Uncertain Outcomes and Child-Parent Decision Making in Curriculum Choice: What Data Do We Need to Tell Them Apart?*

[UNDER REVISION]

Pamela Giustinelli†
Survey Research Center, University of Michigan, Ann Arbor, MI, U.S.A.

December 12, 2010

Abstract

Predicting any choice under uncertainty with multiple decision makers requires disentangling the relative roles that the main structural elements of the decision process, such as decision makers' beliefs and preferences, play in driving the choice. In this paper, I focus on curriculum choice with curriculum tracking, and I analyze the problem of empirically distinguishing how children's and parents' beliefs and preferences over future choice-related states drive, via the process of intra-household decision, curriculum choice.

In particular, I collect new data on otherwise unobserved primitives of a family decision process: children's and parents' probabilistic expectations over choice-related outcomes, their individual preferences over available alternatives (or "stated preferences"), and the family decision protocol. And I estimate a simple model of curriculum choice featuring uncertainty and cooperative-type decision processes that aggregate children's and parents' beliefs and preferences heterogeneously across families.

On a descriptive side, the paper demonstrates how joint use of subjective data on elements of the decision process and actual choices (or "revealed preferences") can be employed to separately identify and estimate structural parameters capturing decision makers' trade-offs among future outcome states ("preference weights") from parameters describing the group-level decision process ("aggregation weights"). On a normative side, it illustrates how the proposed framework can be used (i) to quantify the impact of policies affecting decision makers' expectations on the distribution of choices and (ii) to assess whether

*I heartily thank Chuck Manski for his helpful comments on this work and for his constant encouragement and guidance throughout dissertation, as well as the other members of my committee, David Figlio, Joel Mokyr, and Elie Tamer, for their availability and feedback. I am enormously indebted to Paola Dongili and Diego Lubian, for without their support and friendship this project would have not come into existence. I have greatly benefited from patient and insightful discussions with Federico Grigis and from inputs on different issues and at different stages by Ivan Canay, Adeline Delavande, Jon Gemus, Aldo Heffner, Aviv Nevo, Stefano Rossi, Zahra Siddique, Chris Taber, Basit Zafar, Claudio Zoli, and seminar participants to the 2009 MOOD doctoral workshop (Collegio Carlo Alberto, Turin, Italy), Northwestern U., the VIII Brucchi Luchino workshop (Bank of Italy, Rome, Italy), U. of Verona, the V RES Ph.D. Meeting (City U., London, UK), U. of Michigan SRC, U. of Michigan Economics, U. of Maryland AREC, U. of East Anglia, Uppsala U., U. of Alicante, U. of Konstanz, U. of Bern, the 2010 MEA Annual Meeting (Evanston, IL, USA), and the 2010 EEA Summer Meeting (U. of Glasgow, Glasgow, UK). Data collection was funded by the SSIS of Veneto, whose financial support I gratefully acknowledge together with that of the University of Verona. All remaining errors are mine.

†Correspondence to: Pamela Giustinelli, University of Michigan, Survey Research Center, 1355 ISR Building, 426 Thompson Street, Ann Arbor, MI 48106 U.S.A. Office phone: +1 734 764 6232. E-mail: <*pgiusti@isr.umich.edu*>

accounting for multilateral and heterogeneous decision protocols is important for prediction and policy analysis.

[JEL codes: C25, C35, C50, C71, C81, C83, D19, D81, D84, I29, J24].
[Key words: Curricular Tracking, Curriculum Choice, Choice under Uncertainty, Subjective Probabilistic Expectations, Child-Parent Decision Making, Heterogeneous Decision Protocols, Stated and Revealed Preferences, Choice-Based Samples].

1 Introduction

Social researchers and policy makers have long been interested in analyzing and predicting choices with *uncertain outcomes* and with participation of *multiple decision makers*. These choices span human capital investment, sexual behavior, crime behavior, and countless others. For instance, members of criminal gangs choose whether to commit crimes with partial knowledge of their probability of being arrested; sexually active partners make contraceptive choices with partial knowledge of effectiveness and side effects; family members select curricular tracks for their children with partial knowledge of children's tastes, ability, and future opportunities and choices. However, predicting any of these behaviors to inform policy requires disentangling the relative roles that decision makers' beliefs and preferences over future realizations of choice-related outcomes and other structural elements of the decision process play in driving the choice. This is because there will generally exist several configurations of decision makers' beliefs, preferences, and decision processes that are compatible with the same observed choice *and* have different implications for policy.

In this paper, I focus on high school curriculum choice with curricular tracking, and I address the specific identification problem of empirically distinguishing how children's and parents' beliefs and preferences over future outcome states drive, via heterogeneous processes of intra-household decision, curriculum choice. Nevertheless, while my analysis is especially relevant for educational policy and for the debate on intergenerational transmission of beliefs and preferences from parents to children (e.g., Bisin and Verdier (2001) and Doepke and Zilibotti (2008)), its framework is fairly general. It encompasses any choice situation featuring a small group of decision makers that face a *common* discrete choice with uncertain outcomes, hold *subjective beliefs* and *individual preferences* over possible outcome states, and employ a *cooperative*-type decision protocol aggregating their preferences and beliefs and nesting more unilateral decisions as special cases.[1] Hence, from a theoretical perspective, the paper's setup may be thought of as an application of Savage (1954)'s framework and Harsanyi (1955)'s utilitarian aggregation combined, as recently conceptualized and discussed by Gilboa et al. (2004).[2]

[1]Specifically, while I assume that decision makers are rational in the sense that they maximize their subjective expected utility under unilateral decision, I do not assume *a priori* that they hold rational expectations. However, my framework allows for this possibility.

[2]A main feature of this framework is that unanimity of group members' preferences over alternatives does not imply that

To illustrate the problem within the context of interest, let us consider the choice faced by an adolescent child ("he") and his parent ("she") that wish to select the best curriculum for the child. Child's taste for subjects, his academic ability, and his choices and outcomes after graduation are uncertain. For simplicity, let child and parent be concerned exclusively with the child's taste for subjects and with the program difficulty level. Child and parent hold subjective probabilistic beliefs over realization of different taste and difficulty states and attach individual valuations to them. Moreover, either the child makes curriculum choice individually or child and parent make a joint decision. In this setting, being able to tell beliefs and preferences apart is very important, since expectations-driven choices may be affected, e.g., by provision of information about subjects and difficulty levels, while preferences-driven choices may require a different policy (e.g., no policy). Furthermore, both identifying the target (child, parent, or both?) of a policy that aims at affecting curriculum enrollment via information provision and assessing the potential effectiveness of such a policy via counterfactual analysis require uncovering the role played by each decision participant in the choice.

Thus far, insufficient knowledge and lack of adequate data on how individuals and groups make decisions with uncertain outcomes has rendered this identification problem hard to tackle empirically (Manski, 2000, 2004). First, commonly available data are mostly limited to decision makers' background characteristics and some features of the alternatives. Second, any statistical analysis associating choices with background characteristics usefully reveals "which individuals or groups choose what", but does not uncover the main decision-making channels nor can be used to answer counterfactual policy questions. Last but not least, while counterfactual analysis relies on structural modeling, identification and estimation of structural models from standard data generally require strong non-testable assumptions, which can make credibility of the derived inference problematic. My work addresses these issues directly by collecting new data on usually unobserved primitives of a family decision process and by showing how such data can be used in estimation of a simple model of curriculum choice with uncertainty and heterogeneous child-parent decision making[3] to aid identification and make inference on families' curriculum choice behavior.[4]

Specifically, I designed and conducted a survey gathering the following field data from a sample of approximately 1,000 Italian families: (A) children's and parents' *probabilistic expectations*

an individually preferred alternative is also socially preferred, since unanimity may be generated by different combinations of individual preferences and beliefs over states of nature. Mongin (2005) offers an in-depth discussion. Raiffa (1968) dramatizes lucidly the problem as a fight between Paretians and Bayesians. My paper, however, does not make any specific assumption about the manner in which family members update their beliefs based on information they receive from the other members.

[3] Besides unilateral decision making, I analyze two types of multilateral decision protocols. In the first, the child chooses after listening to the parent: this involves expectations updating by the child based on parental expectations, but the child is the main decision maker since only his preferences are reflected in the actual choice. In the second, instead, child and parent make a joint decision; hence, preferences and beliefs of both contribute to the final choice. Notice, however, that none of the analyzed decision protocols allows for endogenous preferences' transmission from parents to children.

[4] This approach was inspired by ideas and instances from research on hybrid choice models (e.g., Ben-Akiva et al. (1999) and Ben-Akiva et al. (2002)) and on decision making under uncertainty and with social interactions, especially within the family (Manski (2000, 2002, 2004) and Kapteyn and Kooreman (1992)).

before the choice on a 0-100 scale; (B) children's and parents' stated preferred alternatives *before* the choice, or *stated preferences (SP)*; (C) families' actual choices, or *revealed preferences (RP)*; (D) families' decision protocols as verbally described, individual or group, choice behaviors; (E) orientation suggestions provided by junior high school teachers; (F) families' background characteristics. Then, within the theoretical framework previously outlined, I demonstrate how joint use of these data can be employed to separately identify and estimate structural parameters capturing how children and parents trade off future states of different outcomes ("preference weights") from parameters describing their decision protocol ("aggregation weights").[5]

Actual choices (C) being observed, identification of the empirical models works as follows. Under unilateral and "unitary family" decisions (Becker, 1981), heterogeneity in decision makers' probabilistic expectations over outcome states (A) identifies preference parameters, as do alternatives' and decision makers' specific characteristics in standard random utility models with no uncertainty.[6] However, actual choices and family members' expectations do no longer suffice to separately identify preference and aggregation parameters for families making a multilateral decision *based on (D)*. To solve this problem, I combine data (A) and (C) with family members' stated preferred alternatives (B), within a stated preference-revealed preference (SP-RP) joint framework (e.g., Ben-Akiva et al. (1994) and Hensher et al. (1999)). This approach is non-standard in economics,[7] and, to the best of my knowledge, has never been used for analyzing group decisions under uncertainty.[8] Intuitively, given data on family members' stated preferred alternatives, preference parameters are identified from heterogeneity in expectations (one SP individual choice model for each family member with an "active" decision role); whereas, aggregation parameters are identified from families' actual choices (one RP model of multilateral choice model for each family).

Hence, the empirical tool developed in this paper enables me to investigate the following descriptive and normative issues of curriculum choice: (1) What are the most important determinants of curriculum choice among those outcomes that are uncertain at the moment of the choice and are potentially relevant for it? (2) To what extent are parental beliefs transmitted to children *during* the decision process, and to what extent do parental preferences affect

[5]It is important to notice that I can focus on curriculum demand because Italian secondary education features open enrollment. That is, lack of selectivity from the school side eliminates potential identification problems from the interplay of demand and supply in producing observed choices.

[6]This relates my paper to works employing probabilistic expectations data to aid identification of structural models (e.g., see Delavande (2008), Zafar (2008), and Arcidiacono et al. (2010) for static choices and Erdem et al. (2005) and Pantano and Zheng (2010) for dynamic settings), as opposed to papers which employ them to improve efficiency of estimation (e.g., van der Klaauw (2000) and van der Klaauw and Wolpin (2010)).

[7]However, it is well established in some fields outside economics, such as transportation and marketing. Ben-Akiva and Morikawa (1990) and Morikawa et al. (1991) first noticed the complementary advantages of revealed and stated preferences data, and proposed a simple method to combine them in estimation of discrete choice models of travel demand. Morikawa (1994) subsequently extended the method to incorporate serial correlation and state dependence. Ben-Akiva et al. (1994), Ben-Akiva et al. (1997), Louviere et al. (2000), Train (2003), Hensher et al. (2005), Train and Wilson (2007), and references therein provide up-to-date discussions of the theoretical framework and of different conceptual and methodological issues.

[8]Dosman and Adamowicz (2006) use SP-RP methods to examine household vacation site choice with inter-spouses bargaining; however, their setting does not feature uncertainty nor heterogeneous decision processes.

curriculum choice, *conditional* on the observed family decision process? (3) When choosing multilaterally, do children and parents select non-dominated alternatives, given their individual preferences? (4) How does curriculum enrollment respond to policy-induced changes in decision makers' beliefs?[9] (5) Is it important to account for child-parent multilateral decisions and heterogeneous decision processes in models of curriculum choice?

Consistent with findings from previous studies (e.g., Dominitz and Manski (1996), Delavande (2008), Zafar (2008), and others), a descriptive analysis of my data reveals that respondents exhibit substantial heterogeneity in beliefs; however, mean and median responses for "objective outcomes"[10] are not far in magnitude from population statistics and from statistics in comparable samples (see Giustinelli (2010) for details).[11] Furthermore, while children's and parents' distributions of beliefs for different outcomes are overall similar to each other, parents tend to be more optimistic about children's academic performance and future college and work outcomes than children are. This, too, matches with findings from other studies comparing probabilistic expectations of teenagers and their parents on children's engagement of risky behaviors and their future study and work outcomes (e.g., Quadrel et al. (1993), Dominitz et al. (2001), and Attanasio and Kaufmann (2010)).

Similarity of children's and parents' beliefs is also confirmed by estimates of two unitary family specifications (benchmark) assuming that children and parents are, alternatively, the "representative" family decision makers. In particular, when alternatively used to explain observed choices, children's and parents' beliefs produce the same preference ordering over the most valued outcomes (e.g., child's taste for subjects and outcomes capturing future college and work choices and opportunities). Nevertheless, some differences exist in the relative magnitude of preference weights (i.e., across pairs of outcomes) obtained from children's and parents' beliefs as well as in the preference ordering of least valued outcomes. In fact, the model taking parents as representative decision makers appears less good at explaining actual choices, consistent with a prominent role played by children.

Indeed, more direct evidence on the latter is provided by the data on family decision protocols (D). Either children chose unilaterally (protocol "1"; $\approx 27\%$), or they chose after listening to their parents (protocol "2"; $\approx 35\%$), or children and parents made a joint decision (protocol "3"; $\approx 38\%$). This pattern is nicely validated by comparison of children's and parents' stated preferred curricula (B) with actual choices (C). In the overall sample, 14% of children did not have their own way in the choice versus 40% of parents. And when the sample is disaggregated by reported decision protocols, the first figure intuitively increases with parental participation

[9]To clarify, my setup enables me to quantify the effect of pre-specified changes in family members' expectations on the population distribution of curriculum enrollment. However, quantifying the effect of specific information provided to families by a planner would additionally require a model of how family members process such information and, possibly, sequential observations on families' expectations.

[10]For example, graduating from different high school curricula (in whatever amount of time, in the regular time, and in the regular time with a high GPA), enrolling in college after graduation from different curricula, etc.

[11]However, because my data are cross-sectional, I cannot carry a formal test of rational expectations.

in the choice and the second decreases with it. Notably, within the subsample of families that reported making a joint decision, only a small fraction (3-5%) selected an individually dominated alternative based on child's and parent's stated preferences (B).

When information on family decision processes is used to estimate basic protocol-specific models of curriculum choice (i.e., with no within children and within parents observed or unobserved heterogeneity nor serial correlation across data sources), results uncover existence of both similarities and differences in preferences across families employing different decision protocols and between children and parents. On the one hand, child's taste for subjects is consistently the most valued outcome across all groups. On the other hand, preference ordering over the remaining outcomes and the relative magnitude of preference weights between pairs of outcomes tend to vary across groups. Children who chose after listening to their parents incorporate parental beliefs into their own partially and heterogeneously across outcomes. And "cooperative families" parental preferences and beliefs affect actual choices.

When I use these estimates to simulate the effect of specific changes in individual expectations on curriculum enrollment (e.g., following new information about the outcomes or some institutional change of the schooling system), I find that accounting for heterogeneous decision processes generates predictions that differ in magnitude, though not qualitatively, from those yielded by the unitary specifications. Moreover, identity of policy recipients (children, parents, or both) matters.

Before moving on with the specifics of identification and the empirical analysis, it is worth to make some assumptions and potential limitations more transparent. On the side of the study design and data collection, direct observation of family members' probabilistic beliefs, choice preferences, and decision processes is clearly a key strength of the analysis, since it makes modeling expectations and assuming a particular decision-making unit unnecessary. However, it is important to understand that this approach does not eliminate altogether the need for assumptions; rather, it transfers their locus from things researchers do not know to be true nor can generally test (i.e., the behavioral process) to elements over which they should have some control or, at least, better information (i.e., the data collection and its properties). With this rationale in mind and because of its focus on identification, this work takes expectations and decision protocol data at face value,[12] without concerning itself with the statistical issues that would arise if those features of the decision process were measured with error.[13]

On the theoretical side, potential criticisms pertain credibility of the following maintained

[12] However, I use stated preferences as indicators of latent utility functions, and I allow them to feature a different generating process than actual choices.

