choice Card Presented to Parents

	PUBLIC	GOVERNMENT-DEP. PRIVATE	INDEPENDENT PRIVATE
COST	0€/month	100€/month	400€/month
DISTANCE	3km	20km	5km
LANGUAGE MODEL	All Basque	Bilingual	Trilingual
RELIGIOUS ORIENTATION	Secular	Religious	Secular
SCHOOLING AGES 2-18	✗ No	✓ Yes	✗ No
IMMIGRATION	20 %	10 %	
EXTRACURRICULAR OFFER	Standard	Standard	Extensive
RECOMMENDED	Yes	Yes	No
YOUR CHOICE	☐	☐	☐

Note: A hypothetical choice card presents three different alternatives – public, government-dependent private, and independent private schools. Each of those three alternatives is characterized by certain levels of each attribute.

After deciding on the attributes and their levels with help from the focus group and generating the experimental design, we conducted a pilot phase to check how a small set of parents would answer the full survey. This pilot phase was run before the actual implementation of the whole DCE and enabled us to ensure that the wording in the survey was both correct and unambiguous and that the design of the experiment worked, allowing for the estimation of the coefficients in the Logit-type model.

We then handed out the questionnaires in paper form between October 2015 and January 2016. We randomly selected 20 schools in the Metropolitan area of Bilbao and

distributed to each school, in collaboration with the corresponding head teachers, 15 pre-stamped envelopes among parents that had children aged between three and eight. The families were randomly chosen from the school records. The surveys were therefore completed by the parents at home during their spare time. Given the limited financial support, the collection of the survey via a pre-stamped envelope was the only viable alternative. The surveys were filled out autonomously by the two parents and this could lead to an undesirable bias. Nevertheless, some of the families (approximately 10%) were supervised by the authors when filling out their surveys. In general, parents took the survey very seriously because choosing a school was a very important decision for them, one they had faced relatively recently.

As previously mentioned, the survey asked the parents to answer the SP part of the questionnaire separately and the RP part jointly. This was essential to distinguish the individual preferences from the joint preference expressed as a couple. Despite the fact that the families were contacted through the schools' head teachers, the response rate was poor (119 families, containing 238 parents, responded). This is likely to be due to the facts that the families were unsupervised while filling out the questionnaire and that they were responsible for returning their own responses themselves. Due to the relatively limited sample, caution is necessary when interpreting the results of the estimations. However, the sample data seem to be representative of the schools in the area, as explained by Vega-Bayo and Mariel (2016), who use the SP part of the survey as their data set. Their results are based on the random parameter logit model (Train, 2009) and present an economic valuation of school characteristics by means of parents' willingness to pay for certain school attributes. These willingness-to-pay values are then related to different socio-demographic variables to try to disentangle the underlying preference heterogeneity. They conclude that the language spoken at home determines

much of the school choice. Basque-speaking families prefer to send their children to all-Basque schools, whereas, as expected, Spanish-speaking families prefer the bilingual or even the trilingual language model to the all-Spanish or all-Basque model.

3. Method

As a starting point for our analysis, we use McFadden's (1974) random utility model. Under this framework the utility U_{ntj} that respondent n obtains from alternative j in each choice (card) situation t can be expressed as:

$$U_{ntj} = \lambda(V_{ntj} + \varepsilon_{ntj}), \text{ with } V_{ntj} = \sum_{k=1}^{K}(\beta_k x_{ntjk}) + ASC_j \quad (1)$$

for a total of J alternatives, N individuals and T choice cards. We assume that the deterministic part of the utility V_{ntj} is a linear combination of K observable explanatory variables, attributes x_{ntjk} and attribute parameters β_k. The alternative-specific constants ASC_j capture the average effect on utility of all factors that are not included in the model. The alternative-specific constants are included only in $J-1$ utilities for identification purposes (Train, 2009). The parameter λ is a scale factor that is inversely proportional to the common standard deviation σ_ε of the Gumbel error terms, and it is usually fixed to $\lambda = \pi/(\sqrt{6}\,\sigma_\varepsilon)$ due to the identification so that $Var(\varepsilon_{ntj}) = \pi^2/6$.

In our case the SP part of the survey was completed by 119 husbands and 119 wives separately, and each spouse responded to 12 choice cards (T=12) with 3 alternatives representing the public, private and government-dependent schools (J=3). This is why the number of observations for each gender is N=119×12=1,428. The SP part of the model includes the 11 attributes described above: *cost*, *distance from home*, *linguistic model*, *religious orientation*, *schooling through college*, *presence of immigration*, *extracurricular activities* and *recommended*. If models of individual

preferences for men and women are estimated separately, the corresponding deterministic parts of the utility function in equation (1) for men ($V_{ntj}^{SP_M}$) and women ($V_{ntj}^{SP_W}$) are defined as:

$$V_{ntj}^{SP_M} = \lambda_{SP_M}(ASC_j + \beta_1^{SP_M} x_{ntj1} + \cdots + \beta_{11}^{SP_M} x_{ntj11}), \quad (2)$$

$$V_{ntj}^{SP_W} = \lambda_{SP_W}\left(ASC_j + \beta_1^{SP_W} x_{ntj1} + \cdots + \beta_{11}^{SP_W} x_{ntj11}\right). \quad (3)$$

The RP part of the survey collects the actual school choice made by the parents. The corresponding model for that joint decision includes the same attributes as (2) and (3), but the number of alternatives and observations differs. In our sample of 119 valid families, 37 different schools are chosen, meaning that in our case J=37, N=119 and T=1 (1 choice per family, the actual choice), so the sub-index t can be dropped. Therefore, the deterministic part of the utility function (1) for the real joint school choice is:

$$V_{nj}^{RP} = \lambda_{RP}\left(ASC_j + \beta_1^{RP} x_{nj1} + \cdots + \beta_r^{RP} x_{nj11}\right). \quad (4)$$

Efficient full information maximum likelihood (FIML) estimates of the joint model, which gathers SP and RP responses, can be derived by pooling the individual and joint choices into a single sample. If the indirect utility structures for the individual (SP) and joint (RP) decisions are those defined in (2), (3) and (4), then the indirect utility structure of the joint model is defined as

$$V_{ntj}(\cdot) = \begin{Bmatrix} \lambda_{SP_M}\left(ASC_j^{SP_M} + \beta_1^{SP_M} x_{ntj1} + \cdots + \beta_{11}^{SP_M} x_{ntj11}\right), \text{if } n \text{ man}, \lambda_{SP_M} = 1 \\ \lambda_{SP_W}\left(ASC_j^{SP_W} + \beta_1^{SP_W} x_{ntj1} + \cdots + \beta_{11}^{SP_W} x_{ntj11}\right), \text{if } n \text{ woman}, \lambda_{SP_W} > 0 \\ \lambda_{RP}\left(ASC_j + \beta_1^{RP} x_{nj1} + \cdots + \beta_{11}^{RP} x_{nj11}\right), \text{if } n \text{ family}, \lambda_{RP_J} > 0 \end{Bmatrix} \quad (5)$$

where $\lambda_{SP_M}$is set to one to allow the identification of λ_{SP_W} and λ_{RP}. Our aim is to analyze the performance of bargaining models assuming that the members of a couple bargain over their joint evaluations of the alternatives based on their respective individual utilities (e.g., Dosman and Adamowicz, 2006). That is why the proposed

joint decision model includes a bargaining parameter δ and the joint parameter of each attribute in (4) is therefore defined as a linear combination of the SP coefficients from (2) and (3). Therefore, the parameters of the part of the utility that corresponds to the joint decision, represented by the last equation in (5), are usually defined as a weighted mean of the coefficients corresponding to individual choices. In that case the joint decision part of the utility in (5) would become

$$\lambda_{RP_J}\left(ASC_j^{RP} + (\delta\beta_1^{SP_M} + (1-\delta)\beta_1^{SP_W})x_{nj1} + \cdots + (\delta\beta_{11}^{SP_M} + (1-\delta)\beta_{11}^{SP_W})x_{nj11}\right) \quad (6)$$

assuming that $0 \leq \delta \leq 1$. Some papers discuss that assumption and find evidence that $\delta_1 > 1$. Beharry-Borg et al. (2009) describe $\delta > 1$ values as a symptom of the group polarization phenomenon, that is, the individual preferences when they are part of a group are even stronger than the individual responses had they not been part of the group. At the opposite end, Dellaert et al. (1998, p.137) suggest that $\delta < 0$ is evidence of the "systematic denial of the individual's preference in the joint evaluation."

