The influence of individual husband’s and wife’s preferences on joint parental school choice for their children

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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 as a household. Our findings show firstly that the husbands’ and wives’ 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 a good part of the variation in students’ educational achievements when 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 on a daily basis. The quantitative literature dealing with 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 expected conclusion of these studies is that certain schools are chosen by parents with specific socio-economic characteristics. It is frequently reported in the literature that segregation by income and/or social class 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.

Official evaluation programs have developed objective test score indicators to measure school performance. Despite the increased public availability of such scores, many studies suggest that these are of limited guidance to parents at the stage at which they make 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 into which both parents bring 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 analyze 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).

In our study we propose and apply an approach that is innovative in the school choice literature. It consists of a modified bargaining discrete choice model of the type 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 by 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 follows a section explaining the methodology, and the results are presented in Section 4. The last section concludes.

2. Case Study

The educational system in the 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 across schools. Besides those three original language models, nowadays 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 (e.g. German, English or French) and hence teaches in that language.

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 conducted by both parents. Its content was structured in the following sections. 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, 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 both conducted, in their own separate ways, 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 hypothetic 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 considered to be important by 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
recommendations. 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**

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost (tuition fees)</strong></td>
<td><strong>Public</strong></td>
</tr>
<tr>
<td></td>
<td>Euro/month</td>
</tr>
<tr>
<td></td>
<td>Gov. Dependent</td>
</tr>
<tr>
<td></td>
<td>Euro/month</td>
</tr>
<tr>
<td></td>
<td>Indep. Private</td>
</tr>
<tr>
<td></td>
<td>Euro/month</td>
</tr>
<tr>
<td>Distance from home</td>
<td>1 km</td>
</tr>
<tr>
<td></td>
<td>3 km</td>
</tr>
<tr>
<td></td>
<td>5 km</td>
</tr>
<tr>
<td></td>
<td>10 km</td>
</tr>
<tr>
<td></td>
<td>20 km</td>
</tr>
<tr>
<td></td>
<td>30 km</td>
</tr>
<tr>
<td>Linguistic model</td>
<td>All Spanish</td>
</tr>
<tr>
<td></td>
<td>All Basque</td>
</tr>
<tr>
<td></td>
<td>Bilingual</td>
</tr>
<tr>
<td></td>
<td>Trilingual</td>
</tr>
<tr>
<td></td>
<td>Interna-</td>
</tr>
<tr>
<td></td>
<td>tional School</td>
</tr>
<tr>
<td>Religious orientation</td>
<td>Secular</td>
</tr>
<tr>
<td>Schooling through college</td>
<td>Yes</td>
</tr>
<tr>
<td>Presence of immigration</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Extracurricular activities</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td>Extensive</td>
</tr>
<tr>
<td>Recommended</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

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.
After deciding on the attributes and their levels with the help of 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 to 300 randomly selected families of the Metropolitan area of Bilbao that had children aged between three and eight in the Basque school system. The surveys were distributed in a pre-stamped envelope and completed by the parents at home during their spare time. 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 identify separately the individual preferences from the joint preference expressed as a couple. In spite of 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 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, 2013) 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:

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

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 \( \beta_k \). The parameter \( \lambda \) is a scale factor that is inversely proportional to the common standard deviation \( \sigma_\varepsilon \) of the Gumbel error terms, and it is usually fixed to \( \lambda = \pi / (\sqrt{6} \sigma_\varepsilon) \) due to the identification so that \( \text{Var}(\varepsilon_{ntj}) = \pi^2 / 6 \).
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 \(N=119 \times 12=1,428\). 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 \(V_{ntj}^{SPM}\) and women \(V_{ntj}^{SPW}\) are defined as:

\[
V_{ntj}^{SPM} = \lambda_{SPM} (ASC_j + \beta_1^{SPM} x_{ntj1} + \cdots + \beta_{11}^{SPM} x_{ntj11}),
\]