[13] To clarify, the nature of expectations and stated preference data and the fact that this study collects them retrospectively easily raise concern about issues of endogenity and bias in their reports, e.g., due to cognitive dissonance and consequent ex post rationalization. While Zafar (2010*a*)'s and Chen and Risen (2010)'s recent analyses may help relaxing major concerns, I discuss potential issues in the order they present themselves in the body of paper. On the other hand, recent papers have started accounting for potential measurement error in empirical analyses employing expectations data (e.g., Erdem et al. (2005)) and have proposed different ways to think of and deal with specific response patterns, such as rounding (e.g., Manski and Molinari (2010)) and bunching at "focal values" like 50% (e.g., Kezdi and Willis (2008)).

assumptions: (i) separability of uncertain outcomes, (ii) independence of beliefs and utility valuations over outcome states, (iii) exogeneity of decision makers' beliefs with respect to choice preferences, (iv) exogeneity of family decision protocols with respect to choice preferences, and (v) cooperative child-parent decision making with common knowledge of family members' preferences and beliefs. (i) and (ii) follow directly from the adopted Bayesian-type framework à la Gilboa et al. (2004).[14] (iii) comes from the imperfect information model of randomness considered here, which allows decision makers to possibly measure attributes with error, but assumes that such errors do not affect decision making.[15] As for (iv), while observed decision protocols and actual choices appear to be statistically related in my data, it is to be established whether such a relationship is structural in nature, as it would be if, e.g., selection of a family decision protocol for curriculum choice were to depend on child's and parent's preferences and beliefs.[16] Finally, I focus on cooperative family decision processes (v), because of a main feature curriculum choice shares with a panel- of-experts problem (e.g., Raiffa (1968)) in which aggregation of family members' preferences and beliefs is implicitly motivated by the wish of making a better choice than the one a single member would make individually. However, it is clear that the typical nature of child-parent interactions suggests exploring also non-cooperative, agency-type venues (e.g., Cosconati (2009)). I consider this work to be a first step; (iv) and (v) are work in progress (Cosconati and Giustinelli (2010) – TBA).

The paper is organized as follows. Section 2 motivates the application and summarizes the contributions of the paper to the relevant literature. Section 3 conceptualizes child, parent, and family choice problems and illustrates the main identification and policy issues through a simplified example with two decision protocols, two alternatives, and two binary outcomes. Section 4 covers the study design and describes the samples used in the empirical analysis of section 5. Section 6 presents the counterfactual policy exercises. Conclusions follow.

2 Background: Curriculum Choice under Uncertainty and Child-Parent Decision Making

Importance and uncertainty of curriculum choice are tightly related to the purpose of curricular tracking: that is, to provide educational specialization so that children with different aptitudes and aspirations may pursue careers involving different areas and types of expertise.[17] In par-

[14] It is important to notice that assumptions (i) and (ii) affect identification. Hence, the present analysis holds *within* the class of problems featuring those assumptions, which appear to be prominent in empirical research.

[15] For instance, this assumption would be violated if decision makers were aware of their errors, were risk averse, and had differential information across alternatives.

[16] This may depend on gains and costs from cooperation (as in Del Boca and Flinn (2006, 2010)), on a deliberate parental behavior (as in Bisin and Verdier (2001) and Doepke and Zilibotti (2008)), or on some other reasons. Indeed, if that were the case, quantifying the effects of a policy targeting family members' expectations would require a joint model of decision protocol selection *and* curriculum choice, since that policy would affect curriculum choice both directly *and* through the channel of choice protocol selection.

[17] Educational tracking may be by ability (as in the U.S.), curricular, or a combination of the two (as in many European countries). Time of tracking and allocation mechanism of children into tracks vary across countries. In the OECD group, the

ticular, the time of tracking and the extent of specialization and separation of different tracks affect the consequences of curriculum choice on children's outcomes, by shaping the form and degree of uncertainty for this choice.[18] This is because the earlier a child's age at tracking, the longer the future he must anticipate, and the less the accumulated experience with past school performance he can use to form expectations on his tastes, ability, and future outcomes. Hence, awareness that the type of training in high school carries consequences for future education and work opportunities and that "wrong choices" may not be easily or costlessly corrected makes it very important for adolescents to be able to make a sensible choice.

Motivated by these issues, this work contributes to existing empirical studies of curriculum choice with curricular tracking (e.g., Flabbi (2001) and Checchi and Flabbi (2007)), by modeling uncertainty explicitly within a structural framework, but without imposing strong assumptions on how youths and their parents form expectations on future choice-related outcomes (see Manski (1993) and references therein). More generally, the paper fits in with the literature modeling career choice as one requiring a large investment in training and being made by individuals with uncertain ability and investment returns (see, e.g., Bamberger (1986) on occupation choice and Altonji (1993) and Zafar (2008) on college major choice). It is closest to Zafar (2008), who estimates a static model of college major choice under uncertainty using probabilistic expectations data from a sample of Northwestern students. The main differences between Zafar (2008)'s work and mine are that I analyze an earlier and compulsory career-type choice and that I model it as a family choice with heterogeneous decision processes. On the contrary, Zafar (2008) assumes that college students are the main decision makers of their major, which appears sensible given their age, and yet finds evidence of a possibly strong parental influence (see also Zafar (2010*b*)).

All the more so, identification of a proper decision-making unit for curriculum choice is not at all unambiguous, since in most OECD countries children are tracked into different curricula during adolescence (e.g., in Italy between 13 and 14). The main difficulty here is that, on the one hand, adolescents undergo development of their preferences and capabilities for communication, formal reasoning, and independent action; on the other hand, they still rely on parental guidance and support.[19] In particular, while adolescents seem old enough to play an active role in their

modal age of first tracking is between 15 and 16, and ranges from 10 in Austria and Germany to 18 in Canada and the U.S. (Brunello and Checchi, 2007). In fact, the American system is considered to be de-tracked curricular-wise. Lately, however, some states have experienced specialization shifts, such as the Florida requirement that 9th graders declare a major. As for the sorting mechanism, in some countries children are tracked by testing, as in Germany, and in others by "family background" (i.e., choice), as in Italy (see Checchi and Flabbi (2007)).

[18]On the supply side, there is a substantive literature studying how the institutional features of a stratified schooling system affect its efficiency (e.g., Brunello and Giannini (2004)) and equity (see, e.g., Brunello and Checchi (2007) and Checchi and Flabbi (2007) for the case of curricular tracking and Figlio and Page (2002) for ability grouping). The tension between breadth and depth of education and the related policy problem of determining the optimal time of tracking are prominent issues (e.g., Malamud (2010), Brunello et al. (2007), Ariga et al. (2005), and Ariga et al. (2010)). Intuitively, if a central planner had perfect knowledge of children's ability, he may wish to track students as early as possible. But since, *like families*, he does not, he faces a clear trade-off between time of tracking and probability of misallocation.

[19]Prior research establishes that children's involvement in decisions increases over ages 9-13 (Yee and Flanagan, 1985), while decision autonomy increases over ages 12-17 (Dornbusch et al., 1985). Moreover, the formal reasoning skills needed

schooling decisions, their level and rate of autonomy acquisition will generally vary with their traits, abilities, environment, as well as parental preferences, resources, and parenting style (Lundberg et al., 2007). Hence, it seems natural to hypothesize existence of heterogeneous decision processes across families, ranging from unilateral to more interacted protocols.

To date, however, only a recent handful of studies have challenged the unitary view of household behavior (Becker, 1974, 1981) in the context of educational choices (e.g., Bursztyn and Coffman (2009) and Berry (2009)). These works develop non-cooperative models of child-parent interactions with moral hazard, which motivate empirical applications on children's school attendance behavior or achievement using data from field experiments in developing countries.[20] My paper contributes to this stream of works by structurally analyzing a different schooling choice margin and by focusing on cooperative child-parent interactions, while allowing for heterogeneous family processes (unilateral and joint decisions). This is justified by the fact that in my setting children and parents are assumed to solve the very same problem, i.e., choose the curriculum that suits the child best. Thus, even though in this paper I do not model family selection into decision protocols, which I take as exogenously given, the underlying idea is that cooperation exists whenever communication of opinions, information, and preferences can improve quality of choice.

Last but not least, curriculum choice has also been regarded as a channel through which parents may try to create their children in their own image (*à la* Bisin and Verdier (2001))–thereby generating little intergenerational mobility (see, e.g., Checchi and Flabbi (2007))–or, rather, to improve their children's condition (as in Doepke and Zilibotti (2008)). However, while "cultural transmission" of preferences and beliefs from parents to children is generally considered to be the main vehicle for either possibilities, very little is known in practice of how children and their parents perceive uncertain dimensions of curriculum choice and of what roles children and parents play in it. Data collection and empirical analysis carried by this work provide new evidence and shed some light on these issues.

to generate and weigh alternatives have been found to develop rapidly from age 8-9 to age 15-16 (Keating, 1990). Finally, experimental studies evaluating children's development of abilities related to rational decision-making have found that patterns of adolescents' decision-making behavior are very similar to those observed in adults (e.g., Harbaugh et al. (2001), Harbaugh et al. (2002), Schlottmann and Anderson (1994), and Schlottmann (2001), among others).

[20] Bursztyn and Coffman (2009) analyze adolescents' school attendance behavior in Brazilian *favelas*, and provide evidence that child-parent conflict plays an important role via the parents' difficulty of monitoring their children's actions. Berry (2009), instead, tests whether identity of recipient (either the parent or the child) of cash incentives for school achievement (enrollment, or attendance) in India affects their effectiveness. Additionally, Attanasio and Kaufmann (2010) analyze high school and college enrollment decisions in rural Mexico with data from *Progresa*, and find that both children's and parents' expectations matter for the former, while only youths' expectations are relevant for the latter. However, they do not model child-parent interactions. In fact, these papers and mine fit in with an emerging literature studying child-parent interaction dynamics in child development and family decision-making and their consequences on children's outcomes (see Weinberg (2001), Burton et al. (2002), Akabayashi (2006), Lundberg et al. (2007), Lizzeri and Siniscalchi (2008), Hao et al. (2008), (Dauphin et al., 2008), Cosconati (2009), and Souza (2010)). All these works model child-parent interactions as non-cooperative games for, under the influence of earlier works exploring limitations of Becker (1981)'s "Rotten Kid Theorem" (e.g., Bergstrom (1989)), they consider the standard assumption of (spousal) bargaining (that binding, costlessly enforceable agreements can support an efficient solution) not plausible in the child-parent context (see Lundberg et al. (2007)).

3 The Identification Problem, Idealized

3.1 Curriculum Choice under Uncertainty: Basic Setup

The environment is populated with families, $f = 1, ..., F \in \mathcal{F}$, each one formed by one adolescent child, $c = c(f)$, and one parent, $p = p(f)$.[21] Families face high school curriculum choice for their children over a set of available alternatives, $j = 1, ..., J \in \mathcal{J}$,[22] and wish to make an optimal child-curriculum match, as follows:

$$\max_{j \in \mathcal{J}} \theta_{cj}, \tag{1}$$

where θ_{cj} represents the *unknown* quality of the match between child c and curriculum j.[23] This parameter may be thought of as a composite one, encompassing immediate quality of curriculum choice as well as post-graduation opportunities and choices. Examples are whether the child would enjoy core subjects of curriculum j, how his performance would be in curriculum j, which opportunities curriculum j would provide him with after graduation, and so forth, should he enroll in curriculum j. In my notation, individuals' indeces indicate individual-specific variables or parameters, when used as subscripts; they indicate variables or parameters specific to the class of individuals identified by the index, when used as superscripts.

Assuming separability of θ_{cj}'s components yields a convenient representation of uncertainty as a set of binary outcomes, $\mathcal{B} = \{\{b_n \in \{0,1\}\}_{n=1}^N\}$, with corresponding *objective* ex ante realization probabilities, $\{\{\Pi_{cj}(b_n \in \{0,1\})\}_{n=1}^N\}_{j=1}^J$, such that $\Pi_{cj}(b_n = 1) = 1 - \Pi_{cj}(b_n = 0)$.[24] Importantly, I do not assume that family members know these ex ante probabilities; rather, they hold *subjective* probabilities, $\{\{\{P_{ij}(b_n \in \{0,1\})\}_{n=1}^N\}_{j=1}^J\}_{i \in \{c,p\}}$, which may or may not coincide with the objective ones. To clarify, $\Pi_{cjn} = \Pi_{cj}(b_n = 1)$ indicates the objective ex ante probability that outcome $b_n = 1$ occurs if child c attends curriculum j; whereas, $P_{ijn} = P_{ij}(b_n = 1)$ indicates the subjective probability held by family member $i \in \{c, p\}$ for the same outcome. Hence, for each family f, $(N \times J)$ objective probabilities and $(N \times J \times 2)$ subjective ones are defined.[25]

Throughout the section, I illustrate the framework and the identification problem via a simple example with 2 alternatives, 2 outcomes, 2 decision processes, and 1 family. The family chooses between an art-oriented curriculum, "Michelangelo" (M), and a science-oriented

[21] I assume dyadic families because my data are available for one parent only. Theoretically, this amounts to assuming that parental role in the choice can be represented through primitives of a single parent, the "representative" or "relevant" parent.

[22] For simplicity I assume that all families face the same choice set, i.e., $\mathcal{J}_f \equiv \mathcal{J}\ \forall f \in \mathcal{F}$.

[23] Given institutional features of Italian secondary education (see Giustinelli (2010) for a detailed summary), the supply side is characterized (1) by curricular tracking with physically separate curricula (i.e., offered by different schools) and (2) by an open enrollment system in which the allocation mechanism of children to curricula and schools is family choice. On the demand side, I assume (3) a hierarchical process of (a) selection of a family decision process, (b) curriculum choice, and (c) school choice as well as (4) separability of curriculum choice from other family choices. (1) and (2) allow me to focus on the demand side; (3) and (4) allow me to analyze curriculum choice in isolation.

[24] Here for simplicity I assume that $\mathcal{B}$ is constant both within and across families.

[25] Choice of modeling uncertainty as a set of separable binary outcomes is dictated by feasibility of data collection so that, for each respondent $i \in \{c(f), p(f)\}$, $\{\{P_{ij}(b_n = 1)\}_{n=1}^N\}_{j=1}^J$ are elicited in place of the more complicated objects $\{P_{ij}(b_1, ..., b_N)\}_{j=1}^J$. Notice, however, that if multiple discrete or continuous outcomes were included, multiple points of the respondents' distributions of beliefs should be elicited.

curriculum, "Galileo" (G), by weighing a "Difficulty" outcome (D)–that the child will graduate in the regular time–and a "Flexibility" outcome (F)–that the training he receives will allow him to choose among a wide range of fields in college. The world is such that an M-diploma is easier to obtain than a G-diploma ($\Pi_{MD} = 95 > \Pi_{GD} = 70$; math at Galileo is really hard!). However, an M-diploma provides less flexibility than a G-diploma ($\Pi_{MF} = 30 < \Pi_{GF} = 90$; Michelangelo's artistic training is somewhat narrow, and is good only if the child wants to study architecture or some art-related field in college). Moreover, family members hold subjective assessments, $\{(P_{iMD}, P_{iMF}); (P_{iGD}, P_{iGF})\}_{i\in\{c,p\}}$, of the objective probabilities, $\{(\Pi_{MD}, \Pi_{MF}); (\Pi_{GD}, \Pi_{GF})\} = \{(95, 30); (70, 90)\}$, and use the former within one of the following decision processes: either the child unilaterally chooses his own curriculum or child and parent make a joint decision. Finally, one researcher ("she") and one planner ("he") observe the family's final choice, M, and some background characteristics of family members. With these data, the researcher is in charge of analyzing curriculum choice and of informing the planner. In turn, the planner is in charge of implementing useful policy, if desirable. Notice that family members' subjective expectations and the family decision process are not observed.

3.2 The Individual Problem: Separating Preferences and Beliefs

Analysis of the *individual* curriculum choice problem, either as faced by the child or by the parent, introduces the challenge of empirically separating the decision maker's preferences from his/her beliefs (see also Delavande (2008) and Zafar (2008)).