Our approach deviates from the standard bargaining model defined by (6) (see the discussion in Dosman and Adamowicz, 2006), because the joint choices that are analyzed in the existing literature are expressed in a hypothetical context and do not represent the real behavior of the couple. That is, in the literature a parameter estimated from a joint decision model typically lies between the estimated parameters β from individual models, and a simple linear combination $(\delta\beta + (1-\delta)\beta)$ seems like a suitable proposal. In our case, however, the parents' school decision is a real choice manifesting a real preference, and the estimated parameter from a joint decision model can be on a completely different scale from the parameters estimated by individual models. Therefore, the corresponding parameters in the joint part of the model can deviate from the proposed linear combination of the SP coefficients more than is usually described in the literature due to the different nature of the joint decision data (RP).

For this reason, we redefine the joint decision part of the utility in (5) as

$$\lambda_{RP_J}\left(ASC_j^{RP} + (\,\delta\beta_1^{SP_M} + (1-\delta)\,\beta_1^{SP_W})\,\sigma_1\,x_{nj1} + \cdots + (\,\delta\beta_{11}^{SP_M} + (1-\delta)\beta_{11}^{SP_W})\,\sigma_{11}\,x_{nj11}\right), \qquad (7)$$

where new scale parameters $\sigma_k, k = 1,2,\ldots,11$ account for the difference between SP and RP data. Obviously, some restrictions in (7) will be needed for the sake of identification. The parameters σ_k represent a measure of the average difference between what the members of a couple prefer as individuals in a hypothetical school choice context and what they actually decided jointly in the real school choice for each attribute. The indirect utility structure of the bargaining model therefore has the following form:

$$V_{ntj}(\cdot) = \begin{Bmatrix} \lambda_{SP_M}\left(ASC_j^{SP_M} + \beta_1^{SP_M}x_{ntj1} + \cdots + \beta_{11}^{SP_M}x_{ntj11}\right), \text{if } n \text{ man}, \lambda_{SP_M} = 1 \\ \lambda_{SP_W}\left(ASC_j^{SP_W} + \beta_1^{SP_W}x_{ntj1} + \cdots + \beta_{11}^{SP_W}x_{ntj11}\right), \text{if } n \text{ woman}, \lambda_{SP_W} > 0 \\ \lambda_{RP_J}\left(ASC_j^{RP} + (\,\delta\beta_1^{SP_M} + (1-\delta)\,\beta_1^{SP_W})\,\sigma_1\,x_{nj1} + \cdots + (\,\delta\beta_{11}^{SP_M} + (1-\delta)\beta_{11}^{SP_W})\,\sigma_{11}\,x_{nj11}\right), \text{ if } n \text{ joint}, \lambda_{RP_J} > 0 \end{Bmatrix}$$

(8)

In this framework, δ represents the bargaining coefficient. It indicates the degree of prevalence of the husband's individual utility over that of the wife's in the real joint decision. O'Neill and Hess (2014) highlight the importance of different weights δ across attributes, but these would lead in our case to an unidentified model, as each parameter of the joint model is already multiplied by an attribute-specific scale σ_k. To enure $0 \leq \delta \leq 1$ and $\sigma_k > 0$, these parameters are re-parametrized as $\delta = \exp(\theta)\,/(1+\exp(\theta))$ and $\sigma_k = \exp(\mu_k)$, and the estimated parameters are θ and $\mu_k, k = 1,2,\ldots,11$.

4. Results

Our initial data set of 119 families was reduced to 109 when we discarded the responses from some incorrectly completed questionnaires. Moreover, there were only 4 observations corresponding to independent private schools. Though this was not

surprising given the percentage of such schools in the area, they were insufficient for us to estimate the coefficient of the *international* language model. Hence, these observations were also dropped and the attribute was not included in the RP part of the model. The final sample for our analysis included 105 families.

Table 2 shows the descriptive statistics of the school characteristics as well as some socio-economic characteristics of the sampled families. Our sample is restricted to families with children ages 3-8 living in the metropolitan area of Bilbao. That is why some of the characteristics present unexpected values. There are no official statistics for this subpopulation that could be directly comparable to ours, but according to the last available report of the Basque Institute for Statistics - Eustat regarding the family income, the average family income was 3,448 € per month. In our sample 59% of the families have medium income (i.e., > 3,000 € but < 6,000 €). The average number of children for two-parent families in the province of Vizcaya in 2011 was 1.54 and the percentage of people between ages 20-64 with a higher education degree was 37.23%. The proportion of actual public, government-dependent private and independent private schools in the area is 39%, 59% and 2% respectively. This means that in our sample, the government-dependent private schools are slightly overrepresented, which is also related to high percentages of higher levels of education for both parents. However, despite these discrepancies, the collected sample seems to represent the target population of the metropolitan area of Bilbao relatively well.

TABLE 2: Descriptive statistics

Variable	Description	min.	max.	mean	st.dev.
Family and chosen school:					
Cost	Tuition fees for Government-dependent Private schools (€)	15	260	98.1	55.0
Distance	Distance from home (km)	0	20	3.6	4.0
Immigration	Presence of immigration in school (%)	0	30	6.0	5.3
Parents:					
Age Father	Father´s age	28	58	41.4	5.0
Age Mother	Mother´s age	26	55	40.2	4.7

Family and chosen school:		***Value***	***Frequency***
Schooling	Schooling through college, = 0 if yes	0	32%
	= 1 if yes	1	68%
Religious orientation	= 0 if secular	0	67%
	= 1 if religious	1	33%
Extracurricular activities	= 0 if standard	0	39%
	= 1 if extensive	1	61%
Recommended	= 0 if no	0	39%
	= 1 if yes	1	61%
Children	Number of children	1	28%
		2	60%
		3	12%
Family income	= 1 if Family income < 3000 €	1	36%
	= 2 if 3001 € < Family income < 6000 €	2	59%
	= 3 if Family income > 6001 €	3	5%
Type of school	= 1 if public	1	27%
	= 2 if government-dependent private	2	70%
	= 3 if independent private	3	3%
Parents:			
Education husband	= 1 if no education	1	1%
	= 2 if primary education	2	3%
	= 3 if 1st level secondary education (compulsory, ages 12-16)	3	8%
	= 4 if 2nd level secondary education (optional, ages 16-18)	4	13%
	= 5 if non-university post-secondary education (2 year "colleges")	5	23%
	= 6 if university education	6	32%
	= 7 if university education + postgraduate studies	7	20%
Education wife	= 1 if no education	1	0%
	= 2 if primary education	2	0%
	= 3 if 1st level secondary education (compulsory, ages 12-16)	3	2%
	= 4 if 2nd level secondary education (optional, ages 16-18)	4	3%
	= 5 if non-university post-secondary education (2 year "colleges")	5	19%
	= 6 if university education	6	56%
	= 7 if university education + postgraduate studies	7	20%
Language home husband	Language usually used with children, = 0 is Spanish,	0	86%
	= 1, Basque	1	14%
Language home wife	Language usually used with children, = 0 is Spanish,	0	86%
	= 1, Basque	1	14%