\(2\)

\[
V_{ntj}^{SPW} = \lambda_{SPW} (ASC_j + \beta_1^{SPW} x_{ntj1} + \cdots + \beta_{11}^{SPW} x_{ntj11}).
\]

\(3\)

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:

\[
V_{nj}^{RP} = \lambda_{RP} (ASC_j + \beta_1^{RP} x_{nj1} + \cdots + \beta_{r}^{RP} x_{nj1}).
\]

\(4\)

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
\[ V_{nj}(\cdot) = \begin{cases} 
\lambda_{SPM} \left( ASC_j^{SPM} + \beta_1^{SPM} x_{nj1} + \cdots + \beta_{11}^{SPM} x_{nj11} \right), & \text{if } n \text{ man, } \lambda_{SPW} = 1 \\
\lambda_{SPW} \left( ASC_j^{SPW} + \beta_1^{SPW} x_{nj1} + \cdots + \beta_{11}^{SPW} x_{nj11} \right), & \text{if } n \text{ woman, } \lambda_{SPW} > 0 \\
\lambda_{RP} \left( ASC_j^{RP} + \beta_1^{RP} x_{nj1} + \cdots + \beta_{11}^{RP} x_{nj11} \right), & \text{if } n \text{ family, } \lambda_{RP} > 0 
\end{cases} \] (5)

where \( \lambda_{SPM} \) is set to one to allow the identification of \( \lambda_{SPW} \) and \( \lambda_{RP} \). 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 on the basis of their respective individual utilities (e.g. Dosman and Adamowicz, 2006). That is why the proposed joint decision model includes a bargaining parameter \( \delta \) 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

\[ \lambda_{RP} \left( ASC_j^{RP} + (\delta \beta_1^{SPW} + (1 - \delta) \beta_1^{SPW}) x_{nj1} + \cdots + (\delta \beta_{11}^{SPW} + (1 - \delta) \beta_{11}^{SPW}) x_{nj11} \right) \] (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) 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 \( \beta \) 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

\[
\lambda_{RP}(ASC_{ij}^{RP} + (\delta \beta_1^{SPW} + (1 - \delta) \beta_1^{SPW}) \sigma_1 x_{nj1} + \cdots + (\delta \beta_{11}^{SPW} + (1 - \delta) \beta_{11}^{SPW}) \sigma_{11} x_{nj11}),
\]

(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 \( \sigma_k \) 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:

\[
V_{ntj}(\cdot) = \begin{cases} 
\lambda_{SPW}(ASC_{ij}^{SPW} + \beta_1^{SPW} x_{ntj1} + \cdots + \beta_{11}^{SPW} x_{ntj11}), & \text{if } n \text{ man, } \lambda_{SPW} = 1 \\
\lambda_{SPW}(ASC_{ij}^{SPW} + \beta_1^{SPW} x_{ntj1} + \cdots + \beta_{11}^{SPW} x_{ntj11}), & \text{if } n \text{ woman, } \lambda_{SPW} > 0 \\
\lambda_{RP}(ASC_{ij}^{RP} + (\delta \beta_1^{SPW} + (1 - \delta) \beta_1^{SPW}) \sigma_1 x_{nj1} + \cdots + (\delta \beta_{11}^{SPW} + (1 - \delta) \beta_{11}^{SPW}) \sigma_{11} x_{nj11}), & \text{if } n \text{ joint, } \lambda_{RP} > 0 
\end{cases}
\]

(8)

In this framework \( \delta \) represents the bargaining coefficient. It indicates the degree of prevalence of the man’s individual utility over that of the woman’s in the real joint decision. O’Neill and Hess (2014) highlight the importance of different weights \( \delta \) 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 \( \sigma_k \). To assure \( 0 \leq \delta \leq 1 \) and \( \sigma_k > 0 \), these parameters are reparametrized as \( \delta = \exp(\theta) / (1 + \exp(\theta)) \) and \( \sigma_k = \exp(\mu_k) \), and the estimated parameters are \( \theta \) 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.