The Child Problem. Let the child be the unilateral decision maker first. He chooses a high school curriculum according to decision rule (1). Formally, he maximizes over $\mathcal{J}$ a separable-in-outcomes linear *subjective* expected utility of the form

$$EU_{cj} = \sum_{n=1}^{N} \sum_{b_n\in\{0,1\}} P_{cj}\left(b_n\right) \cdot u(b_n, z_c) + x_{cj}'\delta(z_c) + \varepsilon_{cj} = \sum_{n=1}^{N} P_{cjn} \cdot \Delta u_n^c + \bar{U}^c + x_{cj}'\delta^c + \varepsilon_{cj}, \quad (2)$$

which is a function of the vector of uncertain outcomes ($b = (b_1, ..., b_N)$), a $M \times 1$ vector of child-curriculum specific attributes not subject to uncertainty ($x_{cj} = (x_{cj1}, ..., x_{cjM})'$), a vector of individual characteristics (z_c), and a random term unobservable to the econometrician (ε_{cj}). Each structural preference parameter, $\Delta u_n^c = u(b_n = 1, z_c) - u(b_n = 0, z_c)$, is the difference in utility the child derives from occurrence of outcome n ($b_n = 1$) relative to its non-occurrence ($b_n = 0$). Notice that in this formulation preference parameters are assumed to be identical for all children sharing the same observable characteristics (z_c) and that, being constant over alternatives, $\bar{U}^c = \sum_{n=1}^{N} u(b_n = 0, z_c)$ drops out of the choice.

Keeping up with the example, let us momentarily simplify the framework by assuming that the researcher and the planner do know that the child is the only decision maker and that he chooses according to "$\underset{j\in\{M,G\}}{Max} \; EU_{cj} = P_{cjD} \cdot \Delta u_{cD} + P_{cjF} \cdot \Delta u_{cF}$". Even within this simple setup, the researcher is faced with multiple competing explanations consistent with choice of M. The following two scenarios illustrate the identification problem and its relevance for policy.

- Scenario I. The child holds rational expectations, i.e., $\{(P_{cMD}, P_{cMF}); (P_{cGD}, P_{cGF})\} = \{(95, 30); (70, 90)\}$, and only cares about difficulty, e.g., $\{\Delta u_{cD}, \Delta u_{cF}\} = \{10, 0\}$. Indeed, with a linear compensatory rule trading off difficulty and flexibility, this configuration of preferences and beliefs implies $EU_{cM} = 95 \cdot 10 + 30 \cdot 0 > EU_{cG} = 70 \cdot 10 + 90 \cdot 0$.
- Scenario II. The child holds rational expectations on difficulty, he erroneously perceives the two alternatives as providing the same degree of flexibility, e.g., $\{(P_{cMD}, P_{cMF});$ $(P_{cGD}, P_{cGF})\} = \{(95, 90); (70, 90)\}$, and he equally cares about difficulty and flexibility, e.g., $\{\Delta u_{cD}, \Delta u_{cF}\} = \{5, 5\}$. This yields $EU_{cM} = 95 \cdot 5 + 90 \cdot 5 > EU_{cG} = 70 \cdot 5 + 90 \cdot 5$.

Under the standard assumption that individual preferences are hardwired and cannot be manipulated, scenario I ("preference-driven" choice) has different policy implications than scenario II ("expectations-driven" choice). Specifically, if the planner were to intervene by providing the child with the correct information (optimistically assuming the planner himself knows it), his policy would be meaningful and possibly effective only under the second scenario. That is, if the informed decision maker of scenario II were now to "comply" and use the disclosed objective realization probabilities, he would switch to choice of G (since $95 \cdot 5 + 30 \cdot 5 < 70 \cdot 5 + 90 \cdot 5$). Under scenario I, instead, the decision maker will choose M even without holding rational expectations, as long as he does not value flexibility and he correctly perceives M as an easier alternative.

The Parent Problem. I assume that parents put themselves into their children's "shoes", i.e., they solve the same problem as their children; but they do it through their own lenses, i.e., through their subjective expectations and preference weights. This echoes Bisin and Verdier (2001)'s assumption of parental "imperfect empathy", and implies that the parental problem can be formalized as in (2), substituting the individual index c with p.

3.3 The Family Problem: Introducing Cooperative Decision Making

A family-level decision process for curriculum choice may consist of a unilateral decision by a single family member or may entail interactions among members. Specifying a particular form of interaction requires knowledge or assumptions on whether, which, and how family members' beliefs and preferences enter the process and on whether and how the choice set and other constraints are modified by the interaction itself. A fairly general formalization of a *cooperative* decision process under uncertainty, which nests unilateral decision and other interacted processes as special cases, incorporates both revision of decision makers' expectations and negotiation over preferences. Specifically, child and parent update their subjective beliefs to account for each other's opinions and information, using outcome-specific weights ($w_n^{c,k}$ and $w_n^{p,k}$, respectively).[26] And they maximize a weighted average of their thus *updated* subjective expected utilities, using a different set of outcome-level weights (ϕ_n and φ_m), which reflect how much "outcome-specific say" each member has in the choice, as follows:

$$\underset{j\in\mathcal{J}}{Max}\ \Gamma_{fj}^k = \sum_{n=1}^{N} \phi_n \cdot \left\{ \left[w_n^{c,k} \cdot P_{cjn} + (1-w_n^{c,k}) \cdot P_{pjn} \right] \cdot \Delta u_n^{c,k} \right\} + \\ + (1-\phi_n) \cdot \left\{ \left[(1-w_n^{p,k}) \cdot P_{cjn} + w_n^{p,k} \cdot P_{pjn} \right] \cdot \Delta u_n^{p,k} \right\} + \\ + \sum_{m}^{M} \varphi_m \cdot \left[\delta^{c,k} \cdot x_{cjm} \right] + (1-\varphi_m) \cdot \left[\delta^{p,k} \cdot x_{pjm} \right] + \varepsilon_{fj}^k, \qquad (3)$$

where Γ_f^k is family f's objective function;[27] Δu_n^i, δ_m^i, and P_{ijn} are the child's and parent's preferences and expectations; ε_{fj}^k is a random component capturing the observational difficulty of the econometrician; and dependence of the preference parameters on individual characteristics (z_i) is suppressed for notational convenience.

In the simple binary example, let us assume that whenever child and parent make curriculum choice cooperatively they solve

$$\max_{j\in\{M,G\}} \omega_c \cdot [P_{cjD} \cdot \Delta u_{cD} + P_{cjF} \cdot \Delta u_{cF}] + \omega_p \cdot [P_{pjD} \cdot \Delta u_{pD} + P_{pjF} \cdot \Delta u_{pF}],$$

with $\omega_c + \omega_p = 1$. This process is nested in problem (3), with $\phi_n \equiv \omega_c$ and $\{w_n^{c,k}, w_n^{p,k}\} \equiv \{1,1\}$ $\forall n$. It is then easy to concoct a third scenario in which, choosing according to this rule, child and parent select again M.

- Scenario III. Child and parent weight their expected utilities with a greater weight to the parent, e.g., $\{w_c, w_p\} = \{1/3, 2/3\}$, and they hold preferences and expectations such that they both care equally about difficulty and flexibility, e.g., $\{\Delta u_{cD}, \Delta u_{cF}\} \equiv \{\Delta u_{pD}, \Delta u_{pF}\} = \{5,5\}$; the child has rational expectations, i.e., $\{(P_{cMD}, P_{cMF}); (P_{cGD}, P_{cGF})\} = \{(95,30); (70,90)\}$; the parent, instead, erroneously perceives M and G as providing the same degree of flexibility, e.g., $\{(P_{pMD}, P_{pMF}); (P_{pGD}, P_{pGF})\} = \{(95,90); (70,90)\}$. All this implies

$$EU_{fM} = \frac{1}{3}[95 \cdot 5 + 30 \cdot 5] + \frac{2}{3}[95 \cdot 5 + 90 \cdot 5] > EU_{fG} = \frac{1}{3}[70 \cdot 5 + 90 \cdot 5] + \frac{1}{3}[70 \cdot 5 + 90 \cdot 5].$$

This last example shows how knowledge of decision process dynamics, such as presence or absence of interpersonal interactions, is also fundamental to inform policy. In this case, for information provision to be meaningful in the first place, it should target the parent. Fur-

[26] This setup can accommodate opinion polarization by not restricting weights $w_n^{i,k}$ to lie in $[0,1]$ (e.g., Arora and Allenby (1999)).

[27] Which, in general, needs not be an expected utility itself.

thermore, assessing whether disclosing certain information may be at all effective and to what extent (which the planner may wish to know given that information provision is generally costly) requires knowledge of the relative importance of each participant and of her/his preferences. In scenario III, parental importance and preference weights are such that disclosure of the objective probabilities on flexibility, if feasible, may effectively induce a change in behavior, since

$$\frac{1}{3}\left[95\cdot 5+30\cdot 5\right]+\frac{2}{3}\left[95\cdot 5+30\cdot 5\right]<\frac{1}{3}\left[70\cdot 5+90\cdot 5\right]+\frac{2}{3}\left[70\cdot 5+90\cdot 5\right],$$

but it needs not do so in general.

Let us finally consider a situation in which child and parent are totally aligned and both prefer M, based on the wrong perception that it provides the same degree of flexibility as G, i.e., $\{\Delta u_{cD},\Delta u_{cF}\}\equiv\{\Delta u_{pD},\Delta u_{pF}\}=\{5,5\}$ and $\{(P_{cMD},P_{cMF});(P_{cGD},P_{cGF})\}\equiv\{(P_{pMD},P_{pMF});(P_{pGD},P_{pGF})\}=\{(95,90);(70,90)\}$. Then, preference alignment between child and parent should make them "indifferent" among different decision processes, at least within a class of models satisfying unanimity (e.g., Raiffa (1968), Gilboa et al. (2004), and Mongin (2005)). Indeed, any group decision rule linearly combining child's and parent's expected utilities, including $\{0,1\}$ and $\{1,0\}$, would result in choice of M, given the primitives. However, from the point of view of a social planner, knowing which process is employed in the choice is still important. Assume he does not. Then, if the family decision process is such that the child chooses unilaterally (as in scenario II), providing the correct information may be useful. If, instead, the process entails weighting child's and parent's expected utilities with weights 1/3 and 2/3 (as in scenario III), targeting the child alone would not be effective, since

$$\frac{1}{3}\left[95\cdot 5+30\cdot 5\right]+\frac{2}{3}\left[95\cdot 5+90\cdot 5\right]>\frac{1}{3}\left[70\cdot 5+90\cdot 5\right]+\frac{2}{3}\left[70\cdot 5+90\cdot 5\right];$$

however, targeting the parent alone or both may be, e.g.,

$$\frac{1}{3}\left[95\cdot 5+90\cdot 5\right]+\frac{2}{3}\left[95\cdot 5+30\cdot 5\right]<\frac{1}{3}\left[70\cdot 5+90\cdot 5\right]+\frac{2}{3}\left[70\cdot 5+90\cdot 5\right].$$

In the empirical application, I focus on three main decision processes I observe in my sample, all nested in (3).[28]

- **Child chooses unilaterally** ($k=1$)

  When a child chooses individually without major interactions with his parents, the family criterion function, Γ^1, coincides with the child's expected utility (2). This protocol includes the possibility that the child interacts with any person or listens to any source different

[28] Clearly, other behavioral assumptions of joint decision making would be possible. Nash bargaining would be one (as in Zhang et al. (2009)); joint regret minimization a second one (as in Aribarg et al. (2010)); according to a third one the child may choose unilaterally over a "constrained choice set" established by the parent (as suggested by a few children' answers to an open question of my survey).

from his parents, and is nested in (3), with $\phi_n = 1$ and $w_n^{c,1} = 1 \; \forall n$.[29]

- **Child chooses after listening to the parent ($k = 2$)**

  I formalize this process as one in which the child maximizes an expected utility function based on his own preferences, $\{\Delta u_n^{c,2}\}_{n=1}^N$ and $\{\delta_m^{c,2}\}_{m=1}^M$, and on updated expectations that incorporate parental opinions via $\{w_n^{c,2}\}_{n=1}^N$. Like the previous one, this process is nested in (3), with $\phi_n = 1 \; \forall n$.[30]

- **Child and parent make a joint decision ($k = 3$)**

  I model this process as a special case of (3) with $w_n^{c,3} = 1$ and $w_n^{p,3} = 1$ for all n, i.e., a joint decision involving by-outcome negotiation with no explicit expectations' revision.

As previously noticed, in this paper I do not model the process leading to employment of a particular family decision protocol. Hence, no specific interpretation is given to the weights aggregating child's and parent's preferences and beliefs. For instance, while weights $\{(1-w_n^{c,2})\}_{n=1}^N$ in protocol 2 will generally capture child's internalization of parental opinions and suggestions,[31] such parameters may be easily thought to depend on aspects of parental socialization decisions and style (see Bisin et al. (2004) and references therein for relevant discussions).

4 Survey and Data

4.1 Study Design and Sample Characteristics

Study participants were sampled from the population of all 9th graders entering any public high school of the Municipality of Verona, Italy in September 2007 and their parents.[32] The total number of students in the population was 4,189. Sampling was choice-based, i.e., random within choices.[33] This sampling scheme is cheaper than random sampling from the whole population and is natural for the choice under study, since students are physically clustered in schools and, hence, in curricula. Recruitment was done by contacting school principals directly. Virtually 100% of sampled students participated in the survey (1,215). Parental participation was expectedly lower (≈ 60%), but still very good for this type of surveys.[34] The 2007-2008

[29] A case in which the parent chooses unilaterally would be totally symmetric, with the roles of child and parent reversed.

[30] It is easy to show that this process accommodates failures of Pareto Optimality. An example within the M-G illustration is available upon request. Again, a case in which the parent chooses after listening to her would be symmetric.

[31] In fact, the extent to which a child relies on parental opinions on a specific outcome may vary across families and across curricula, e.g., depending on whether he thinks that the parent has more experience with or better information about certain curricula. While I do not model this explicitly, in empirical analysis weights could be easily made depend on covariates capturing these aspects.

[32] Within Veneto, choice of Verona was mainly due to institutional and geographical characteristics–such as the size of the area, the location of schools within the area, and characteristics of the public transport network–which make all curricula in the defined choice set available to everybody (see Giustinelli (2010) for details).

[33] Manski and McFadden (1981) and Cosslett (1993) provide systematic treatments of estimation of discrete choice models with endogenously stratified samples, of which choice-based sampling is a special case.

[34] The 60% average parental participation rate, however, masks important differences across parents' subgroups. In particular, participation rates of parents from families in which child reported having chosen unilaterally are lower than average. That is, whichever the underlying reason–either a deliberate parenting style or disengagement–for parents of "$k = 1$ children" not to participate in their children's choice, they also appear to be the same parents who did not participate in the survey. This is not particularly problematic for the empirical analysis of this paper, since I employ parents' expectations and stated

distributions of curriculum enrollment in the population and in the estimation samples are shown in table 1 (column 2 and remaining ones, respectively).[35]

Children filled out an in-class paper-based questionnaire ($\approx$ 20-28 students per class) during one school hour ($\approx$ 50-60 minutes), assisted by an instructor previously trained for the purpose and by the class teacher. Parent questionnaire, instead, was taken home by students and returned to school after 7-10 days. These formats were chosen to maximize participation and facilitate administration inside schools.[36] Giustinelli (2010) report complete English translations of both questionnaires.

Important design choices were to collect field data rather than experimental data and between collecting retrospective and prospective data. The former was suggested by the high-stakes and once-and-for-all nature of curriculum choice.[37] As for the latter, collecting data retrospectively during the first 10 days of school had two main advantages. First, actual choices could be observed. Second, children and parents could separately provide their probabilistic expectations and stated preferences with reference to a point in time–*before* the decision process–that was likely to vary across families.[38] A clear disadvantage of the retrospective approach is that its validity relies on respondents' capability to recall their expectations

preferences data only in models of interacted decision making, i.e., only for those subgroups of families in which parental participation rates are generally high (up to 80%). However, this response pattern would be troublesome if one wished to use the data to analyze decision protocol selection.

[35]For detailed descriptions of the original samples and of the samples used for estimation, see Giustinelli (2010). The following stylized patterns are found: (i) gender specialization: vocational and technical curricula of industrial type and technical schools for surveyors are predominantly chosen by boys, while vocational curriculum of commercial or social type, artistic education, and general curricula of humanities, languages, and education sciences are predominantly chosen by girls; (ii) higher percentage of children with irregular paths in vocational curricula; (iii) higher percentage of foreign born children or children of foreign born parents in vocational curricula and in linguistic curricula; (iv) selection by parental education: children of high educated parents are concentrated in general curricula, especially humanities and math and sciences; (v) selection by final grade obtained in junior high graduation exam: children enrolled in general, technical, and vocational tracks feature decreasing grades.