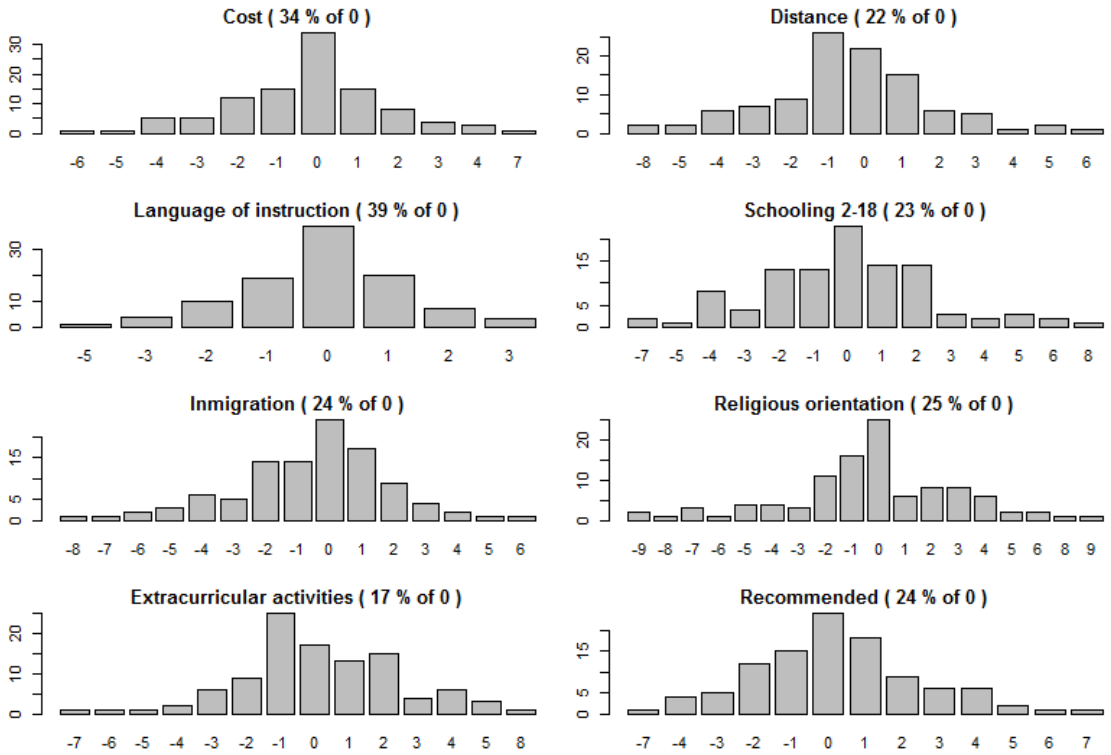
Source: Authors' calculation

The surveys were filled out autonomously by the two parents, therefore the independence of responses in the separate SP part of the survey cannot be guaranteed for all families (only 10% of the parents were supervised). Nevertheless, the data indicates that the parents followed the instructions for independent completion of the survey.

After the completion of 12 choice cards, each parent was asked to value the importance of each attribute on a 10-point Likert scale. These ratings are usually included in DCE to analyze the attribute decision rules. They cannot be used directly in

a model as explanatory variables because they are by definition endogenous but they can be used as indicators for latent constructs in hybrid choice models (Hess and Hensher, 2013). This indirect use in the choice models is, however, not possible in our case because our sample size is limited and, therefore, not sufficiently large to allow for an estimation of a hybrid choice model which generally contains a very high number of parameters.

Figure 2. Differences between the ratings on importance of each attribute stated separately by husbands and wives



Note: Histograms present the distribution of variables defined as differences between the scores on the importance of each attribute. The value of zero means that the score set by both parents is the same. The higher absolute value of the difference, the bigger the departure in scores set by both parents.

Nevertheless, this information can be used to analyze the differences in responses between husbands and wives. Table 3 shows the descriptive statistics of variables defined as differences between the scores on the importance of each attribute stated separately by husbands and wives. Since the ratings can take on values between 1 and 10, the minimum possible value of these differences is -9 and the maximum

possible value is 9. The minimum and maximum values and standard deviations in Table 3 show that these differences have a very large spread. Moreover, for the attributes *Distance* and *Inmigration* the null hypothesis that the difference is zero is rejected at the 5% significance level. It seems to be an indication of within-family variation represented by the ratings, and an indication that the surveys were filled out separately. This conclusion is also supported by the bar plots of these differences, depicted in Figure 2. As shown in Figure 2, the distribution of these differences is wide and the percentages of families with the same score assigned to an attribute (i.e., the difference is equal to zero) are relatively low, varying between 17 % and 39 %.

As expected, the most homogenous scores are obtained for the attribute *Language of instruction* and *Cost*. As explained above, the language of instruction is a critical attribute for many families and this proximity of husbands and wives scores is, therefore, expected. The cost of schooling is usually an important part of the family budget, thus, the similarity of scores is also an expected result. The biggest differences correspond to the attribute *Extracurricular Activities*. The parent who is more involved in the daily routine of the children can be more concerned about extracurricular activities assigning a higher rating to this attribute, and this is probably why these differences are observed.

Table 3: Descriptive statistics of the differences between the scores on importance of each attribute stated separately by husbands and wives

Variable	min.	max.	mean	st.dev.	t-test	p-value	
Cost	-6	7	-0.22	2.03	-1.11	0.27	
Distance to home	-8	6	-0.51	2.32	-2.23	0.03	**
Extracurricular activities	-7	8	0.14	2.41	0.61	0.54	
Immigration	-8	6	-0.55	2.46	-2.27	0.02	**
Instruction language	-5	3	-0.13	1.38	-0.93	0.35	
Schooling 2-18	-7	8	-0.08	2.60	-0.30	0.76	

Recommended	-7	7	0.23	2.32	1.01	0.31
Religious orientation	-9	9	-0.26	3.31	-0.80	0.43

Note: Descriptive statistics of variables defined as differences between the scores on the importance of each attribute represented in histograms in Figure 2.

The qualitative attributes *linguistic model*, *religious orientation*, *schooling through college*, *extracurricular activities* and *recommended* were effect coded (Bech and Gyrd-Hansen, 2005), and the quantitative attributes *cost*, *distance from home* and *presence of immigration* were divided by 100, 10 and 10, respectively, to avoid numerical issues in the estimation process. All the models presented below were estimated in PythonBiogeme (Bierlaire, 2003, 2008) by maximum likelihood.

The separate estimations of the three conditional logit models for the families', husbands' and wives' choices presented in Table 4 lead to exactly the same results as an estimation of the joint conditional logit model defined in (5) and (1) applied to a pooled sample. The maximized LogL=-2,379.3 of the pooled model equals the sum of the maximized LogL values of the three separate models presented in Table 4, leading to the conclusion that the scale factors λ_{SP_W} and λ_{RP_J}can be set to one (Swait and Louviere, 1993).

TABLE 4: Separate Estimation MNL

	Joint			**Men (SP)**			**Women (SP)**		
	Decision (RP)								
	β^{RP}			β^{SP_M}			β^{SP_W}		
	Coeff.	*Rob. t*		*Coeff.*	*Rob. t*		*Coeff.*	*Rob. t*	
Cost	-0.77	-1.44	*	-0.26	-4.06	***	-0.25	-3.57	***
Distance from home	-0.52	-8.44	***	-0.06	-1.23		-0.05	-1.47	*
Extracurricular activities	0.54	2.89	***	-0.06	-1.47	*	0.11	2.71	***
Immigration	0.12	0.90		-0.16	-4.85	***	-0.11	-3.63	***
Bilingual	0.92	1.63	*	0.22	2.50	***	0.33	4.29	***
International				0.54	2.73	***	0.17	0.81	
All Spanish	-0.78	-1.45	*	-0.75	-7.29	***	-0.87	-9.40	***
Trilingual	0.11	0.17		0.66	7.57	***	0.34	4.49	***
Schooling 2–18	-0.16	-0.66		-0.09	-2.07	***	0.01	0.15	
Recommended	1.63	7.05	***	0.08	2.09	***	0.04	0.96	
Religious orientation	-1.15	-2.41	***	-0.20	-4.06	***	-0.15	-3.10	***
ASC gov.-dependent	2.06	2.27	***	0.76	5.76	***	0.72	6.02	***
ASC private				0.03	0.09		0.49	1.71	**
LogL	-107.3			-1130.7			-1141.3		
Num. of parameters	11			13			13		
Choices	105			1191			1198		

*** 5%, ** 10%, * 20%, Rob. t. stands for robust t-statistic

The SP results for men and women presented in the third and fifth columns of Table 4 are very similar, indicating that there are no large differences between husbands' and wives' preferences regarding the school choice in the metropolitan area of Bilbao. The highest coefficients (in absolute values) correspond to the cost and the language of instruction (*bilingual, international, all Spanish* and *trilingual*), highlighting these as the most important attributes in school choice. The language of instruction is a critical attribute for many families, because proper knowledge of Basque is desirable, either because of the sense of pride and cultural identity inherent to Basque society or because of the high unemployment rate combined with the language policy regarding civil servants (most civil service jobs in Basque Country require knowledge of Basque at the C1 level in the Common European Framework of Reference for Languages, i.e., advanced or proficient users). These issues, together with the fact that it is widely accepted in the area that to speak Basque well enough the all-Spanish language model should be avoided, explain the observed positive preference for the other language models.