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 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 2 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 2, leading to the conclusion that the scale factors $\lambda_{SPW}$ and $\lambda_{RPJ}$ can be set to one (Swait and Louviere, 1993).

<table>
<thead>
<tr>
<th>TABLE 2: Separate Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Joint</strong></td>
</tr>
<tr>
<td>Dec (RP)</td>
</tr>
<tr>
<td>Cost</td>
</tr>
<tr>
<td>Distance from home</td>
</tr>
</tbody>
</table>
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%

The SP results for men and women presented in the third and fifth columns of Table 2 are very similar, indicating that there are no big 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 the 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 2. 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 the majority of the schools in the area.

The estimation of the bargaining model (8) is presented in Table 3. The coefficients corresponding to the individual husbands’ and wives’ decisions based on SP data are presented in the fifth and seventh columns of Table 3, and these are almost identical to the coefficients in Table 2 that correspond to the separate estimation. The first and third columns of Table 3 present the estimations corresponding to the RP part of the bargaining model. The linear combination of the individual coefficients \( \delta \beta_k^{SPM} + (1 - \delta) \beta_k^{SPW} \) could not be estimated for all the attributes, as the majority of them were effect coded, which, together with the limited sample size of the RP data, made the estimated likelihood function flat, causing

### TABLE 3: Joint Bargaining Model

<table>
<thead>
<tr>
<th>Joint Decision</th>
<th>Men (SP)</th>
<th>Women (SP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \mu_k )</td>
<td>( \beta_k^{SP} )</td>
</tr>
<tr>
<td>Cost</td>
<td>1.09</td>
<td>-0.26</td>
</tr>
<tr>
<td>Distance from home</td>
<td>2.27</td>
<td>4.06**</td>
</tr>
<tr>
<td>Extracurricular activities</td>
<td>2.69</td>
<td>0.79</td>
</tr>
<tr>
<td>Immigration</td>
<td>0.12</td>
<td>-0.16</td>
</tr>
<tr>
<td>Bilingual</td>
<td>0.92</td>
<td>2.50***</td>
</tr>
<tr>
<td>International</td>
<td>0.54</td>
<td>2.73***</td>
</tr>
<tr>
<td>All Spanish</td>
<td>-0.78</td>
<td>-2.29***</td>
</tr>
<tr>
<td>Trilingual</td>
<td>0.11</td>
<td>7.57***</td>
</tr>
<tr>
<td>Schooling 2–18</td>
<td>1.52</td>
<td>0.57</td>
</tr>
<tr>
<td>Recommended</td>
<td>3.32</td>
<td>6.56***</td>
</tr>
<tr>
<td>Religious orientation</td>
<td>-1.15</td>
<td>-2.41***</td>
</tr>
<tr>
<td>ASC gov.-dependent</td>
<td>2.06</td>
<td>2.72***</td>
</tr>
<tr>
<td>ASC private</td>
<td>0.03</td>
<td>0.09</td>
</tr>
</tbody>
</table>

\( \theta \) Bargaining coef. | -0.30 | -0.09 |

LogL | -2379.3 |
Num. of parameters | 38 |

*** 5%, ** 10%, * 20%
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 $\delta$ 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, despite the fact that the social position of women in the 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.

The first column of Table 3 presents the estimation of the scale parameters $\mu_k$ 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.

5. Conclusion 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 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.

The first 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 implication 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 simplifies markedly the data collection process and therefore makes it much cheaper, because there is no necessity to gather responses from the two spouses.

Our second 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. 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 the analysis of new, still unimplemented policies. Some authors find similar results obtained by the two approaches (Whitehead et al., 2010), while the majority of the 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 third interesting result is that neither the husband’s nor the wife’s preferences prevail in the school choice. This appears to a certain extent to oppose 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.
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).

Future research that applies a bargaining discrete choice model to the issue of school choice should consider random parameters in the stated and 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 big samples.
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