[36]Face-to-face interviews were discarded because of sample size-costs considerations. At-home internet-based formats were avoided for a number of reasons. The first is selectivity, since some families may not have internet access or may have internet access with a usage-based rate. Second, a sizeable number of parents may not be proficient at using a personal computer or the internet. And it was suspected that the at-home mode would obtain lower response rates among children, too, relative to the in-class mode. Finally, availability of computer laboratories varied greatly across types of school, and their use appeared to have greater potential for conflict with school activities and logistics of survey administration.

[37]Empirical studies analyzing discrete choices by groups, especially outside economics, use experimental settings. However, they systematically focus on decisions over goods that, relative to curriculum choice, are frequently purchased, low-stakes, and characterized by choice dynamics similar to those of existing comparable types of goods, a circumstance that renders the experimental situation more realistic and familiar to participants (see, e.g., Dosman and Adamowicz (2006)). For instance, marketing studies typically involve tasks confronting respondents with hypothetical choice scenarios in which attributes of alternatives and choice sets are appropriately manipulated, and require alternating individual and group tasks, implying the simultaneous physical presence of group members and a decision protocol fixed by design (see, e.g., Aribarg et al. (2002)). Moreover, these studies usually analyze choices with no uncertainty.

[38]The way in which the choice process unfolded over time may vary, too. E.g., in cooperative families children and parents may choose after a series of repeated interactions, or they may "sit down around a table" and settle on a choice once and for all. Additionally, collecting data in subsequent instances (i.e., once before and once after the choice) would pose both the issue just discussed and additional challenges from possible attrition.

Table 1: Observed Choices and Reported Decision Protocols

Curriculum	**Population**[a] **(%)**	**Represent.**[b] **Model All**	**Represent.**[c] **Model Matched**	**Protocol 1**[d] **Reported by Child**	**Protocol 2**[e] **Reported by Child**	**Protocol 3**[f] **Reported by Child**
Vocational - Commerce	320 (7.64)	86 (8.62)	36 (6.25)	14 (8.23)	13 (5.94)	12 (5.04)
Vocational - Industrial	311 (7.43)	51 (5.11)	17 (2.95)	11 (6.47)	3 (1.37)	7 (2.94)
Total Vocational	631 (15)	137 (13.73)	53 (9.20)	25 (14.70)	16 (7.31)	19 (7.98)
Technical - Commerce-Social	742 (17.72)	100 (10.02)	57 (9.90)	17 (10)	17 (7.76)	26 (10.92)
Technical - Industrial	521 (12.44)	85 (8.52)	55 (9.55)	25 (14.70)	13 (5.94)	28 (11.76)
Technical - Surveyors	285 (6.81)	96 (9.62)	67 (11.63)	23 (13.53)	18 (8.22)	29 (12.18)
Total Technical	1548 (36.9)	281 (28.16)	179 (31.08)	65 (38.23)	48 (21.92)	83 (34.86)
Total Artistic	177 (4.2)	76 (7.62)	15 (2.60)	18 (10.59)	5 (2.28)	5 (2.10)
General - Humanities	395 (9.43)	172 (17.23)	123 (21.35)	16 (9.41)	52 (23.74)	52 (21.85)
General - Languages	168 (4.01)	59 (5.91)	33 (5.73)	6 (3.53)	22 (10.05)	8 (3.36)
General - Learning-Social S.	330 (7.89)	100 (10.02)	57 (9.90)	18 (10.59)	29 (13.24)	21 (8.82)
General - Math and Sciences	940 (22.43)	173 (17.33)	116 (20.14)	22 (12.94)	47 (21.46)	50 (21.01)
Total General	1833 (43.8)	504 (50.49)	329 (57.12)	62 (36.47)	150 (68.49)	131 (55.04)
Total	4189 (100)	998 (100)	576 (100)	170 (100)	219 (100)	238 (100)
Declared Choice Protocol				170 (27.11)	219 (34.93)	238 (37.96)
Total				627 (100)	627 (100)	627 (100)

[a] Source: Provincial Agency for Education of Verona (Italy).

[b]: after dropping families in which child has any item non-response in the expectation questions.

[c]: after dropping families in which either child or parent have any item non-response in the expectation questions.

[d]: after dropping families in which child has any item non-response in the expectation questions.

[e]: after dropping families in which either child or parent have any item non-response in the expectation questions, child did not report his stated preferred curriculum, and responding parent is different from relevant parent.

[f]: after dropping families in which either child or parent have any item non-response in the expectation questions, either child or parent did not report their stated preferred curricula, and responding parent is different from relevant parent.

and choice preferences as they were before the decision process.[39] An additional related complication is that, while the implemented sampling design for actual choices and family members' characteristics should be viewed as purely choice-based, that of stated choice preferences–which I use as dependent variables in the empirical analysis–should be more appropriately viewed as one from an "intercept & follow" survey, whose econometrics is less known and less developed than that for pure choice-based samples (see McFadden (1996)).

4.2 Subjective Data: Elicitation and Description

Verbal Categories of Family Decision Protocols. Children's and parents' perception of their family decision process was elicited by means of the following question (here directed to the child).

Which one of the following statements best describe the WAY in which the CHOICE of your high school curriculum was made? Please mark one only.

(A) We realized pretty soon that in our family we had the SAME IDEA	○
(B) We DISCUSSED within our family till we reached a COMMON DECISION based on some COMPROMISE	○
ONLY ONE PERSON took the final decision, AFTER RECEIVING INFORMATION from the others and LISTENING to their OPINIONS	
Indicate who decided:	
(C) Myself	○
(D) My father	○
(E) My mother	○
(F) Other person, specify:	○
ONLY ONE PERSON made the final decision, WITHOUT discussing or exchanging OPINIONS with others	
Indicate who decided:	
(G) Myself	○
(H) My father	○
(I) My mother	○
(L) Other person, specify:	○

[39] In a paper concerned with ex post rationalization by parents asked in surveys to retrospectively report children wantedness, Rosenzweig and Wolpin (1993) find that such reports of wantedness after children are born are significantly influenced by a number of children's traits. While the case Rosenzweig and Wolpin (1993) analyze and mine may appear similar, two important distinctions should be made. First, at the time of my survey none of the outcomes for which respondents were asked to report their probabilistic expectations had realized. Second, as described in subsection 4.2, respondents were never inquired about whether they wanted to choose the curriculum they eventually enrolled in. Rather, they were presented with the choice set available in Verona, and they were asked to rank curricula in that choice set, according to their preferences, their expectations, and the criteria they *individually* thought were important for the choice. Finally, in a recent paper Chen and Risen (2010) show analytically and experimentally that if people's ratings/rankings are an imperfect measure of their preferences, and their choices are at least partially guided by their preferences, observed spreading of alternatives may not be unambiguosly taken as evidence of choice-induced attitude change due to cognitive dissonance and corresponding reduction via ex post rationalization, since it will generally occur even with stable preferences.

Format and wording were inspired by those of analogous questions in existing surveys (e.g., NELS88 (1988), IARD (2001), CISEM-IARD (2007), and others), but feature a potential improvement upon them in that decision protocol categories can be mapped more naturally into economic models of individual and group choice under uncertainty (e.g., categories (C)-(F)). On the one hand, this kind of information sometimes found in large scale surveys could and should be more frequently incorporated into economic models of choice, at least when elicited through a wording that has a natural behavioral interpretation in economics.[40] On the other hand, this design is subject to the basic criticism that categories are very stylized relative to the full range of possible real-life decision protocols: e.g., some modes of behavior may be excluded while others may be grouped in the same category. Moreover, qualitative descriptions of group decision protocols might be especially prone to subjectivity of interpretation.[41]

Answers to the protocol question and to a follow-up question asking respondents to list the persons the decision maker talked to, and to indicate whether (s)he talked to them simultaneously or separately, were then used to classify reported protocols into the 5 categories described in subsection 3.3.[42] Table 1 shows the distribution of family decision protocols reported by children in the estimation samples:[43] either children chose unilaterally (protocol "1"; ≈ 27%), or they chose after listening to their parents (protocol "2"; ≈ 35%), or children and parents made a joint decision (protocol "3"; ≈ 38%).[44] On the whole, these numbers may appear somewhat surprising, since parents may be expected to play a much larger role, especially given the age of the child and the importance of the choice. However, comparison of children's and parents' favorite curricula before the choice with actual choices reveals that only 14% of children did not have their own way versus 40% of parents (see tables 2 and 3). Moreover, when the sample is disaggregated by family decision protocol, the first figure intuitively increases with parental participation in the choice and the second figure decreases with it. These patterns are consistent with similar evidence from sociological and psychological studies on parenting in decision making (e.g., CISEM-IARD (2007, 2009); see also Giustinelli (2010) for additional references). Those studies have interpreted this evidence within the context of a more general shift that parenting style of modern Western families seems to have undergone in the last few decades towards a more open–"affective and supportive"–approach than the one–"prescriptive and rigid"–in vogue among previous generations (Provantini and Arcari, 2009).

[40]Recent examples using questions from the Health and Retirement Study (HRS) and the National Longitudinal Survey of Youth 1997 (NLSY97) are, respectively, Friedberg and Webb (2006) and Cosconati (2009).

[41]Alternatively, in marketing studies stated measures of influence are often elicited via a 0-100 scale (e.g., Aribarg et al. (2002)). However, it is not obvious whether qualitative differences among group decision protocols can be easily reduced to mere quantitative differences and elicited from survey respondents as such.

[42]Child chooses unilaterally ($k = 1$): this includes the case in which he talked to any person different from his parents and, hence, it groups part of (C) and all (G). Child chooses after listening to the parent ($k = 2$): part of (C). Child and parent make a joint decision ($k = 3$): (A) and (B). Parent chooses after listening to the child ($k = 4$): part of (D) and (E). Parent chooses unilaterally ($k = 5$): this includes the case in which she talked to any person different from the child, and is based on part of (D) and (E), as well as all (H) and (I). Additionally, when either (A) or (B) was selected, the respondent was asked a follow-up question eliciting the identity of the "threat decision maker" for the counterfactual situation in which any agreement or compromise could not be reached. Answers to this question and other information were used to define the relevant or representative parent. See Giustinelli (2010) for additional details.

[43]Because of selection in parental participation and because the student questionnaire was administered in class with the assistance of survey administrators (as opposed to the parent questionnaire which was self-administered by parents), in the empirical analysis I relay on children's reported protocols. This is also the approach taken by most studies of parenting in developmental psychology and economics, which find (as I do) somewhat low correlations between adolescents' and parents' reports of parenting modes in family decision making (e.g., Bumpus et al. (2001), Cosconati (2009), and others). Giustinelli (2010) offers additional discussions on these issues.

[44]The fraction of families for which no protocol or a different protocol were reported was below 5% and was dropped from the sample.

Stated Preferences as Curriculum Rankings and Junior High Orientation. Children's and parents' stated preferences were elicited by means of the following question (here directed to the child).

RANK the following types of secondary school from YOUR most preferred one to the one you like the least, considering only YOUR preferences, expectations, and the criteria YOU thought were important for choosing among them. Start by assigning 1 to YOUR FAVORITE curriculum, then proceed by increments of 1 till YOUR LEAST preferred one. The same number may not be assigned to two different schools.

Curriculum (either standard or laboratory)	**Rank**
Vocational - Commerce	
Vocational - Industrial	
Technical - Commerce or Social	
Technical - Industrial	
Technical - Surveyors	
Artistic Education	
General - Humanities	
General - Languages	
General - Learning or Social Sciences	
General - Math and Sciences	

The purpose of this question was to elicit children's and parents' preferred alternatives (SP data), which may not coincide with observed choices (RP data) due to intra-family interactions in decision making. To clarify, a child who reported choosing after listening to his parent (protocol $k = 2$) needed to provide his original probabilistic beliefs (see paragraph "Probabilistic Expectations" below) *and* the curriculum ranking generated by such beliefs, net of any updating based on parental input. Hence, a substantial difference from typical SP experiments is that here the required effort is one of recall of a past state or situation, rather than of imagination of a hypothetical scenario. As discussed later in section 5, this will affect specification of RP and SP utilities and interpretation of the relationship between their unobservable components.

Table 2 compares RP data and child's SP data in the main estimation samples. As previously mentioned, the proportion of families in which chosen curriculum and child's stated preferred one do not coincide is approximately 13-14% in the pooled samples (columns 1 and 2). This figure is smallest among families in which children reported choosing unilaterally (column 3), and it increases slightly with more interacted protocols (columns 4 and 5). In turn, table 3 shows actual choice and parent's stated preferred curriculum do not coincide in 40% of families. This percentage is highest among families in which children reported choosing unilaterally, and decreases with more cooperative protocols.

A different but interesting question is whether cooperative families selected an alternative that was not dominated, given child's and parent's initial preferences. Table 4 shows that cooperative families fail to select an undominated alternative in approximately 5% of cases in my sample, thereby supporting "group rationality" (see Raiffa (1968)).

Finally, a short section of the survey was devoted to gathering information on orientation suggestions families received from junior high school teachers. Specifically, respondents were asked whether they had been given any advise on which curriculum the child may successfully pursue by at least one of his junior high school teachers or counseling staff members. And in case of an affirmative answer, they were asked to indicate (1) which suggestion(s) they had received and from whom; (2) whether the suggestion was considered important/useful when making the choice; (3) why the suggestion was considered or not in the choice (depending on the answer to (2)).

Clearly, the fact that child's stated preferred curriculum and chosen one do not coincide in 11% of cases even among $k = 1$ families (see table 2) is problematic conceptually. Taking the reported choice protocol seriously, this fact suggests that some factor entering the actual decision process affected the final decision but was abstracted from by some children when they answered the stated preference question. However, figures in table 5 show that for about 60% of cases in which children's SPs do not match with RPs, the latter coincides with junior high school teachers' suggestions. Hence, one possibility is that, when responding the SP question, some children abstracted from the role that teachers' suggestions had in affecting their choice. Alternatively, parents may have had an active role in the choice, which would jeopardize the reliability of reported decision protocols, or some other factor played a role but was totally or partially abstracted from in children's answers. I explore some of these possibilities in section 5.

Table 2: Comparing RP and Child SP

	Represent. Model All	**Represent. Model Matched**	**Protocol 1 Reported by Child**	**Protocol 2 Reported by Child**	**Protocol 3 Reported by Child**	**Total (1+2+3)**
RP $\equiv$ C-SP	836 (86.09)	475 (87.16)	151 (88.82)	194 (88.58)	207 (86.97)	552 (88.04)
RP $\neq$ C-SP	135 (13.91)	70 (12.84)	19 (11.18)	25 (11.42)	31 (13.03)	75 (11.96)
Total	971 (100)	545 (100)	170 (100)	219 (100)	238 (100)	627 (100)

Table 3: Comparing RP and Parent SP

	Represent. Model Matched	Protocol 1 Reported by Child	Protocol 2 Reported by Child	Protocol 3 Reported by Child	Total (1+2+3)
RP ≡ P-SP	327 (60)	44 (54.32)	127 (59.07)	150 (63.03)	321 (60.11)
RP ≠ P-SP	218 (40)	37 (45.68)	88 (40.93)	88 (36.97)	213 (39.89)
Total	545 (100)	81* (100)	215* (100)	238 (100)	534 (100)

*: Smaller sample sizes than in corresponding cells of table 2 are due to item non-response in parental SP.

Table 4: RP, Child-SP, Parent-SP, and P.O. - Protocol $k = 3$ Reported by Child

	RP P.O.	**RP ¬P.O.**	**Mar.**
RP≡C-SP≡P-SP	138 (57.98)	0 (0)	138 (57.98)
RP≡C-SP≠P-SP	69 (28.99)	0 (0)	69 (28.99)
RP≡P-SP≠C-SP	12 (5.04)	0 (0)	12 (5.04)
RP≠C-SP&P-SP	7 (2.94)	12 (5.04)	19 (7.98)
Marginals	226 (94.96)	12 (5.04)	238 (100)

Table 5: RP, Child-SP, and JH - Protocol $k = 1$ Reported by Child

	RP ≡ JH	**RP ≠ JH**	**Marginals**
RP ≡ Child-SP	68 (55.74)	37 (30.33)	105 (86.07)
RP ≠ Child-SP	10 (8.20)	7 (5.74)	17 (13.93)
Marginals	78 (63.93)	44 (36.07)	122 (100)

Probabilistic Expectations. From the framework illustrated in sections 1 and 3 and existing sociological evidence on curriculum choice in Italy (IARD, 2001, 2005), I identified the following list of outcomes as potentially important in driving curriculum choice.[45]

[45] Questions eliciting children's expected earnings at age 30 (under the alternative scenarios that they would be working immediately after graduation and that they would first obtain a college degree) were also included. However, response rates were low. Many children had no sense of the order of magnitude of a monthly salary. A minority of them provided answers based either on information received during junior high school orientation or on their knowledge of their parents' earnings. As for parents, a number of them left written notes on the survey instrument explaining that, beyond the difficulty of providing any meaningful forecast, they did not regard such a factor as particularly important for the choice.