Regarding the remaining attributes, the following conclusions can be drawn. *Distance* has a very low coefficient, and it is even insignificant for men, implying that for them school distance does not appear to be an important characteristic. *Extracurricular activities* is the only attribute for which members of couples have opposite preferences. This could be related to the fact that extracurricular activities are more relevant to mothers than to fathers. Mothers are usually the ones who pick up the children and are therefore more likely than their husbands to be concerned about extracurricular activities. The importance of these activities is also related to the publicly recognized problem of long working hours in Spain, which makes it harder to reconcile work and family life (Sánchez, 2016).

Immigration causes disutility in both mothers and fathers. This is in line with other findings in the empirical literature, suggesting that there is some evidence of segregation in schools (e.g. Bifulco and Ladd, 2007; Denessen et al., 2005; Elacqua, 2012). The *schooling 2–18* and *recommended* attributes have very low coefficients (in absolute values) and are insignificant for women. Finally, the attribute *religious orientation* presents a negative and relatively high (in absolute values) coefficient, indicating that on average families prefer secular schools nowadays.

The RP model of the joint decision leads to markedly different coefficient estimates, as one can observe in the first column of Table 4. The highest coefficients in absolute values correspond to *recommended* and *religious orientation.* This indicates that, when it comes to the real school choice, parents pay more attention to these attributes than they stated in the SP part of the survey. The difference in the *recommended* coefficients was expected: not many people send their children to a school for which they do not have at least some degree of recommendation, even if it is only through mere acquaintances. Given the high (in absolute values) negative coefficient of *religious orientation* in the RP, the majority of the families on average prefer a secular school even more strongly than in the hypothetical choice, but this school attribute can be controversial and decisive in parents' decision (Cohen-Zada and Justman, 2012).

The language of instruction (*bilingual, international, all Spanish* and *trilingual*) coefficients generally indicate the same results as in the SP data estimation (the *bilingual* linguistic model is the preferred one overall, and the *all-Spanish* linguistic model is the rejected one), but they are less important than in the SP model. Surprisingly, the *immigration* coefficient is not significant, showing that on average the

parents in the metropolitan area of Bilbao do not consider it to be an important issue; immigration is generally not a problem in most of the schools in the area.

TABLE 5: Joint Bargaining Model

	Joint Decision (RP)			Men (SP)						Women (SP)			
	μ_k			β^{RP}			β^{SP_M}			β^{SP_W}			
	Scale coeff.	*Rob. t*		*Coeff.*	*Rob. t*		*Coeff.*	*Rob. t*		*Coeff.*	*Rob. t*		
Cost	1.09	1.53	*				-0.26	-4.06	***	-0.25	-3.57	***	
Distance from home	2.27	4.02	***				-0.06	-1.23		-0.05	-1.47	*	
Extracurricular activities	2.69	0.79					-0.06	-1.47	*	0.11	2.71	***	
Immigration				0.12	0.90		-0.16	-4.85	***	-0.11	-3.63	***	
Bilingual				0.92	1.63	*	0.22	2.50	***	0.33	4.29	***	
International							0.54	2.73	***	0.17	0.81		
All Spanish				-0.78	-1.45	*	-0.75	-7.29	***	-0.87	-9.40	***	
Trilingual				0.11	0.17		0.66	7.57	***	0.34	4.49	***	
Schooling 2–18	1.52	0.57					-0.09	-2.07	***	0.01	0.15		
Recommended	3.32	6.56	***				0.08	2.09	***	0.04	0.96		
Religious orientation				-1.15	-2.41	***	-0.20	-4.06	***	-0.15	-3.10	***	
ASC gov.-dependent				2.06	2.27	***	0.76	5.76	***	0.72	6.02	***	
ASC private							0.03	0.09		0.49	1.71	**	
	θ *Bargaining coeff.*	*Rob. t*											
	-0.30	-0.09											
LogL	-2379.3												
Num. of parameters	38												

*** 5%, ** 10%, * 20%, Rob. t. stands for robust t-statistic

The estimation of the bargaining model (8) is presented in Table 5. The coefficients corresponding to the individual husband's and wife's decisions based on SP data are presented in the fifth and seventh columns of Table 5, and these are almost identical to the coefficients in Table 4 that correspond to the separate estimation. The first and third columns of Table 5 present the estimations corresponding to the RP part of the bargaining model. The linear combination of the individual coefficients ($\delta\beta_k^{SP_M} + (1-\delta)\,\beta_k^{SP_W}$) could not be estimated for all the attributes, as most were effect coded, which, together with the limited sample size of the RP data, made the estimated likelihood function flat, causing convergence problems in the estimation procedure. Therefore, some of the coefficients (*immigration*, *bilingual*, *all Spanish*, *trilingual* and *religious orientation*) were eliminated from the bargaining structure and estimated as in the previous conditional logit model defined in (5) and (1). The bargaining parameter δ was included only in the remaining attributes. Its estimation is

not significantly different from zero. This means that on average neither the husbands' nor the wives' preferences have a larger influence on the final school choice, since $\delta = \exp(0) = 0.5$. That is, the parents' preferences are equally important in the actual school choice. This means that, even though the social position of women in Basque society has traditionally been better than in neighboring cultures (Ortiz-Osés and Mayr, 1981), their opinion does not prevail over their husband's when it comes to making the joint choice of a school for their children.

As mentioned above, language has a very strong role in the Basque Country educational system. This is clearly not the case in most other areas in Spain or other countries. Therefore, the results cannot be extrapolated easily and must be interpreted with caution. This strong language-preference dimension could be affecting our results, especially if we consider that assortative mating of parents might be very strongly based on the language. This is supported by the descriptive statistics shown in Table 2, which indicates that all parents in our sample use the same language to communicate with their children. The bargaining process could be influenced by this issue. This can be one of the reasons why the parents' preferences are equally important in the actual school choice, since the strong language-preference dimension might influence other dimensions and the whole bargaining process.

The first column of Table 5 presents the estimation of the scale parameters μ_k defined in (8). Their values indicate the closeness (or distance) between the couple's real choice and the hypothetical one in the stated preferences. One can observe that three out of five scale parameters are significant, indicating that the revealed preferences for these attributes deviate markedly from the stated preferences. According to our results, parents are more sensitive to the cost of the school than they state in the hypothetical part of the survey and they pay more attention to the distance to the school.

Lastly, they place more weight on the school being recommended than they state in the hypothetical choice. This comparison of the RP and SP figures shows that our results are mixed, given that some SP coefficients of our bargaining model are not unlike the RP data, while there are some coefficients that differ significantly.

As a last step, we analyze the within-family differences in preferences for each school attribute. Our data set does not contain sufficient information at the family or individual level to allow for the estimation of individual coefficients of our choice model, because there is only one observation for the joint family RP choice and twelve observations per each husband and wife. This is why we focus on individual specific mean coefficients (Greene et al., 2005; Hess, 2010), which can be obtained from a mixed logit model. The mixed logit model (Hensher and Greene, 2003; McFadden and Train, 2000) allows us to incorporate random coefficients in a choice model. This is done by assuming a specific distribution for each coefficient and estimating that distribution's corresponding parameters. The specific coefficient for each respondent, representing his/her specific individual preference, would therefore be drawn from that distribution. Since there is usually not enough information collected to estimate the individual preferences, we focus on specific subgroups. Thus, we can distinguish between the distribution of tastes in the population, and the distribution of tastes in the subpopulation of respondents who make particular choices.