Outcome	Description
$b_1 = 1$	"Like": the child enjoys the curriculum core subjects.
$b_2 = 1$	"Ability-Effort I": the child spends 2.5h or more per day studying or doing homework.
$b_3 = 1$	"Ability-Effort II": the child attains the diploma in whatever amount of time.
$b_4 = 1$	"Ability-Effort III": the child graduates in the regular time.
$b_5 = 1$	"Ability-Effort IV": the child graduates in the regular time *and* with a yearly GPA $\geq 7.5/10$.
$b_6 = 1$	"Peers": the child is in school with his friend(s).
$b_7 = 1$	"Flexibility I": the child faces the subsequent college-work choice flexibly, i.e., upon receiving a training suitable either for studying in some university field(s) or working in some occupation(s).
$b_8 = 1$	"College": the child enrolls in college, conditional on graduating from high school.
$b_9 = 1$	"Flexibility II": the child faces the choice of field in college flexibly, i.e., he can choose among a wide range of fields, conditional on graduating *and* going to college.
$b_{10} = 1$	"Work": the child finds an acceptable and liked job after graduation.
$b_{11} = 1$	"Parent(s)": the child makes his parent(s) happy (child only).

In practice, subjective realization probabilities of outcomes $\{b_n = 1\}_{n=1}^{11}$ for curriculum j held by respondent i (i.e., $\{P_{ijn}\}_{n=1}^{11}$) were elicited for all curricula in the choice set and from both children and responding parents.

The format involved use of percent chances to express uncertainty on future events. A short introduction was provided on the use of the 0-100 scale, and a practice question based on a real-life example was included in the survey (see, e.g., Dominitz and Manski (1997) and Zafar (2008)). Respondents were encouraged to make use of the full range of available values, and a graphical (ruler-like) representation of the scale was shown to ease children's understanding. Since it was extremely important that respondents provided their own expectations independently of those of their family, they were encouraged to think back to the previous year, when a curriculum had not yet been chosen nor a final discussion had taken place in the family. To illustrate, the question eliciting children's probabilistic expectations for the "Like" outcome (b_1) is reported below. All expectations questions featured a tabular display identical to that of the rank question, with the second column labeled "Percent Chance" in place of "Rank".

When you attended your last year of junior high school, what did you think would be the percent chance that YOU would ENJOY the SUBJECTS taught in each of the following types of school, should you enroll in each one of them?

Responses to the expectations questions for the original data sets are extensively described and compared to available statistics in Giustinelli (2010). Here, I show the distributions of responses for the outcome "child graduates in the regular time and with a yearly GPA ≥ 7.5"

for two different curricula (vocational commercial and general math and science) and different estimation samples (all students, matched students, and matched parents), as an illustration (see figure 1). This is an outcome of particular interest, since respondents' probabilistic expectations on this outcome can be interpreted as their perception of child's ability, perhaps combined with his effort. Patterns are intuitive. Let us first compare the two distributions of subjective expectations in the overall sample of students for vocational commerce and general math in the two top graphs of figure 1: general math is perceived as a harder curriculum than vocational commerce–as indeed it is observed to be in actuality–with the distribution of the former more concentrated on lower realization probabilities. Let us then compare the distributions of subjective expectations of children and parents (matched samples) for the same curriculum (general math) in the bottom histograms: higher frequencies in the right part of the parental distribution are consistent with the common finding that parents tend to be more optimistic than children (e.g., Fischhoff et al. (2000), Dominitz et al. (2001), and Attanasio and Kaufmann (2010)).

5 Empirical Analysis (UNDER REVISION)

5.1 The "Unitary Family" Benchmark: Curriculum Choice by a Representative Decision Maker

5.1.1 Econometric Model

I initially assume that the utility function of the "decision-making unit" of family f, $i = i(f)$, over curriculum j depends only on a number of uncertain outcomes (see description in subsection 4.2) and possibly on the orientation suggestion provided by children's junior high school teachers

$$E_{ij} = \alpha_j^i + \sum_{n=1}^{N} P_{ijn} \cdot \Delta u_n^i + \delta^i \cdot 1_i\{j \text{ suggested}\} + \varepsilon_{ij}, \tag{4}$$

where α_j^i is an alternative-specific constant and $1_i\{\cdot\} = 1$ if the statement in brackets holds.[46] I further assume that the random terms, $\{\varepsilon_{ij}\}_{j=1}^{10}$, are i.i.d. Type-I Extreme Value with scale parameter μ^i, which implies a conditional logit.[47] Hence, the probability of observing child $c(f)$ attending curriculum $\tilde{j}$ is

$$P\left(\tilde{j}|\{\{P_{ijn}\}_{n=1}^{N}, 1_i\{j \text{ suggested}\}\}_{j=1}^{10}\right) = \\ = \frac{exp\left(\mu^i\left[\alpha_{\tilde{j}}^i + \sum_{n=1}^{N} P_{i\tilde{j}n} \cdot \Delta u_n^i + \delta^i \cdot 1_i\{\tilde{j} \text{ suggested}\}\right]\right)}{\sum_{j=1}^{10} exp\left(\mu^i\left[\alpha_j^i + \sum_{n=1}^{N} P_{ijn} \cdot \Delta u_n^i + \delta^i \cdot 1_i\{j \text{ suggested}\}\right]\right)}. \tag{5}$$

[46]In principle, any orientation suggestion should be incorporated in decision makers' expectations. Hence, if the utility parameter attached to the suggestion dummy is significant, this means either that elicited expectations do not incorporate its information or that decision makers attach a weight to the counselors' word beyond its information content.

[47]This assumption implies a IIA substitution pattern, and is discussed later.

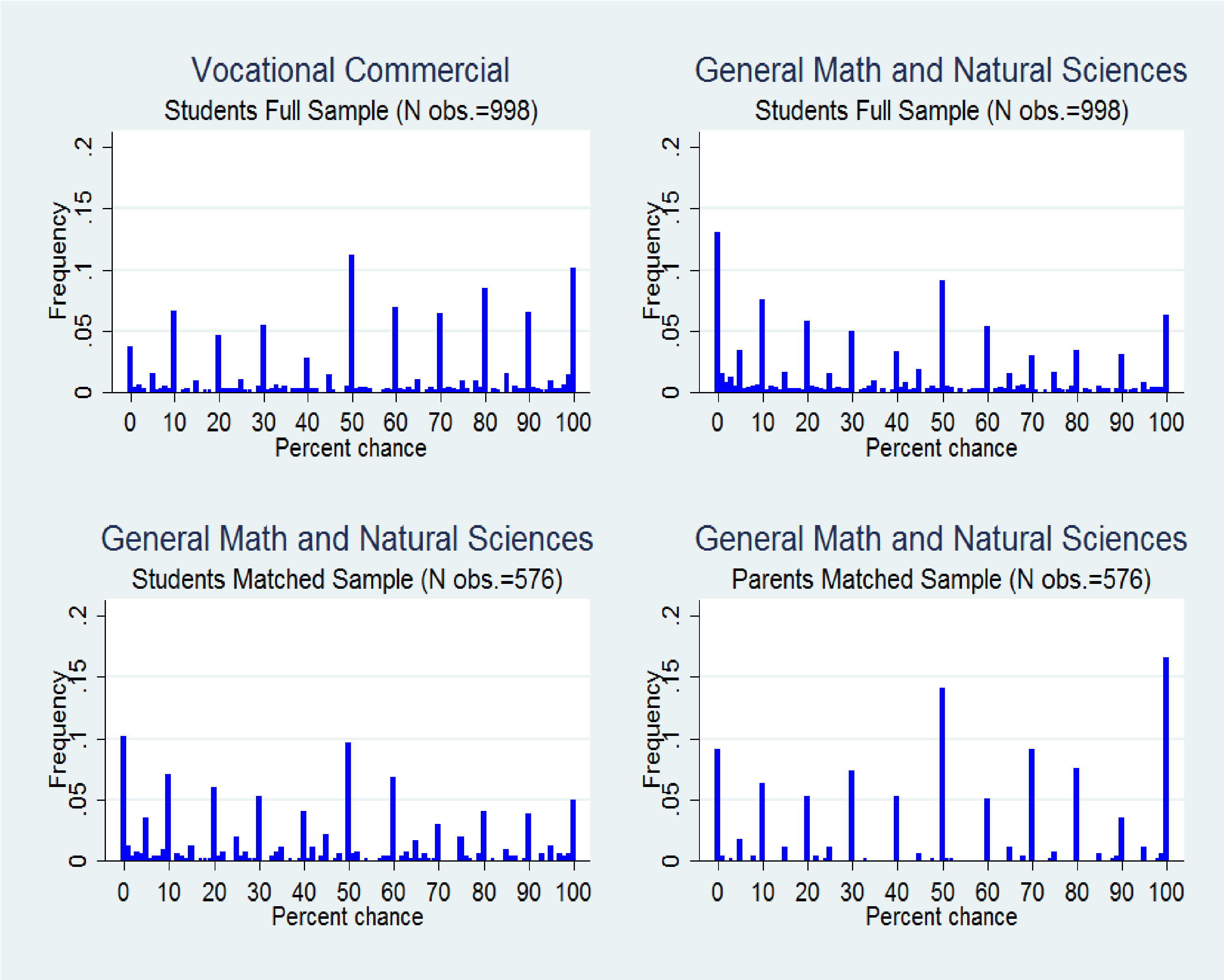

Figure 1: Students' and Parents' Use of the 0-100 Scale. Percent Chances that the Child Graduates in the Regular Time with an Yearly GPA ≥ 7.5

I use observed choices (RP data) together with children's and parents' probabilistic expectations and junior high school suggestions to estimate two benchmark versions of (5). In the first, the child is the representative or relevant decision maker (i.e., $i(f) \equiv c(f)$). In the second, I make the symmetric assumption about the parent (i.e., $i(f) \equiv p(f)$). I additionally compare these estimates with ones obtained using children's and parents' stated preferred alternatives (SP data) as response variables in place of actual choices.

Under the parametric assumptions for the random terms and after setting $\alpha_{10}^{t,i} = 0$ as a location normalization, the models' coefficients, $\{\{\{\alpha_j^{t,i}\}_{j=1}^{9}, \{\Delta u_n^{t,i}\}_{n=1}^{N}, \delta^{t,i}\}_{i\in\{c,p\}}\}_{t\in\{\text{RP},\text{SP}\}}$, are identified up to a scale factor, $\mu^{t,i}$. Statistical identification of utility parameters relies on heterogeneity in decision makers' beliefs and orientation suggestions, which function as alternatives' and individuals' specific attributes of the conditional logit.[48]

Estimation of (5) needs to take endogenous stratification into account (Manski and McFadden, 1981). For the models employing actual choices (RP) as responses the sample is choice-based. This implies a likelihood of observing the generic attributes' vector-observed choice pair $(x, \tilde{j})$ of the form

$$\lambda_{cb}(x, \tilde{j}) = p(x|\tilde{j})H(\tilde{j}) = \frac{P(\tilde{j}|x;\theta)p(x)}{Q(\tilde{j})}H(\tilde{j}) = \lambda_r(\tilde{j}|x)p(x)\frac{H(\tilde{j})}{Q(\tilde{j})}, \tag{6}$$

with

$$Q(\tilde{j}) = \int_X P(\tilde{j}|x;\theta)p(x)dx. \tag{7}$$

$P(\tilde{j}|x,\theta)$ is the conditional probability that alternative $\tilde{j} \in \mathcal{J}$ is selected given covariates $x \in X$, and specifies the behavioral choice model up to a parameter vector $\theta \in \Theta$ to be estimated. $p(x)$ is the marginal distribution of attributes. $Q(\tilde{j})$ is the population share of response $\tilde{j}$, and $H(\tilde{j})$ is the corresponding sampling probability characterizing the choice-based sampling protocol. Finally, "cb" and "r" stand for choice-based and random sampling, respectively. The important point here is that under choice-based sampling the kernel of the likelihood, $\left[P(\tilde{j}|x,\theta)/Q(\tilde{j})\right]$, depends on the true θ via $Q(\tilde{j})$, which therefore needs to be accounted for in estimation. This differs from the case of random sampling, in which the kernel would simply be $P(\tilde{j}|x,\theta)$.

While a number of different estimators have been proposed depending on a researcher's knowledge of p and Q (see the review by Cosslett (1993)), I adopt the weighted exogenous sampling maximum likelihood (WESML) estimator by Manski and Lerman (1977), on the ground that it is computationally tractable and provides a constrained best predictor of the discrete

[48] If rational expectations were assumed, individual probabilistic expectations may be simply replaced with the average realizations in the population disaggregated by individual characteristics if available. In fact, estimation results from subjective expectations may be compared with those obtained imposing assumptions on expectations, such as rational expectations (see, e.g., Delavande (2008)). Yet, it should be kept in mind that this would not provide a test for rational expectations, since there are different reasons why respondents may have expectations that differ from the mean realizations of some population or sub-population of reference. For instance, they may actually have rational expectations, but their process may differ from the one of the population taken as a reference.

response even when this is not logit (Xie and Manski, 1989). In fact, the WESML estimator is a pseudo-maximum likelihood approach that starts from the likelihood function appropriate under exogenously stratified sampling and re-weights the data to achieve consistency, with weights equal to $[H(j)/Q(j)]^{-1}$ (see Manski and McFadden (1981) for details). Hence, knowledge of the $Q(j)$'s is required, but not that of $p(x)$. I obtained the 2007-2008 population enrollment shares, $\{Q(j)\}_{j=1}^{10}$, for my application from the Provincial Agency for Education of Verona.

For the models employing stated preferences (SP data), however, the implemented sampling scheme should be more appropriately viewed as one of "intercept & follow", with choice-based recruitment or interception. McFadden (1996) shows that for the basic case without persistent heterogeneity across choice situations,[49] data from all choice situations different from the intercept can be treated in estimation as if the sampling were random.[50]

Finally, I specify all SP-based models in terms of the highest ranked curriculum only, rather than using the full alternatives' ranking. Indeed, existing empirical evidence (see, e.g., BenAkiva et al. (1991)) supports significant differences among models for different ranks, with decreasing stability of ranking information as alternatives' rank decreases, which renders the full-ranking approach potentially problematic.

5.1.2 Empirical Findings

Revealed Preferences. In the extreme left panel of table 6 (columns 2-5), I report preference parameters' estimates for the first unitary benchmark model that uses subjective expectations from all sampled children entering high school for the first time and actual choices as responses. All specifications include alternative-specific constants. Their estimates (not shown for reasons of space) measure the average effect of unincluded factors on the utility of each alternative relative to the scientific curriculum, whose constant was normalized to 0. Most of them are significantly different from zero, and an LR test confirms their overall significance.

All coefficients display the expected (positive) sign, perhaps with the exception of that of "average daily homework $\geq$ 2.5h" (b_2), which may be rather hypothesized to be negative. The most important outcomes are, in decreasing order of importance, "child likes the subjects" (b_1), "face a flexible college field choice" (b_9), "graduate in the regular time" (b_4), "find a liked job after graduation" (b_{10}), "attend college" (b_8), and "face a flexible college-work choice" (b_7), whose coefficients are all significant at 1%.[51] In particular, the coefficient of "child likes the subjects" is approximately 2.5 times larger than that of "face the college field choice flexibly", 3.5 times larger than that of "graduate in the regular time", and 5 times larger than that of

[49] I provide more discussion on the case with serial correlation across RP and SP data below.

[50] However, estimation of any population quantity (e.g., choice probabilities, elasticities, etc.) from the obtained estimates requires sample re-weighting, since even in this case the distribution of explanatory variables will be generally biased toward configurations consistent with more frequent selection of the intercept choices (see also Ben-Akiva et al. (1997)).

[51] Notice that the estimated preference weight on graduating in the regular time will generally pick up expected (monetary and non-monetary) costs from *not* graduating in the regular time and their disutility, since no measures of such costs are included in the specified utility function. An analogous reasoning applies, e.g., to the coefficient of attending college.

"find a liked job after graduation", whose coefficient is comparable in magnitude to those of "attend college" and "face a flexible college-work choice".

In column 3, I augment specification (S1) with the outcome "make parent happy" (b_{11}), which turns out to be the third most important outcome after "child likes the subjects" and "face a flexible college field choice". Nevertheless, qualitative results do not change relative to those of (S1), in the sense that the importance ranking of the other factors remains the same. Hence, as hypothesized, all outcomes related to a child's future choices and opportunities (b_7-b_{10}) are important for the choice. Instead, somewhat surprisingly, "being in school with friends" (b_6) does not appear to be valued significantly.

Inclusion of the orientation dummy[52] in columns 4 and 5 induces only marginal changes in the estimates, mostly by making the coefficient of the homework time's outcome not significant. However, the preference weight on the orientation variable itself is significant and approximately 4 times smaller in magnitude than the coefficient of "child likes the subjects". This is true despite the fact that the information content of junior high school orientation suggestions should be incorporated in the decision makers' expectations. Hence, either orientation suggestions affect individual preferences directly, and not only through expectations, or somehow respondents abstracted from the orientation suggestions in answering the expectations questions.[53]

I show estimates for the alternative benchmark model that uses actual choices and parental expectations in the second left panel of table 6 (columns 6-7). Remarkably, this model implies the same preference ranking over the most valued outcomes–"child likes the subjects" (b_1), "face a flexible college field choice" (b_9), "graduate in the regular time" (b_4), and "find a liked job immediately after graduation" (b_{10}), in decreasing order of importance–as the model estimated from children's expectations. This confirms the similarity of children's and parents' beliefs over the analyzed outcomes. In column 7, the orientation dummy is again significant and about 4 times smaller than the one attached to "child likes the subjects".

Finally, to ease comparison between children's and parents' preferences I show estimates for the same specifications, but obtained from families in which expectations were available for both child and parent (columns 8-13). It should be kept in mind, however, that estimated utility coefficients measure the product of preference weights ($\{\{\Delta u_n^i\}_{n=1}^N\}_{i\in\{c,p\}}$) and the scale ($\{\mu^i\}_{i\in\{c,p\}}$), which are not separately identified. Hence, differences in estimates for children and parents may be due to differences in preference parameters, in scale parameters,

[52]This variable is equal to 0 both when a curriculum was not suggested (this includes the case in which a track was suggested but a curriculum was not specified) *and* when no suggestion at all was provided, and equal to 1 otherwise. I also tried a second version (estimates not shown), in which I constrained the utility coefficient attached to the suggestion indicator (and not the indicator itself) to be equal to 0 when the child (parent) received a suggestion but declared it was not considered in the choice (see Hensher, Rose and Greene (2005) for an argument in favor of the latter specification). However, the results were identical to the ones shown. The sample size is reduced by more than 100 observations because of item non-response on the orientation question.

[53]A caveat about the use of the orientation dummy is that teachers may not only have based their suggestions on children's abilities and aptitudes (and possibly on their family background), but they may have also accounted for children's intentions and preferences (Checchi, 2008). Indeed, a few parents reported being aware of this fact and having taken it into account when weighting the suggestion.

Table 6: "Representative Decision Maker" Model with RP Data

	All Children and Parents						Matched Children and Parents					
	Children				Parents		Children				Parents	
Variables	**(S1)**	**(S2)**	**(S3)**	**(S4)**	**(S1)**	**(S3)**	**(S1)**	**(S2)**	**(S3)**	**(S4)**	**(S1)**	**(S3)**
Like Subjects (b_1)	5.94*** (0.41)	5.58*** (0.41)	6.05*** (0.50)	5.75*** (0.50)	8.14*** (0.64)	7.45*** (0.64)	6.12*** (0.57)	5.64*** (0.59)	5.79*** (0.63)	5.40*** (0.65)	8.10*** (0.63)	7.44*** (0.64)
Daily Homework $\geq$ 2.5h (b_2)	1.07*** (0.40)	0.91** (0.42)	0.80* (0.49)	0.58 (0.51)	0.97* (0.61)	0.89* (0.69)	1.01* (0.66)	0.71 (0.66)	0.69 (0.75)	0.41 (0.75)	0.96* (0.61)	0.87* (0.68)
Graduate in Regular Time (b_4)	1.62*** (0.46)	1.59*** (0.46)	1.41*** (0.49)	1.45*** (0.49)	1.68** (0.82)	1.68** (0.87)	2.27*** (0.52)	2.30*** (0.55)	1.98*** (0.61)	1.98*** (0.64)	1.58** (0.83)	1.54** (0.88)
In School with Friend(s) (b_6)	0.36* (0.24)	0.11 (0.25)	0.20 (0.28)	-0.05 (0.29)	0.69* (0.42)	0.69* (0.49)	0.33 (0.37)	0.02 (0.39)	0.12 (0.40)	-0.13 (0.41)	0.71** (0.43)	0.70* (0.50)
Flexible College-Work Choice (b_7)	1.05*** (0.32)	0.96*** (0.32)	1.36*** (0.37)	1.21*** (0.39)	0.87** (0.45)	0.99** (0.53)	1.74*** (0.46)	1.49*** (0.49)	1.84*** (0.47)	1.65*** (0.50)	0.89** (0.45)	1.03** (0.53)
Attend College (b_8)	1.13*** (0.43)	0.92** (0.46)	1.31*** (0.52)	1.22** (0.56)	0.70 (0.65)	1.14* (0.78)	1.13** (0.61)	0.90* (0.64)	0.74 (0.65)	0.52 (0.71)	0.70 (0.65)	1.13* (0.79)
Flexible College Field Choice (b_9)	2.40*** (0.47)	2.11*** (0.48)	2.58*** (0.64)	2.19*** (0.67)	2.64*** (0.62)	1.94*** (0.75)	3.59*** (0.77)	3.27*** (0.78)	3.84*** (0.87)	3.45*** (0.89)	2.59*** (0.63)	1.87*** (0.75)
Liked Job after Graduation (b_{10})	1.16*** (0.30)	1.05*** (0.31)	1.09*** (0.36)	0.98*** (0.37)	1.18*** (0.47)	1.16** (0.50)	1.13*** (0.45)	1.13*** (0.46)	1.01** (0.47)	1.02** (0.49)	1.19*** (0.47)	1.14** (0.50)
Parent Happy (b_{11})	–	1.74*** (0.39)	–	1.74*** (0.49)	–	–	–	2.19*** (0.72)	–	2.01*** (0.78)	–	–
JHS Suggestion	–	–	1.59*** (0.19)	1.49*** (0.20)	–	1.90*** (0.21)	–	–	1.54*** (0.25)	1.43*** (0.24)	–	1.91*** (0.21)
Constants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-630.358	-612.273	-442.091	-429.431	-455.437	-379.272	-339.832	-326.477	-281.294	-271.957	-449.725	-373.192
Sample Size	998		857		588	550	576		537		576	537

***: significant at 1%, **: significant at 5%, *: significant at 10%

or in both.[54]

A quick way to check whether preference weights are likely to be similar between children and parents is to compare ratios of estimated coefficients from each group for pairs outcomes, since such ratios are scale free. Estimates' ratios from columns 10 and 11 imply that children value "child likes the subjects" approximately 1.5 times more than "face a flexible college field choice", 3 times more than "graduate in the regular time" and "face a flexible college-work choice", and more than 5 times more than "find a liked job after graduation". Whereas the corresponding ratios for parents (column 13) are approximately 4, 5, 7, and 6.5, respectively.[55],[56]

Overall, children's expectations appear to have more explanatory power on actual choices, consistent with the descriptive evidence presented in subsection 4.2 that children had a more important role in the choice than their parents. However, the high level of significance of children's expectations for almost all outcomes may also suggest greater underlying heterogeneity in preferences.[57]

Stated Preferences. To gain further insight on the similarity, or lack thereof, of children's and parents' preferences and on whether a unitary model for curriculum choice may be reasonable for this data I estimate children's and parents' preferences from SP data, and I compare these estimates with each other and with those obtained using actual choices as responses.

Before moving to an inspection of these estimates, however, it is important to discuss their general meaning. In particular, one should be cautious in interpreting them as strictly providing children's and parents' preference parameters under the alternative scenarios of child's and parent's unilateral decisions. In fact, this interpretation would first require that members of families that employed multilateral decision protocols (and non-decision makers of families using a unilateral protocol) were presented with a counterfactual SP choice scenario of individual curriculum choice. Second, it would require that decision makers of families that employed a unilateral decision protocol were presented with an SP choice scenario featuring an explicit reference to the actual choice situation. Nevertheless, since children's and parents' SPs were elicited through a task that encouraged respondents to recall their beliefs and preferences before the family choice process took place, estimates from SP data should contain useful information on how children and parents trade off future choice-relevant outcome states, assuming stable

[54] In particular, because the scale is inversely related to the variance of the unobserved factors, it may differ in the two groups. Swait and Louviere (1993) propose a procedure for estimating scale factor ratios for a pair of data sets. They also suggest likelihood ratio tests for whether preference parameters are statistically equal in the two data sets while scale factors are permitted to differ and, if this first hypothesis cannot be rejected, for whether the scale factors are equal, given equality of the preference parameters. A caveat is that the test relies on the logit assumption to hold.

[55] Estimates of preference parameters from children's and parents' expectations and for different samples may be also evaluated and compared in terms of the change they imply in predicted choice probabilities, when expectations for specific outcomes and alternatives change marginally. I calculated the marginal effects of an increase of decision makers' subjective expectations by 0.10 for each outcome, based on estimates in columns 5 and 7 of table 6. These estimates are not shown for reasons of space, but are available upon requests.

[56] TRY VISUAL TEST!

[57] Notice that reported significance levels may also be partially an artifact of the fact that current standard errors do not account for clustering at the class level.

preferences.

While this is the main rationale for use of stated preferences, well known caveats are that responses may be influenced by an "inertia" of the current actual choice (e.g., due to "justification bias")[58] and that sometimes respondents tend not to consider situational constraints or to focus only on few most important attributes ("prominence hypothesis"). Therefore, following existing evidence and practice, I present SP specifications including "RP dummies" that are meant to capture "true state dependence" (as opposed to serial correlation) between SP and RP data.[59] And in later subsections, when I estimate protocol-specific models combining SP and RP data, I both allow for differences in the underlying process of unobservables (i.e., data-specific constants and scale parameters) and I investigate the possibility that coefficients on some explanatory variables may vary between the RP and SP models.

Comparison of estimates in columns 5 of tables 7 (SP model) and 6 (RP model) reveals that the relative importance of different outcomes implied by children's stated preferred alternatives and by observed choices differ somewhat. Outcomes related to future opportunities and choices, such as finding a liked job after graduation and attending college, play a relatively more important role in explaining stated preferences than actual choices, while the opposite is true for some of the in-high school outcomes, like graduating in the regular time. Moreover, the model based on SP data detects positive preferences for being in school with friends, but implies a smaller weight on making parents happy and the orientation suggestion. For parents, too, the relative importance of finding a liked job upon graduation and of making a flexible college-work choice is higher based on stated preferences (e.g., compare column 7 in tables 7 and 6), while the orientation dummy's coefficient is lower. The weight on homework time is now intuitively negative, though not statistically significant. Finally, as opposed to what observed for children, parents do not appear to assign a significant positive weight on their children being in school with friends based on stated preferences.

In table 8 I present the same specifications as in table 7 augmented with the RP dummies. Their coefficients are all positive, mostly significant, and between 1/4 and 3/4 the magnitude of the most important outcome (estimates not shown for reasons of space). Moreover, while inclusion of these variables does not induce major changes in the ranks of the most important outcomes neither for children nor for parents, it induces some changes in the outcomes' relative weights. It also makes the sign of the orientation dummy turn negative, suggesting that the positive coefficient of the latter in table 7 was picking up the positive correlation between teachers' suggestions and actual choices.

[58]This would be the case in my setting if respondents displayed ex-post rationalization when retrospectively reporting their stated preferred curriculum; however, see the work by Chen and Risen (2010).

[59]This was first proposed by Morikawa (1994). See also Ben-Akiva et al. (1994) and Morikawa et al. (2002) for further discussions.

Table 7: Children's and Parents' Preferences from SP Data

	All Children and Parents						Matched Children and Parents					
	Children				Parents		Children				Parents	
Variables	**(S1)**	**(S2)**	**(S3)**	**(S4)**	**(S1)**	**(S3)**	**(S1)**	**(S2)**	**(S3)**	**(S4)**	**(S1)**	**(S3)**
Like Subjects (b_1)	7.11^{***} (0.53)	6.71^{***} (0.53)	7.22^{***} (0.62)	6.89^{***} (0.64)	4.08^{***} (0.29)	3.78^{***} (0.31)	7.06^{***} (0.65)	6.64^{***} (0.66)	7.05^{***} (0.74)	6.70^{***} (0.76)	4.06^{***} (0.30)	3.78^{***} (0.31)
Daily Homework (b_2)	0.79^{**} (0.46)	0.64^{*} (0.47)	0.50 (0.50)	0.32 (0.52)	−0.21 (0.42)	−0.20 (0.43)	0.20 (0.59)	0.08 (0.59)	2.18×10^{-3} (0.66)	−0.14 (0.67)	−0.19 (0.43)	−0.17 (0.44)
Graduate in Regular Time (b_4)	1.66^{***} (0.47)	1.54^{***} (0.48)	1.33^{***} (0.52)	1.25^{***} (0.53)	−0.12 (0.45)	−0.18 (0.48)	1.19^{**} (0.60)	1.08^{**} (0.60)	0.94^{*} (0.62)	0.85^{*} (0.62)	−0.19 (0.46)	−0.24 (0.48)
In School with Friend(s) (b_6)	0.64^{***} (0.22)	0.49^{*} (0.24)	0.66^{***} (0.23)	0.52^{**} (0.25)	0.09 (0.31)	−0.02 (0.33)	0.74^{***} (0.30)	0.61^{**} (0.32)	0.78^{***} (0.30)	0.64^{**} (0.32)	0.09 (0.31)	−0.01 (0.34)
Flexible College-Work Choice (b_7)	0.70^{**} (0.38)	0.55^{***} (0.38)	0.57^{*} (0.37)	0.42 (0.38)	1.05^{***} (0.35)	1.13^{***} (0.38)	0.69^{*} (0.44)	0.51 (0.46)	0.64^{*} (0.44)	0.52 (0.47)	0.97^{***} (0.35)	1.04^{***} (0.38)
Attend College (b_8)	2.01^{***} (0.46)	1.95^{***} (0.48)	1.58^{***} (0.47)	1.57^{***} (0.49)	0.37 (0.38)	0.39 (0.40)	1.36^{**} (0.60)	1.16^{**} (0.60)	1.03^{***} (0.63)	0.87^{*} (0.62)	0.37 (0.38)	0.39 (0.40)
Flexible College Field Choice (b_9)	2.51^{***} (0.52)	2.29^{***} (0.52)	2.35^{***} (0.54)	2.15^{***} (0.54)	1.29^{***} (0.46)	1.22^{***} (0.47)	2.81^{***} (0.71)	2.63^{***} (0.71)	2.53^{***} (0.71)	2.37^{***} (0.70)	1.26^{***} (0.46)	1.20^{***} (0.47)
Liked Job after Graduation (b_{10})	2.26^{***} (0.34)	2.30^{***} (0.35)	2.23^{***} (0.37)	2.26^{***} (0.38)	1.87^{***} (0.34)	1.94^{***} (0.37)	2.52^{***} (0.47)	2.57^{***} (0.47)	2.57^{***} (0.48)	2.61^{***} (0.49)	1.90^{***} (0.35)	1.97^{***} (0.37)
Parent Happy (b_{11})	–	1.57^{***} (0.41)	–	1.32^{***} (0.42)	–	–	–	1.46^{***} (0.54)	–	1.38^{***} (0.55)	–	–
JHS Suggestion	–	–	0.38^{***} (0.15)	0.31^{**} (0.16)	–	0.64^{***} (0.16)	–	–	0.35^{**} (0.19)	0.27^{*} (0.18)	–	0.63^{***} (0.16)
Constants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-515.229	-503.288	-433.089	-426.189	-709.581	-646.179	-300.042	-294.457	-276.285	-271.808	-696.524	-633.629
Sample Size	971		836		557	522	545		510		545	510

***: significant at 1%, **: significant at 5%, *: significant at 10%

Overall, ratios of preference parameters across pairs of outcomes display some variation both between children and parents and between data sources, suggesting that the corresponding differences in estimated coefficients are not a pure artifact of heterogeneous variance of unobserved factors across groups and data sources. While some of these differences may well be due to biases in SP responses, it seems reasonable to hypothesize that, in presence of interactions among decision participants and multilateral decisions, utility parameters estimated from actual choices and, alternatively, children's or parents' expectations will capture both preference and interaction components of the decision process. Moreover, as discussed in subsection 3.3, even when children and parents are aligned along theirs beliefs, preferences, or even both, making sensible prediction and counterfactual analysis still requires that family decisions be analyzed through a model that specifies the correct decision-making unit and protocol.