The conditional distribution (Greene et al., 2005; Hess, 2010) of random coefficients depends on some parameters in the subpopulation of people who make a specific sequence of choices when facing the same choice tasks. Typically, the conditional distribution allows us to analyze various aspects of the conditional distribution, such as differences between men and women or young and old people.

We therefore estimate a Random Parameter Logit model, which belongs to the family of Mixed Logit models (Hensher and Greene, 2003; McFadden and Train, 2000), separately for wives and husbands, by maximizing the corresponding simulated log-likelihood function using 2000 random Halton draws. The estimation results are presented in Table 6. These results generalize the results for wives and husbands presented in the third and fifth columns of Table 4, since all of the coefficients are now assumed to be normally distributed. The estimated means and standard deviations of these distributions for men are presented in the third and fifth columns of Table 6, and the seventh and ninth columns present the estimations for women. The general conclusions obtained from Table 6 are very similar to the conclusions from Table 4.

TABLE 6: Separate Estimation RPL

	RPL SP MEN						**RPL SP WOMEN**					
	Coeff.	Rob. t		St. Dev.	Rob. t		Coeff.	Rob. t		St. Dev.	Rob. t	
Cost	-0.494	-5.37	***	0.335	7.12	***	-0.398	-4.19	***	0.271	6.29	***
Distance to home	-0.124	-1.87	*	0.303	4.41	***	-0.099	-1.64		0.436	7.26	***
Extracurricular activities	-0.183	-1.90	*	0.077	0.22		0.225	2.26	**	0.214	1.05	
Immigration	-0.219	-4.63	***	0.194	3.45	***	-0.157	-3.65	***	0.184	3.50	***
Bilingual	0.375	2.86	***	0.016	0.09		0.135	0.78		0.324	0.84	
International	0.590	1.99	**	0.704	2.11	**	-0.194	-0.58		0.829	2.20	**
All Spanish	-0.940	-4.66	***	0.883	3.69	***	-1.686	-6.70	***	1.097	4.36	***
Trilingual	0.952	5.87	***	0.471	2.45	**	0.134	0.73		0.670	3.83	***
Schooling 2-18	-0.266	-2.07	**	0.728	5.43	***	0.010	0.10		0.054	0.16	
Recommended	0.216	2.12	**	0.415	2.83	***	0.141	1.35		0.177	0.78	
Religious orientation	-0.618	-4.33	***	0.771	5.51	***	-0.419	-2.90	***	0.876	6.13	***
ASC Gov. dependent private	0.637	1.85					0.243	0.90				
ASC Private	-0.635	-1.41	*				-0.773	-2.21	**			
LogL	-1065.500						-1064.900					
Choices	1191						1198					
Num. of parameters	24						24					

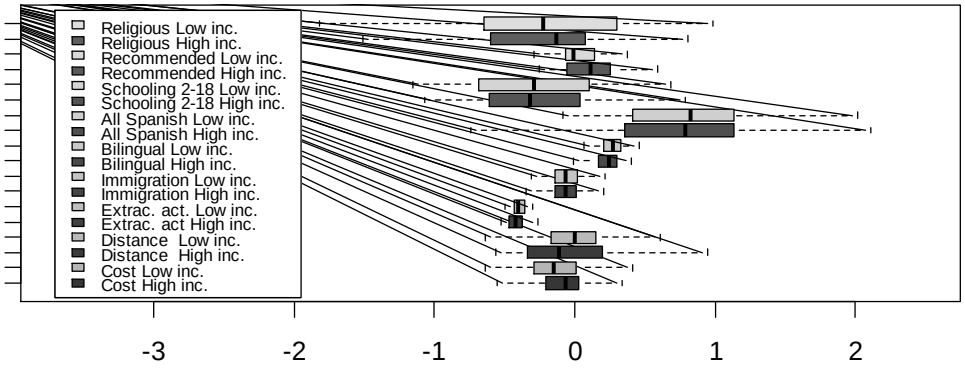
*** 5%, ** 10%, * 20%, Rob. t. stands for robust t-statistic

Subsequently, using the estimations from Table 6 we estimate the individual specific means of the conditional distribution, that is, the means of a distribution in the subpopulation of people who make a specific sequence of choices when facing the same choice tasks. Given these individual specific means, we can compute the within-family differences in preferences for each school attribute, obtaining a measure of their proximity or distance. These differences can be further analyzed for different subgroups (socio-demographic categories).

Figure 3 presents the box-and-whisker plot of the distributions of the within-family differences in preferences for each school attribute, for two family income categories. The category of *low income* is defined as a family income of less than 3000 €/month. Likewise, the category of *high income* is defined as a family income higher than 3000 €/month. Figure 4 presents the within-family differences in preferences for each school attribute, for two parental educational categories. The category of *university education* is defined as both parents having a university degree or a higher educational level. Similarly, Figure 5 presents the within-family differences in preferences for each school attribute, for two parental age categories. The *young* category families have at least one parent who is less than 41 years old.

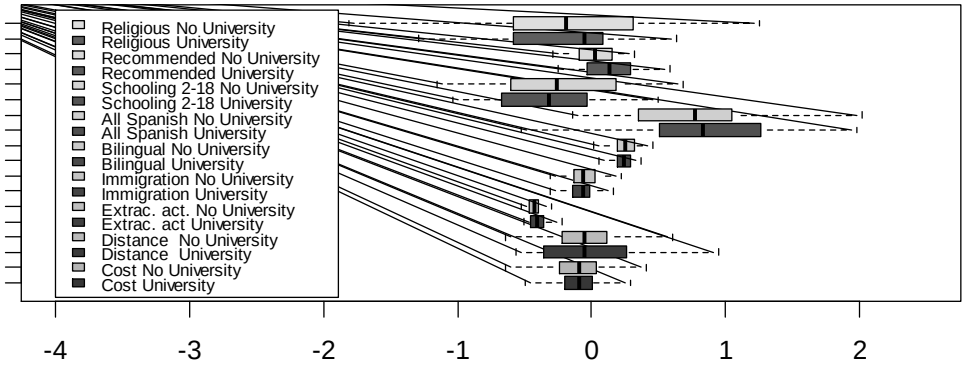
Figures 3, 4 and 5 suggest that family income and parental education and age do not have a big impact on the within-family differences in preferences for each school attribute regarding the school choice. Given the relatively wide spread of all distributions presented in these three figures, the null hypothesis of an equal mean for each pair of opposed categories would not be rejected in any comparison. However, this is probably a result of having a relatively small sample. Nevertheless, the differences in Figure 5 are generally bigger in comparison to Figures 3 and 4, leading to the conclusion that age probably has the biggest impact on the within-family differences in preferences for each school attribute among the analyzed socio-demographic variables.

Figure 3: Within-family differences in preferences for each school attribute for two family income categories



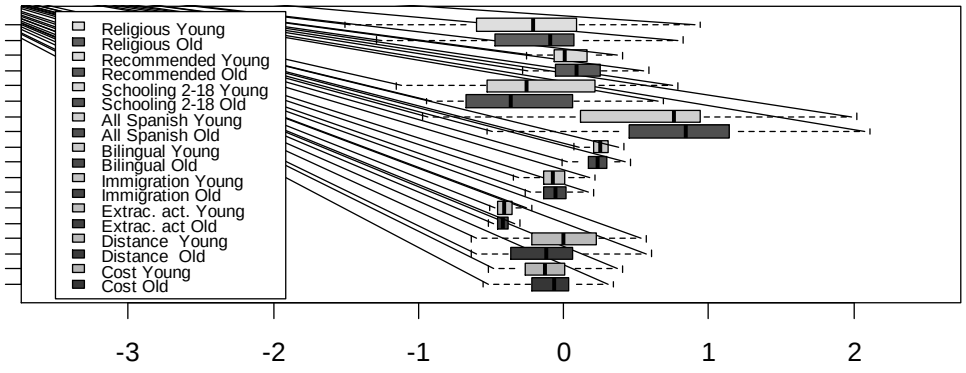
Note: Box-and-whisker plot of the distributions of the within-family differences in preferences for two family income categories. The category of *low income* is defined as a family income of less than 3000 €/month and the category of *high income* higher than 3000 €/month

Figure 4: Within-family differences in preferences for each school attribute for two parental education categories



Note: Box-and-whisker plot of the distributions of the within-family differences in preferences for two categories. The category of *university* education is defined as both parents having a university degree or a higher educational level. The category of *no university* represents all other families.

Figure 5: Within-family differences in preferences for each school attribute for two parental age categories



Note: Box-and-whisker plot of the distributions of the within-family differences in preferences for two age categories. The *young* category families have at least one parent who is less than 41 years old. The remaining families are in the category *old*.

5. Conclusions and Discussion

In this paper we study school choice as a joint parental deliberate decision affected by the underlying preferences of the husband and wife. We use a bargaining discrete choice model simultaneously estimated with real data and hypothetical choices obtained by means of a DCE. To the best of our knowledge, this is the first application of a bargaining discrete choice model regarding the issue of parental school choice for children.

It is important to understand the underlying parental decision process thoroughly for many different reasons. A proper understanding can be useful for the definition of policy mechanisms devoted to issues of educational opportunity, social inequity or transportation grants. However, the parental decision also has an impact in related fields like household residential choice (Brasington and Haurin, 2009; Millimet and Rangaprasad, 2007). Better knowledge of the underlying parental decision process allows for a better definition of the objectives and functioning of the school choice

schemes defined by policy makers and educational leaders. Subsequently, they can define better regulations or financial support for certain policies.

One of the key findings is that stated preferences deviate from revealed preferences. The Statute of Autonomy of the Basque Country (Government of the Basque Country, 1979), which is the basic institutional law of the Basque Country; together with the Basic Law of the Normalization of the Usage of the Basque Language (Government of the Basque Country, 1982), which was a development of the rights concerning the Basque language mentioned in the Statute, guarantee that students will have the right to choose to be educated in either Basque or Spanish (or both). Hence, every public school should, in principle, offer all three options concerning the language model, which is undoubtedly the most important characteristic for parents.

In practice, what happens is that families are segregated into different areas or neighborhoods and therefore, even though schools should offer all the options, some schools end up not having the Spanish language model (but this is due to demand, not supply). Hence, families who want their children to study in Spanish must choose a school a bit further away. This is supported, firstly, by the mentioned legal documents themselves: although the Basic Law of the Normalization of the Usage of the Basque Language initially ensures every student's right to choose his or her education in Basque or Spanish in the different education levels, it also concedes in article 16 that, in order to do this in practice, the Basque Government will regulate the different language models of the different schools, *taking into account the parents' will and the socio-linguistic characteristics of the area*. Secondly, Table 7 shows the distribution of the immigration and language models in the main sub-area of the analyzed region; this data also supports that the mentioned segregation exists.

TABLE 7: Distribution of the population, school type and language models in the analyzed region.

	% of population born in			*% of students in each school type*		*% of students in each language model*		
	Basque Country	Spain	Out of Spain	Public	Private	Spanish	Mixed	Basque
Valle de Asua	77.80	16.10	6.10	21.08	78.92	24.39	36.82	38.79
Margen Izquierda	66.75	26.48	6.77	50.00	50.00	4.10	41.79	54.10
Margen Derecha	74.32	16.90	8.78	40.86	59.14	19.84	26.45	53.71
Bilbao	67.68	21.87	10.45	43.05	56.95	3.25	37.35	59.40

Source: Department of Education of the Government of the Basque Country and Eustat – Instituto Vasco de Estadística (Basque Statistics Institute).

There are also numerous articles and reports regarding the widespread practice of families who (falsely) declare themselves living someplace (for example, at the student's grandparents' home) in order to receive more points and gain access to a coveted school (Alonso, 2017; López, 2010; Pérez de Nanclares, 2016). The Basque Government is aware of this issue and is fighting against it, partly because this leads to even more socio-economic segregation, since the type of parents who can carry out this practice are usually non-immigrants who have their own families living in perhaps more desirable neighborhoods than their own (Department of Education of the Basque Country, 2015; Viñas, 2016).

The second interesting result of our study is that husbands' and wives' stated preferences regarding school choice in the metropolitan area of Bilbao are not markedly different. In general, all the coefficients in the stated preferences are similar for men and women. The only exception is represented by the *extracurricular activities* coefficient, which is probably a result of the mother's higher degree of involvement in the organization of the children's daily routine. This is an important result from the data collection point of view. If we focus on data collection aimed at stated preferences for school choice, responses by only one of the spouses seem to be sufficient to represent

the household preferences. This notably simplifies the data collection process and therefore makes it much cheaper, because there is no necessity to gather responses from both spouses.

Our third finding is that the results representing the couple's stated preferences deviate from the revealed preferences for some attributes, such as *cost*, *distance* and *recommended*, which is quite a common result in the literature. Stated preferences can deviate from revealed preferences for different reasons (List and Gallet, 2001). The complexity of the school choice environment in Bilbao can be one of those reasons. The literature offers a wide variety of explanations concerning hypothetical biases and proposes various corrections, but there is no consensus regarding the best method to correct for hypothetical bias. What we assume is that, if there is indeed hypothetical bias, it would be the same for husbands and wives, and that would allow for a comparison of their preferences.

SP surveys offer very valuable results regarding the relative importance of a service's or product's different attributes, but the real willingness-to-pay values for those characteristics can differ from the hypothetical figures obtained from SP data. The former literature comparing the RP and SP methodologies shows the strengths and weaknesses of the two approaches. RP methods may be preferred because they are based on actual instead of hypothetical choices. However, RP methods use historical data, while SP methods allow for the analysis of new, still unimplemented policies. Some authors find similar results obtained by the two approaches (Whitehead et al., 2010), while most applications indicate important discrepancies between them (Bigerna et al., 2016; Hoyos and Riera, 2013; Loureiro and Rahmani, 2016; Morgan and Huth, 2011). Our results are therefore in line with the literature, as the existing studies show that the results vary widely between RP and SP data. This result has important

implications for future studies, showing that, if the parental preferences regarding school choice are the objective of a study, RP data would be the appropriate data set to use.

The fourth notable result is that neither the husband's nor the wife's preferences prevail in the school choice. This appears to a certain extent to contradict some previous findings, which suggest that mothers are on average more involved in school choice (David et al., 1994; Taylor, 2002; Taylor and Woollard, 2010). Specifically, David et al. (1994) examine the process of choosing secondary schools in two inner-London boroughs through a series of interviews and find that, in nearly half of the schools, mothers had the main responsibility for choosing and were invariably involved in the process, unlike fathers. Taylor (2002) also uses a cognitive survey type of analysis to study the decision-making process of families and finds that there is great variation in the roles of the two parents when choosing a school. By conducting several parent interviews in Edmonton (Canada), Taylor and Woollard (2010) analyze how parents choose a high school for their children and how this process varies depending on the socio-economic status of families. They also find that mothers are on average more involved.

We have shown in Table 3 and Figure 2 that the ratings on importance of attributes differ between husbands and wives and, therefore, the similarity of the husband's and the wife's preferences is not caused by the unmonitored collection of the data. These two results are not contradictory. The importance of each attribute is rated by each spouse separately from the other attributes. That is, a rating is assigned to an attribute without taking into account the importance of the remaining attributes. In this rating the husband's and wife's responses differ. But, this separate rating approach is very different from choosing an alternative in a DCE which requires an evaluation of

the whole combination of attributes that describes an alternative (type of school). Our results show that when all attributes are evaluated at the same time, there are no significant differences between husband's and wife's preferences. This result together with the conclusion that neither the husband's nor the wife's preferences prevail in the school choice must be, however, taken with caution given the limited sample size.