Motivated by this idea, in the remaining subsections I pool RP and SP data together, and I exploit their distinct information content together with the information on family decision protocols to gain identification power and to try to separate children's and parents' preference parameters from parameters describing child-parent decision protocols. Specifically, I estimate a distinct discrete choice model for each observed family decision process (child chooses unilaterally, child chooses after listening to the parent, and child and parent make a joint decision), making the conceptual framework described in subsection 3.3 operational.

Notice that while I do necessarily impose restrictions on preference parameters across RP and SP models within decision protocols, I do not impose any restrictions on preference parameters across models describing different protocols. This is because children's and parents' preferences are likely to vary across decision protocol groups, as suggested by raw correlations between observed decision protocols and curriculum choices in the data.[60]

5.2 Child Chooses Unilaterally ($k = 1$)

Taking information on family decision protocols at face value, if a child reported making curriculum choice without interacting with his parents, only his expectations and preferences should be relevant for the choice. Hence, a natural approach is to estimate children's preferences from children's expectations and from either choice or stated preference data. Alternatively, SP and RP data can be combined to increase estimates' precision and gain identification power and insight over parameters capturing possible differences between the data generating processes of the two data sources. In this subsection I explore both possibilities.

[60] In fact, assuming homogeneous preferences within children's and parents' across decision protocols would gain me identification power, possibly allowing me to analyze empirically the general model (3). This is because preference parameters would be mostly identified by variation in beliefs of children and parents from families employing a unilateral decision protocol, whereas beliefs' and preferences' aggregation parameters would be identified from differences between stated preferences and actual choices of families employing more interacted, multilateral decision protocols. A caveat with this approach, however, is that response rates among parents from families employing unilateral protocols is low.

Table 8: Children's and Parents' Preferences from SP Data with Inertia Dummies

	All Children and Parents						Matched Children and Parents					
	Children				Parents		Children				Parents	
Variables	**(S1d)**	**(S2d)**	**(S3d)**	**(S4d)**	**(S1d)**	**(S3d)**	**(S1d)**	**(S2d)**	**(S3d)**	**(S4d)**	**(S1d)**	**(S3d)**
Like Subjects (b_1)	4.34^{***} (0.48)	4.15^{***} (0.49)	4.74^{***} (0.57)	4.59^{***} (0.57)	2.79^{***} (0.30)	2.74^{***} (0.31)	4.17^{***} (0.60)	4.00^{***} (0.62)	4.51^{***} (0.69)	4.37^{***} (0.69)	2.79^{***} (0.30)	2.74^{***} (0.31)
Daily Homework (b_2)	0.08 (0.48)	0.03 (0.48)	−0.06 (0.52)	−0.15 (0.52)	−0.40 (0.40)	−0.38 (0.41)	−0.33 (0.66)	−0.35 (0.66)	−0.49 (0.77)	−0.52 (0.77)	−0.38 (0.41)	−0.35 (0.42)
Graduate in Regular Time (b_4)	1.07^{**} (0.51)	1.04^{**} (0.51)	1.07^{**} (0.54)	1.05^{**} (0.55)	−0.31 (0.43)	−0.27 (0.45)	0.29 (0.76)	0.25 (0.77)	0.32 (0.74)	0.30 (0.76)	−0.34 (0.44)	−0.29 (0.46)
In School with Friend(s) (b_6)	0.54^{**} (0.28)	0.40^{*} (0.29)	0.66^{**} (0.29)	0.53^{**} (0.31)	3.36×10^{-3} (0.29)	−0.09 (0.30)	0.71^{**} (0.36)	0.60^{*} (0.38)	0.74^{**} (0.39)	0.60^{*} (0.42)	0.01 (0.29)	−0.09 (0.31)
Flexible College-Work Choice (b_7)	0.29 (0.42)	0.14 (0.42)	0.20 (0.40)	0.07 (0.42)	0.92^{***} (0.35)	1.02^{***} (0.37)	0.25 (0.49)	0.14 (0.53)	0.30 (0.51)	0.19 (0.56)	0.84^{***} (0.35)	0.93^{***} (0.37)
Attend College (b_8)	1.67^{***} (0.47)	1.59^{***} (0.49)	1.29^{***} (0.49)	1.23^{***} (0.51)	0.21 (0.37)	0.18 (0.38)	0.96^{*} (0.66)	0.83 (0.67)	0.62 (0.69)	0.47 (0.71)	0.22 (0.37)	0.19 (0.39)
Flexible College Field Choice (b_9)	1.39^{***} (0.50)	1.30^{***} (0.51)	1.27^{***} (0.49)	1.17^{***} (0.50)	0.96^{**} (0.45)	1.03^{**} (0.46)	1.10^{**} (0.63)	1.07^{**} (0.65)	0.88^{*} (0.62)	0.81 (0.65)	0.95^{**} (0.45)	1.02^{**} (0.46)
Liked Job after Graduation (b_{10})	2.23^{***} (0.38)	2.27^{***} (0.39)	2.25^{***} (0.41)	2.28^{***} (0.42)	1.65^{***} (0.34)	1.71^{***} (0.36)	2.58^{***} (0.52)	2.65^{***} (0.56)	2.65^{***} (0.56)	2.70^{***} (0.59)	1.68^{***} (0.34)	1.75^{***} (0.36)
Parent Happy (b_{11})	–	0.98^{***} (0.42)	–	0.87^{**} (0.47)	–	–	–	0.67 (0.55)	–	0.76 (0.60)	–	–
JHS Suggestion	–	–	-0.39^{**} (0.22)	-0.41^{**} (0.22)	–	0.33^{**} (0.17)	–	–	-0.55^{**} (0.28)	-0.56^{**} (0.28)	–	0.32^{**} (0.17)
Constants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-382.328	-378.657	-328.096	-325.894	-668.635	-614.023	-210.723	-209.776	-193.854	-192.848	-656.529	-602.179
Sample Size	971		836		557	522	545		510		545	510

***: significant at 1%, **: significant at 5%, *: significant at 10%

5.2.1 Separate RP and SP Models

RP and SP models of unilateral decision are formally equivalent to (4), but they are estimated on the subsample of children that reported making a unilateral choice,

$$\max_{j \in \mathcal{J}} \Gamma^1_{fj} \equiv EU^{t,1}_{cj} = \alpha^{t,1}_j + \sum_{n=1}^{N} P_{cjn} \cdot \Delta u^{c,t,1}_n + \delta^{c,t,1} \cdot 1_c\{\text{j suggested}\} + \varepsilon^{t,1}_{cj}, \tag{8}$$

where $\varepsilon^{t,1}_{cj}$ is i.i.d. Type-I Extreme Value, with scale parameters $\mu^{t,1}$, and $t \in \{\text{RP}, \text{SP}\}$.

I estimate the RP-based unilateral model via WESML with weights $[H(j)/Q(j)]^{-1}$, since, similarly to the case of random sampling, ex-post conditioning does not affect estimation under choice-based sampling (Giustinelli (2010) provides a formal proof). Following McFadden (1996)'s analysis, I instead treat SP data as coming from a random sample.

Estimation Results. In table 9, I show results from separate estimation of the RP model (columns 2-5) and the SP model (columns 6-11) in the sample of children that reported making an individual choice. On the one hand, taste for subjects is still the most valued outcome in all specifications, as implied by both RP and SP data. And the relative magnitude of the coefficient of graduating in the regular time (relative to that of liking the subjects) and its rank among outcomes are fairly stable within data sources. On the other hand, the importance ranks of outcomes capturing post-graduation opportunities and choices display some heterogeneity both between this group and the full sample of children and between RP and SP models within the unilateral decision protocol group.

First, attending college appears to be substantially more important for children that reported making the curriculum choice individually than for the full sample of children, especially based on revealed preferences. While the opposite is true for making a flexible college field choice and finding a liked job after graduation. Second, within the unilateral decision-making group SP data imply more homogeneous preference weights for these outcomes than RPs do. That is, while actual choices imply a positive large preference weight on attending college and small not significantly different from zero weights on making a flexible college field choice and finding a liked job after graduating, stated preferences imply positive, significant, and approximately equal preference weights on all three outcomes. Finally, the importance of making parents happy and of the orientation dummy relative to the most valued outcome, like the subjects, is higher within this group than in the pooled sample.

Table 9: "Child Chooses Unilaterally" (Child's Version) – RP and SP Models

	RP Model				SP Model					
Variables	**(S1)**	**(S2)**	**(S3)**	**(S4)**	**(S1)**	**(S2)**	**(S2d)**	**(S3)**	**(S4)**	**(S4d)**
Like Subjects (b_1)	6.76*** (1.16)	6.46*** (1.08)	6.29*** (1.38)	6.40*** (1.17)	6.16*** (1.02)	5.65*** (1.04)	2.87*** (0.89)	5.86*** (1.13)	5.69*** (1.13)	3.58*** (1.11)
Daily Homework $\geq$ **2.5h** (b_2)	−0.05 (0.74)	−1.20* (0.82)	−1.18* (0.78)	−2.80*** (1.01)	0.57 (1.01)	−0.06 (1.01)	−1.21 (1.14)	−0.04 (1.04)	−0.96 (1.11)	−2.10* (1.44)
Graduate in Regular Time (b_4)	2.60*** (0.85)	2.91*** (0.87)	1.78** (0.99)	2.60*** (1.10)	1.77** (0.98)	1.91** (1.03)	1.44 (1.28)	1.21 (1.03)	1.70* (1.10)	2.13* (1.57)
In School with Friend(s) (b_6)	0.98** (0.51)	0.48 (0.54)	0.87* (0.61)	0.53 (0.62)	0.81* (0.55)	0.31 (0.58)	−0.05 (0.95)	0.67 (0.59)	0.24 (0.70)	−0.19 (1.11)
Flexible College-Work Choice (b_7)	1.66** (0.80)	1.55** (0.84)	2.94*** (0.98)	2.89*** (0.90)	0.75 (0.80)	0.43 (0.83)	−0.29 (0.91)	1.14* (0.85)	0.92 (0.94)	0.04 (0.98)
Attend College (b_8)	3.87*** (1.02)	3.95*** (1.16)	4.68*** (1.49)	5.24*** (2.01)	2.37*** (1.02)	2.53*** (1.08)	−0.14 (1.10)	2.30** (1.11)	2.38** (1.18)	−0.59 (1.16)
Flexible College Field Choice (b_9)	0.47 (0.85)	0.32 (0.95)	−0.45 (1.02)	−1.22* (0.89)	2.52** (1.23)	2.41** (1.11)	2.58** (1.12)	1.51* (1.15)	1.46* (1.06)	2.37** (1.09)
Liked Job after Graduation (b_{10})	0.86 (0.73)	0.88 (0.74)	1.30** (0.77)	1.47** (0.79)	2.84*** (0.81)	3.13*** (0.92)	3.32*** (0.93)	3.13*** (0.80)	3.54*** (0.94)	3.64*** (0.93)
Parent Happy (b_{11})	–	3.23*** (1.02)	–	3.52*** (1.13)	–	2.77** (1.22)	2.55*** (0.88)	–	3.38*** (1.37)	3.92*** (0.98)
JHS Suggestion	–	–	2.40*** (0.64)	2.32*** (0.64)	–	–	–	1.26*** (0.45)	1.14*** (0.44)	−0.04 (0.58)
RP Dummies	–	–	–	–	No	No	Yes	No	No	Yes
Constants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-92.110	-85.159	-61.820	-56.210	-92.839	-88.230	-50.664	-74.944	-69.626	-42.653
Sample Size	170		144		170			144		

***: significant at 1%, **: significant at 5%, *: significant at 10%

5.2.2 Joint SP-RP Model

Let us now reconsider the behavioral model in (8) based on actual choices and add SP information to it. This yields the following SP-RP joint model:

$$\begin{cases} (RP,1): \quad \Gamma^1_{fj} \equiv EU^{RP,1}_{cj} = \alpha^{RP,1}_j + \sum_{n=1}^N P_{cjn} \cdot \Delta u^{c,1}_n + \delta^{c,RP,1} \cdot 1_c\{j \text{ suggested}\} + \\ \qquad\qquad + \lambda^{c,1} \cdot \xi^1_{cj} + \eta^{RP,1}_{fj} \\ (SP,1): \quad EU^{SP,1}_{cy} = \alpha^{SP,1}_y + \sum_{n=1}^N P_{cyn} \cdot \Delta u^{c,1}_n + \delta^{c,SP,1} \cdot 1_c\{y \text{ suggested}\} + \xi^1_{cy} + \nu^{SP,1}_{cy}, \end{cases} \tag{9}$$

where j indexes actual choices (RP) and y indexes stated preferred alternatives (SP), with $j, y \in \mathcal{J}$. ξ^1_{cj} and ξ^1_{cy} are i.i.d. N(0,1) and such that $\xi^1_{cj} \equiv \xi^1_{cy}$ whenever $j = y$. $\eta^{RP,1}_{fj}$ and $\nu^{SP,1}_{cy}$ are i.i.d. Type-I Extreme Value, with scale parameters $\mu^{RP,1}$ and $\mu^{c,SP,1}$.

In static discrete choice models with a single cross-sectional source of data, the main assumption on unobservables concerns whether the latter are allowed to be correlated across alternatives and individuals or they are restricted to be i.i.d. However, similarly to the case of panel data, combination of RP and SP data requires additional assumptions on the relationship between the unobservable components of the two models. And with heterogeneous, individual or multilateral decisions, the particular error structure capturing such correlations will generally depend on the nature of the decision protocol.

Because protocol $k = 1$ is a standard one of unilateral decision, I follow a common practice in the SP-RP literature since Morikawa (1994), and I assume that the unobservable random errors of (RP,1) and (SP,1) are given by a vector of common components $\xi^1_c = \{\xi^1_{cj}\}^J_{j=1}$ and by two vectors of idiosyncratic distinct terms, $\{\eta^{RP,1}_{fj}\}^J_{j=1}$ and $\{\nu^{SP,1}_{cy}\}^J_{j=1}$, uncorrelated between data sources. The basic idea is that, under a unilateral-type decision, the econometrician's observational difficulty on individual preferences should be at least partly shared by RP and SP utilities; this is captured by ξ^1_c. For instance, if one or more uncertain outcomes were omitted from the systematic utility component, then, under the assumptions of the behavioral model of unilateral decision, ξ^1_c should play *exactly* the same role in (RP,1) and (SP,1) (i.e., $\lambda^{c,1} = 1$). However, this need not be the case in general, as it may happen if, e.g., the common error component were to capture a latent unobservable attitude toward a specific alternative.

A fundamental difference between models (8) and (9) is that in the latter the systematic portions of RP and SP utilities feature a common component, $\sum_n P_{cyn} \cdot \Delta u^{c,1}_n$, whose presence enables identification and estimation of the (SP,1) and (RP,1) scales' ratio, $\mu^1 = \mu^{c,SP,1}/\mu^{RP,1}$. Importantly, because of the relationship $\text{Var}(\eta^{RP,1}_{fj}) = (\mu^1)^2 \cdot \text{Var}(\nu^{SP,1}_{cy})$, the estimate of μ^1 can be used to investigate whether the two sources of data have approximately the same amount of random noise by testing $\mu^1 = 1$. The alternative specific constants are also allowed to vary between the two models. Their comparison provides additional information on the relationship between unobservables of the two models, since they capture the average effects of all unobserved factors of utilities.

Clearly, there may be additional utility components that vary across the two models. In the basic specification, I allow the coefficient of the orientation dummy to vary across data sources, as motivated by evidence from tables 5, 6, 7, and 9 that the orientation suggestion may partially account for the not perfect overlapping between actual choices and stated preferred alternatives in the unilateral decision-making group. To get some sense of whether combing SP and RP data by assuming equal preferences for all outcomes is sensible, everything else equal *and* given unilateral decision making, I further allow one preference weight at the time to differ across the two models, and I compare these specifications with the fully restricted model. Finally, I allow for existence of state dependence between stated and revealed preferences by including inertia dummies in (SP,1).

Basic Model without Cross-Data Correlation. I start by maintaining independence between RP and SP unobservables. Then, the joint model (RP,1)&(SP,1) can be estimated by maximizing the following log-likelihood function:

$$\mathcal{LL}^1_{WESML} = \sum_f \left\{ \left[\frac{H(j)}{Q(j)}\right]^{-1} \cdot \sum_{j=1}^{10} d_{fj} \cdot \log\left[P_f\left(j|x^j;\theta^j\right)\right] + \sum_{y=1}^{10} d_{c_f y} \cdot \log\left[P_{c_f}\left(y|x^y;\theta^y\right)\right] \right\}, \tag{10}$$

where $\theta^j = \left\{\{\alpha_j^{RP,1}\}_{j=1}^9, \{\Delta u_n^{c,1}\}_{n=1}^N, \delta^{c,RP,1}\right\}$ and $\theta^y = \left\{\{\alpha_y^{SP,1}\}_{y=1}^9, \{\Delta u_n^{c,1}\}_{n=1}^N, \delta^{c,SP,1}, \mu^1\right\}$, and x^j and x^y are, respectively, the explanatory variables of the RP and SP models.