However, one should note that these studies are based on cognitive interviews concerning the school choice decision process and not on actual experimental data like ours; they also focus on secondary schools instead of primary ones. In their case the school choice decision is made not only by the parents but also by the children themselves, which changes the dynamics of the process. However, our findings could be related to a difference in the earnings or level of attained education between men and women, and it might be worthwhile exploring this issue further.

In general, there is a growing literature providing evidence that household savings and investment are affected by the person in the household, husband or wife, who has greater decision power. Several experiments conducted in African countries show evidence that money handed to women is more likely to be used for expenses such as education, children's nutrition and housing than money given to their male counterparts (Duflo, 2003; Hoddinott and Haddad, 1995).

The last –but not least– conclusion is that the DCE methodology allows us to analyze the within-family differences in preferences for each school attribute, and for different subgroups of the population. This approach could help to disentangle the family school choice decision process even more. Studying the influence of different socio-demographic characteristics on the school choice decision could clarify the dynamics this decision and the real nature of the parental bargaining process.

Future research that applies a bargaining discrete choice model to the issue of school choice should consider random parameters not only in the stated preferences, but also in the revealed preference parts of the model, allowing for taste heterogeneity between men and women. It will, however, imply a high level of effort in the data collection, since only one revealed preference choice is obtained per household and the random parameter model requires relatively large samples. Future studies could also collect data on which family member is the main source of school information. If information is prevalently collected by one of the partners, there might be little room for the other partner to elaborate different preferences. This information could therefore help disentangle the preference heterogeneity between families or parents.

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References

Abdulkadiroglu, A., Angrist, J.D., Hull, P.D., Pathak, P.A., 2016. Charters without lotteries: Testing takeovers in New Orleans and Boston. Am. Econ. Rev. 106(7), 1878–1920. https://doi.org/10.1257/aer.20150479

Adamowicz, W., Hanemann, M., Swait, J., Johnson, R., Layton, D., Regenwetter, M., Reimer, T., Sorkin, R., 2005. Decision strategy and structure in households: A "groups" perspective. Marketing Letters 16(3), 387–399.

Alonso, I., 2017. Educación detecta 105 matrículas escolares con padrones fraudulentos [Education detects 105 school applications with fraudulent census]. http://www.deia.com/2017/01/09/sociedad/euskadi/educacion-detecta-105-matriculas-con-padrones-fraudulentos-el-90-en-araba (accessed 23 July 2017).

Amin, V., Lundborg, P., Rooth, D.O., 2015. The intergenerational transmission of schooling: Are mothers really less important than fathers? Econ. Educ. Rev. 47, 100–117. https://doi.org/10.1016/j.econedurev.2015.01.008

Amorose, A.J., Anderson-Butcher, D., Newman, T.J., Fraina, M., Iachini, A., 2016. High school athletes' self-determined motivation: The independent and interactive effects of coach, father, and mother autonomy support. Psychology of Sport and Exercise 26, 1–8. https://doi.org/10.1016/j.psychsport.2016.05.005

Angrist, J.D., Pathak, P.A., Walters, C.R., 2011. Explaining charter school effectiveness. *National Bureau of Economic Research (NBER)*, *5*(4), working paper no. 17322. https://doi.org/10.1257/app.5.4.1

Bech, M., Gyrd-Hansen, D., 2005. Effects coding in discrete choice experiments. Health Economics 14, 1079–1083.

Beharry-Borg, N., Hensher, D.A., Scarpa, R., 2009. An analytical framework for joint vs separate decisions by couples in choice experiments: the case of coastal water quality in Tobago. Environmental and Resource Economics 43(1), 95–117.

Bierlaire, M., 2003. BIOGEME: a free package for the estimation of discrete choice models, in: Chevroulet, T., Sevestre, A. (Eds.), Proc. 3rd Swiss Transportation Research Conf., March 19–21, 2003, Monte-Verita, Ascona, Switzerland.

Bierlaire, M., 2008. An Introduction to BIOGEME Version 1.7. http://www.biogeme.epfl.ch. (accessed 23 July 2017)

Bifulco, R., Ladd, H.F., 2007. School choice, racial segregation, and test-score gaps: evidence from North Carolina's charter school program. J. Pol. Anal. Manag. 26(1), 31–56.

Bigerna, S., Bollino, C.A., Micheli, S., Polinori, P., 2017. Revealed and stated preferences for CO2 emissions reduction: The missing link. Renew. Sustainable Energy Rev. 68 (2), 1213-1221. http://doi.org/10.1016/j.rser.2016.02.020

Black, S. E., Devereux,P. J., 2011. Recent developments in intergenerational mobility. In Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Economics. Elsevier, Amsterdam, pp. 1487–1541.

Blau, I., Hameiri, M., 2012. Teacher-families online interactions and gender differences in parental involvement through school data system: Do mothers want to know more than fathers about their children? Computers and Education 59(2), 701–709. https://doi.org/10.1016/j.compedu.2012.03.012

Bosetti, L., 2004. Determinants of school choice: understanding how parents choose elementary schools in Alberta. Journal of Education Policy 19(4), 387–405.

Brasington, D.M., Haurin, D.R., 2009. Parents, peers, or school inputs: which components of school outcomes are capitalized into house value? Reg. Sci. Urban Econ. 39(5), 523–529.

Burgess, S., Greaves, E., Vignoles, A., Wilson, D., 2015. What parents want: school preferences and school choice. Economic Journal 125(587), 1262–1289.

Cebolla-Boado, H., Radl, J., Salazar, L., 2014. Aprendizaje y ciclo vital. La desigualdad de oportunidades desde la educación preescolar hasta la edad adulta. Colección Estudios Sociales 39, 1–177.

Chiu, M.M., 2010. Effects of inequality, family and school on mathematics achievement: country and student differences. Social Forces 88(4), 1645–1676. http://doi.org/10.1353/sof.2010.0019

ChoiceMetrics, 2012. Ngene 1.1.1 User Manual & Reference Guide. Sydney. Australia.

Cohen-Zada, D., Justman, M., 2012. Affinity and tension between religious denominations: evidence from private school enrollment. Reg. Sci. Urban Econ. 42(6), 950–960.

Cullen, J. B., Jacob, B. A., Levitt, S., 2006. The effect of school choice on participants: Evidence from randomized lotteries. Econometrica, 74(5), 1191–1230. https://doi.org/10.1111/j.1468-0262.2006.00702.x

David, M., West, A., Ribbens, J., 1994. Mother's Intuition? Choosing Secondary Schools. Falmer, London.

Davis, J., Brazil, N. (2016). Disentangling fathers' absences from household remittances in international migration: The case of educational attainment in

Guatemala. International Journal of Educational Development 50, 1–11. https://doi.org/10.1016/j.ijedudev.2016.05.004

Dellaert, B.G.C., Prodigalidad, M., Louviere, J.J., 1998. Family members' projections of each other's preference and influence: A two-stage conjoint approach. Marketing Letters 9(2), 135–145.

Deming, D.J., 2011. Better schools, less crime? Q. J. Econ. 126(4), 2063–2115. https://doi.org/10.1093/qje/qjr036

Deming, D.J., Hastings, J.S., Kane, T.J., Staiger, D.O. (2014). School choice, school quality, and postsecondary attainment. Am. Econ. Rev. 104(3), 991–1013. https://doi.org/10.1257/aer.104.3.991

Denessen, E., Driessena, G., Sleegers, P., 2005. Segregation by choice? A study of group-specific reasons for school choice. Journal of Education Policy 20(3), 347–368.

Department of Education of the Basque Country, 2015. Orden de 10 de diciembre de 2015 de la Consejera de Educación [Order of December 10th, 2015 of the Adviser of Education].

Dosman, D., Adamowicz, W., 2006. Combining stated and revealed preference data to construct an empirical examination of intrahousehold bargaining. Review of Economics of the Household 4, 15–34. http://doi.org/10.1007/s11150-005-6695-1

Duflo, E., 2003. Grandmothers and granddaughters: old age pension and intra-household allocation in South Africa. World Bank Economic Review 17(1), 1–25.

Elacqua, G., 2012. The impact of school choice and public policy on segregation: evidence from Chile. International Journal of Educational Development 32(3), 444–453.

Fielding-Singh, P., 2017. Dining with dad: Fathers' influences on family food practices. Appetite 117, 98–108. https://doi.org/10.1016/j.appet.2017.06.013

Goldring, E.B., Phillips, K.J., 2008. Parent preferences and parent choices: the public–private decision about school choice. Journal of Education Policy 23(3), 209–230.

Government of the Basque Country, 1979. Ley Órganica 3/1979 de Estatuto de Autonomía para el País Vasco [Statute of Autonomy of the Basque Country].

Government of the Basque Country, 1982. Ley 10/1982 Básica de normalización del uso del Euskera [Basic Law of the Normalization of the Usage of the Basque Language].

Greene, W.H., Hensher, D.A., Rose, J.M., 2005. Using classical simulation-based estimators to estimate individual wtp values, in: Scarpa, R., Alberini, A. (Eds.), Applications of Simulation Methods in Environmental and Resource Economics. Springer Publisher, Dordrecht, Ch. 2, pp. 17–33.

Hanushek, E.A., Kain, J.F., Rivkin, S.G., Branch, G.F., 2007. Charter school quality and parental decision making with school choice. J. Public Econ. 91(5–6), 823–848. http://doi.org/10.1016/j.jpubeco.2006.09.014

Hensher, D.A., Greene, W.H., 2003. The mixed logit model: The state of practice. Transportation 30(2), 133–176.

Hensher, D.A., Puckett, S.M., Rose, J.M., 2007. Extending stated choice analysis to recognise agent-specific attribute endogeneity in bilateral group negotiation and choice: a think piece. Transportation 34(6), 667–679.

Hensher, D.A., Rose, J.M., Black, I., 2008. Interactive agency choice in automobile purchase decisions: the role of negotiation in determining equilibrium choice outcomes. Journal of Transport Economics and Policy 42(2), 269–296.

Hess, S., 2010. Conditional parameter estimates from Mixed Logit models: distributional assumptions and a free software tool. Journal of Choice Modelling 2(1), 134-152.

Hess, S. and Hensher, D.A. (2013) Making use of respondent reported processing information to understand attribute importance: A latent variable scaling approach. Transportation, 40(2), 397-412.

Hoddinott, J., Haddad, L., 1995. Does female income share influence household expenditures? Evidence from Côte d'Ivoire. Oxf. Bull. Econ. Stat. 57(1), 77–96.

Holmlund, H., Lindahl, M., Plug, E., 2011. The causal effect of parents' schooling on children's schooling: A comparison of estimation methods. J. Econ. Lit. 49, 615–651.

Hoyos, D., Riera, P., 2013. Convergent validity between revealed and stated recreation demand data: some empirical evidence from the Basque Country, Spain. Journal of Forest Economics 19(3), 234–248. http://doi.org/10.1016/j.jfe.2013.02.003

Lindhjem, H., Navrud, S., 2009. Asking for individual or household willingness to pay for environmental goods? Implication for aggregate welfare measures. Environmental and Resource Economics 43(1), 11–29.

List J.A., Gallet, C.A. 2001. What experimental protocol influence disparities between actual and hypothetical stated values. Environmental and Resource Economics 20(3), 241–254.

López, M., 2010. Cuando los padres se juegan la cárcel por meter a sus hijos en el colegio que quieren [When parents risk jail to place their children in the school they want]. http://www.elconfidencial.com/sociedad/2010-04-24/cuando-los-padres-se-juegan-la-carcel-por-meter-a-sus-hijos-en-el-colegio-que-quieren_483673/ (accessed 23 July 2017).

Loureiro, M.L., Rahmani, D., 2016. The incidence of calorie labeling on fast food choices: A comparison between stated preferences and actual choices. Econ. Hum. Biol. 22, 82–93.

Marette, S., Issanchou, S., Monnery-Patris, S., Ginon, E., Sutan, A., 2016. Are children more paternalistic than their mothers when choosing snacks? J. Econ. Psychol. 55, 61–76.

Marissa, A., Ishaaq, F. I., 2012. The correlation of perception on the role of father with academic achievement in senior high school student. Procedia – Soc. Behav. Sci. 69 (Iceepsy), 1369–1373.

McBride, B.A., Schoppe-Sullivan, S.J., Ho, M.H., 2005. The mediating role of fathers' school involvement on student achievement. J. Appl. Dev. Psychol. 26(2), 201–216.

McFadden, D., 1974. Conditional logit analysis of qualitative choice behavior, in: Zarembka, P. (Ed.), Frontiers in Econometrics. Academic Press, New York, pp. 105–142.

McFadden, D., Train, K., 2000. Mixed MNL Models for discrete response. J. Appl. Econom. 15 (5), 447–470.

Millimet, D.L., Rangaprasad, V., 2007. Strategic competition amongst public schools. Reg. Sci. Urban Econ. 37(2), 199–219.

Morgan, O.A., Huth, W.L., 2011. Using revealed and stated preference data to estimate the scope and access benefits associated with cave diving. Resour. Energy Econ. 33, 107–118.

O'Neill, V., Hess, S., 2014. Heterogeneity assumptions in the specification of bargaining models: a study of household level trade-offs between commuting time and salary. Transportation 41, 745–763.

Ortiz-Osés, A., Mayr, F.K., 1981. El matriarcalismo vasco. Reinterpretación de la cultura vasca. [The Basque Matriarchy. Reinterpretation of the Basque Culture.] Universidad de Deusto, Bilbao.

Pérez de Nanclares, N., 2016. Educación reubica a los 73 niños cuyas familias falsearon el padrón [Education relocates the 73 children whose families faked their home's location]. http://www.elcorreo.com/alava/araba/201606/18/educacion-reubica-ninos-cuyas-20160617223054.html (accessed 23 July 2017).

Rubinfeld, D.L., Shapiro, P., 1989. Micro-estimation of the demand for schooling: evidence from Michigan and Massachusetts. Reg. Sci. Urban Econ. 19(3), 381–398.

Sánchez, M., 2016. The chart that proves that Spanish schedules are downright weird. El País, March 28.

Rungie, C., Scarpa, R., Thiene, M., 2014. The influence of individuals in forming collective household preferences for water quality. J. Environ. Econ. Manag. 68, 161–174.

Scarpa, R., Thiene, M., Hensher, D.A., 2012. Preferences for tap water attributes within couples: an exploration of alternative mixed logit parameterizations. Water Resour. Res. 48(W01520), 1–11. doi:10.1029/2010WR010148

Swait, J., Louviere, J., 1993, The role of the scale parameter in the estimation and comparison of multinomial logit models. J. Mark. Res. 30, 305–314.

Taylor, C., 2002. Geography of the 'new' education market: secondary school choice in England and Wales. Ashgate, Hampshire.

Taylor, A., Woollard, L., 2003. The risky business of choosing a high school. Journal of Education Policy 18(6), 617–635. doi: 10.1080/0268093032000145872

Train, K., 2009. Discrete Choice Methods with Simulation. Cambridge University Press, New York.

Vega-Bayo, A., Mariel, P., 2015. School choice in the Basque Country: public, government-dependent and private schools with different languages of instruction. Int. J. Educ. Res. 74, 13–25.

Vega-Bayo, A., Mariel, P., 2016. A discrete choice experiment: An application to school choice in the Basque Country. Unpublished manuscript.

Viñas, S. R., 2016. Educación pone coto al fraude del padrón [Education puts a stop to census fraud]. http://www.elmundo.es/pais-vasco/2016/01/12/5694bc80e2704ebd7b8b4658.html (accessed 23 July 2017).

Whitehead, J.C., Phaneuf, D.J., Dumas, C.F., Herstine, J., Hill, J., Buerger, B., 2010. Convergent validity of revealed and stated recreation behavior with quality change: A comparison of multiple and single site demands. Environmental & Resource Economics 45, 91–112.