I report estimates from the basic SP-RP joint model in table 10. Taste for subjects is still the most valued outcome, followed by attend college, make parent happy, and graduate in the regular time (e.g., see estimates in column 2). Whereas the coefficients of making a flexible college field choice and of finding a liked job after graduation are positive but substantially smaller. Clearly, this pattern is mostly driven by the RP component of the model, as suggested by results in table 9. Indeed, when letting preference coefficients vary across data sources one outcome at the time, I generally cannot reject the null of equal coefficients based on a likelihood ratio test (LR), but for the latter outcomes, make a flexible college field choice (b_9) and find a liked job after graduation (b_{10}). Hence, in specification S5 (column 2) I allow coefficients of both b_9 and b_{10} to vary between (RP,1) and (SP,1), while constraining the coefficients of all other outcomes to be the same in the two models. A LR test rejects the fully constrained specification in favor of the latter. Indeed, preference weights for outcomes b_9 and b_{10} are clearly large and significant only in (SP,1), as previous results from separate estimation of the two models already suggested (see table 9).

Table 10: "Child Chooses Unilaterally" (Child's Version) – SP-RP Models

Variables	**(S2)**	**(S5)**	**(S2d)**	**(S5d)**	**S4**	**S6**	**S4d**	**S6d**
Like Subjects (b_1)	5.99*** (1.13)	6.55*** (1.13)	6.25*** (1.10)	6.56*** (1.11)	5.72*** (1.19)	6.57*** (1.23)	6.03*** (1.15)	6.56*** (1.21)
Daily Homework ≥ 2.5h (b_2)	−0.66 (0.84)	−0.73 (0.89)	−1.34** (0.80)	−1.37* (0.84)	−1.77** (1.04)	−2.06** (1.12)	−2.74*** (1.02)	−2.98*** (1.06)
Graduate in Regular Time (b_4)	2.30*** (0.78)	2.59*** (0.85)	2.76*** (0.77)	2.87*** (0.82)	1.90*** (0.87)	2.21** (1.00)	2.54*** (0.99)	2.71*** (1.07)
In School with Friend(s) (b_6)	0.35 (0.46)	0.42 (0.50)	0.40 (0.53)	0.41 (0.53)	0.36 (0.59)	0.48 (0.64)	0.46 (0.69)	0.48 (0.66)
Flexible College-Work Choice (b_7)	0.95* (0.71)	1.14* (0.77)	0.99* (0.76)	1.31** (0.78)	1.74** (0.86)	2.08** (0.94)	2.08** (0.92)	2.47*** (0.94)
Attend College (b_8)	3.20*** (0.92)	3.49*** (1.01)	3.49*** (1.04)	3.60*** (1.09)	3.47*** (1.39)	4.02*** (1.59)	3.82** (1.76)	4.24** (1.86)
Flexible College Field Choice (b_9) **RP**	1.36* (0.88)	0.42 (0.97)	0.84 (0.97)	0.41 (0.98)	0.34 (0.82)	−1.08 (0.96)	−0.20 (0.96)	−1.01 (0.97)
Flexible College Field Choice (b_9) **SP**	–	2.87** (1.41)	–	4.90* (3.37)	–	1.65* (1.28)	–	2.82 (2.80)
Liked Job after Graduation (b_{10}) **RP**	1.81*** (0.69)	0.87 (0.77)	1.58** (0.76)	0.90 (0.76)	2.28*** (0.72)	1.23* (0.89)	2.13*** (0.76)	1.36* (0.83)
Liked Job after Graduation (b_{10}) **SP**	–	3.55*** (1.12)	–	7.51*** (2.57)	–	4.14*** (1.12)	–	6.98** (2.27)
Parent Happy (b_{11})	2.85*** (1.09)	3.22*** (1.18)	3.34*** (0.98)	3.57*** (1.06)	3.09*** (1.13)	3.65*** (1.28)	3.81*** (1.01)	4.13*** (1.10)
JHS Suggestion RP	–	–	–	–	2.33*** (0.64)	2.26*** (0.63)	2.37*** (0.65)	2.32*** (0.63)
JHS Suggestion SP	–	–	–	–	1.10** (0.48)	1.50*** (0.61)	0.06 (0.81)	0.40 (1.22)
RP Dummies	No	No	Yes	No	No	No	Yes	No
SP Scale	1.01*** (0.12)	0.845*** (0.096)	0.547*** (0.088)	0.398*** (0.078)	1.01*** (0.13)	0.813*** (0.103)	0.605*** (0.110)	0.446*** (0.090)
Constants	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-178.309	-174.317	-142.678	-137.881	-131.176	-127.823	-106.310	-102.822
Sample Size	170				144			

***: significant at 1%, **: significant at 5%, *: significant at 10%

As expected, also the coefficient of the orientation dummy differs between the two models (see columns 6-7), being 1.5-2 times larger in (RP,1) than in (SP,1). This finding supports the hypotheses that somehow respondents abstracted from the orientation suggestion when they reported their stated preferences and subjective expectations.

In all basic specifications (columns 2, 3, 6, and 7) the relative scale of SP to RP is not statistically different from 1. Moreover, a more parsimonious model with the RP and SP constants constrained to be equal to each others by alternative is not rejected by an LR test. On the one hand, these findings suggest that for the group of children that chose unilaterally the unobservable processes underlying RP and SP are reassuringly similar. On the other hand, inclusion of the inertia dummies (columns 4, 5, 8, and 9) yields a relative scale of approximately 0.5, which implies a variance for the SP unobservable random components about twice as big as the one for the RP errors. Nonetheless, one should be cautious in interpreting results for specifications of the SP-RP joint model including the inertia dummies, since the latter will generally induce estimates' bias if, as it is likely, there exists also serial correlation between RP and SP error components and such correlation is not accounted for.

Introducing Correlation Across Data Sources. TBA

5.3 Child Chooses After Listening to the Parent ($k = 2$)

The system of latent expected utilities is now

$$\begin{cases} (RP,2): \quad \Gamma^2_{fj} \equiv EU^{RP,2}_{cj} = \alpha^{RP,2}_j + \sum_{n=1}^N \left[w^{c,2}_n \cdot P_{cjn} + (1-w^{c,2}_n) \cdot P_{pjn} \right] \cdot \Delta u^{c,2}_n + \\ \qquad +\delta^{f,RP,2} \cdot 1_f\{j \text{ suggested}\} + \lambda^{c,2} \cdot \xi^2_{cj} + \lambda^{p,2} \cdot \xi^2_{pj} + \eta^{RP,2}_{fj} \\ (c\text{-}SP,2): \quad EU^{SP,2}_{cy} = \alpha^{SP,2}_y + \sum_{n=1}^N P_{cyn} \cdot \Delta u^{c,2}_n + \delta^{c,SP,2} \cdot 1_c\{y \text{ suggested}\} + \\ \qquad +\xi^2_{cy} + \nu^{SP,2}_{cy}, \end{cases} \tag{11}$$

where ξ^2_{cj} and $\xi^2_{pj} \sim N(0,1)$, and $\eta^{RP,2}_{fj}$ and $\nu^{SP,2}_{cj}$ are i.i.d. Type-I Extreme Value with scale parameters $\mu^{RP,2}$ and $\mu^{c,SP,2}$. Parental expectations, $\{P_{pjn}\}^{N2}_{n=1}$, now enter the model. ξ^2_{pj} is an unobservable component in parent's expected utility that is common between the RP model and the following parental SP model:

$$(p\text{-}SP,2): EU^{SP,2}_{py} = \alpha^{SP,2}_y + \sum_{n=1}^N P_{pyn} \cdot \Delta u^{p,2}_n + \delta^{p,SP,2} \cdot 1_p\{y \text{ suggested}\} + \xi^2_{py} + \nu^{SP,2}_{py}. \tag{12}$$

Similar to the case of unilateral decision, a child's SP and RP utilities describing this protocol should still feature some common error components capturing, e.g., his latent attitude toward alternatives. Moreover, notice that any relevant discussion item (outcome) omitted from the model will in fact be omitted from the child SP model, the parent SP model, and the RP model. Hence, there may be some common unobservable components also between the parental SP utility and the child RP utility through the behavioral channel that the child incorporates his parent's expectations in his own.

As far as identification is concerned, children's preference weights, $\{\Delta u_n^{c,2}\}_{n=1}^N$, are identified by variation in children's expectations, mainly through the SP component of the model (c-SP,2). The equality constraints on preference parameters between (c-SP,2) and (RP,2) and the add-to-one restrictions on the aggregation weights for each outcome aid identification by allowing one to back up the latter set of parameters, $\{w_n^{c,2}\}_{n=1}^N$, from the RP model.[61] In fact, whether one is able to pin these weights down with some precision will generally depend on how much variability exists both in child-parent expectations' differences and between children's stated preferences and observed choices across families.

Joint use of SP and RP data further enables identification of the child SP-RP relative scale, μ^2. Observe relatedly, however, that the outcome "make parent happy" may or may not be an item of child-parent discussion. Hence, on the one hand, the assumption that it plays the same role in the child SP and RP utilities (i.e., equal RP and SP preference coefficient) would help identifying μ^2.[62] On the other hand, since disclosure of parental opinions will generally reveal something about what the parent would like or would not like the child to do, children's expectations on "make parent happy" may have different explanatory power in the SP and in the RP models.

Finally, I do not regard the orientation suggestion as an item of child-parent discussion per se, since only expectations are revised according to this protocols, not preferences. Nonetheless, based on results for the unitary and the unilateral decision models, I allow the coefficient on the suggestion dummy to vary across data sources.

Basic Model with Independent SP and RP. I present estimates for the basic SP-RP joint model in table 11. Inspection of the estimated aggregation weights on parental expectations, $\{\widehat{1-w_n^{c,2}}\}_{n=1}^N$, in the top panel reveals that variability of child-parent expectations' differences in the data pins these parameters down with some precision only for few outcomes. For instance, children assign a greater weight on their parents' opinion than on their own about graduating in the regular time. The estimated weight ranges from 0.626 to 1.121, depending on the specification; however, all values between 0.5 and 1 are compatible with the estimates, and for specifications not including the orientation dummy (columns 2-4) even a weight 0 cannot be rejected. The weight on child likes the subjects, instead, is estimated precisely, and lies between 0.413 and 0.457. The hypothesis of equal weights cannot be rejected, while 0 and 1 are rejected

[61] Taking ratios of SP and RP utility coefficients separates $\{w_n^{c,2}\cdot\mu^2\}_{n=1}^N$ and $\{(1-w_n^{c,2})\cdot\mu^2\}_{n=1}^N$ from $\{\Delta u_n^{c,2}\}_{n=1}^N$. Further taking the ratios between $\{w_n^{c,2}\cdot\mu^2\}_{n=1}^N$ and $\{(1-w_n^{c,2})\cdot\mu^2\}_{n=1}^N$, for each outcome, isolates $\{w_n^{c,2}\}_{n=1}^N$.

[62] Since $\{w_n^{c,2}\}_{n=1}^N$ are identified, μ^2 can be obtained from $\{w_n^{c,2}\cdot\mu^2\}_{n=1}^N$. However, any common components between SP and RP utilities that do not involve expectations' aggregation (i.e., as under unilateral decision) will generally yield better statistical identification for the scale parameter.

for all specifications. The weight on making a flexible college field choice favors child's opinion, and values above 0.5 can generally be rejected. As for the remaining outcomes, weights are estimated imprecisely and are, therefore, compatible with any value between 0 and 1.

Estimated preference parameters for this group of children (see middle panel of table 11) differ somewhat from those obtained for $k = 1$ children, and they rather appear to be more similar to estimates from the representative RP model. In particular, child likes the subjects and face a flexible college field choice are the most important outcomes with a relative preference weight of the first to the second of about 1.5 both for this group and in the whole sample of children. Find a liked job after graduation and graduate in the regular time come next with similar coefficients, followed by making a flexible college-work choice and making parents happy. The model with equal SP and RP coefficients on making parents happy cannot be rejected by one in which these coefficient are allowed to differ, everything else equal. Finally, the orientation dummy's coefficient is again large and significant only in the RP utility.

The estimated SP-RP relative scale ranges between 0.5 and 0.6 for specifications excluding the inertia dummies, and it is approximately equal to 0.3 when the inertia dummies are included. Hence, the scale is now significantly different from 1 in all specifications. This means that the variance of the unobserved components of the SP model is more than 3 times larger than the variance of the RP model.

As a matter of fact, a larger SP variance is a common finding in the SP&RP empirical literature, especially when serial correlation and state dependence between data sources are not accounted for (see, e.g., Morikawa (1994)). This is not surprising, since usually SP data are elicited from stated choice experiments under hypothetical scenarios over which respondents will generally have only a subset of the information they would have in actual choice situations. Hence, stated choice experiments tend to elicit preferences mixed with individual expectations of events that may affect choice behavior and are not included in the proposed scenario (see Manski (1999)). Nonetheless, this finding should not be obvious a priori in my setting, for the SP data were not collected under some hypothetical, incomplete scenarios. Rather, respondents were required to think back to their actual preferences and expectations before the decision process took place. Yet, the additional noise may be related to the mental process of recall and abstraction respondents were required to perform.

In table 12 I additionally report estimates of parents' preferences for this group, obtained by estimating (12) using parents' expectations and stated preferences. The implied importance ranking for the outcomes follow closely that observed in table 7 for the whole sample of parents. This is not surprising, since $k = 2$ and $k = 3$ parents make up approximately the 80% of whole sample and, as shown in this subsection and the next, these two groups of parents do not seem to display large heterogeneity in preferences over outcomes.[63]

[63] While it would be interesting to compare preferences of these parents with those of $k = 1$ parents, the high non-participation

Table 11: "Child Chooses After Listening to the Parent" (Child's Version) – Children's SP-RP Model

Variables	(S1)	(S2)	(S2d)	(S3)	(S4)	(S4d)
Weights on Parent's Expectations:						
Like Subjects (b_1)	0.433*** (0.048)	0.450*** (0.052)	0.457*** (0.056)	0.413*** (0.056)	0.434*** (0.059)	0.448*** (0.061)
Daily Homework ≥ 2.5h (b_2)	1.291 (2.581)	1.439 (2.466)	0.962 (1.106)	−0.285 (5.882)	−0.984 (13.964)	−1.921 (27.675)
Graduate in Regular Time (b_4)	0.626* (0.482)	0.669** (0.535)	0.698** (0.399)	1.018*** (0.337)	1.121*** (0.447)	1.028*** (0.231)
In School with Friend(s) (b_6)	−0.168 (1.144)	0.057 (1.173)	−0.475 (3.316)	0.137 (1.183)	0.710 (1.088)	0.386 (1.356)
Flexible College-Work Choice (b_7)	−0.114 (0.485)	0.099 (0.431)	0.182 (0.362)	0.045 (0.542)	0.296 (0.470)	0.373* (0.289)
Attend College (b_8)	−0.386 (1.822)	−1.563 (23.669)	−1.921 (13.240)	1.979 (5.646)	1.131 (2.058)	0.699 (0.916)
Flexible College Field Choice (b_9)	0.204 (0.174)	0.250 (0.172)	0.187 (0.196)	0.230* (0.180)	0.229 (0.159)	0.204* (0.169)
Liked Job after Graduation (b_{10})	0.545** (0.247)	0.494** (0.246)	0.503** (0.263)	0.414* (0.303)	0.281 (0.372)	0.016 (0.766)
Child's Preferences:						
Like Subjects (b_1)	12.64*** (2.24)	12.43*** (2.36)	12.20*** (2.32)	15.14*** (3.06)	15.38*** (3.56)	16.50*** (3.39)
Daily Homework ≥ 2.5h (b_2)	0.80 (1.56)	0.90 (1.56)	1.72 (2.04)	0.64 (2.88)	0.30 (2.12)	0.33 (3.12)
Graduate in Regular Time (b_4)	3.33** (1.57)	2.94** (1.52)	4.06** (2.30)	4.30** (2.05)	3.52*** (1.79)	6.59*** (2.57)
In School with Friend(s) (b_6)	0.81 (0.84)	0.68 (0.90)	0.54 (1.33)	1.05 (0.92)	0.86 (0.94)	1.03 (1.45)
Flexible College-Work Choice (b_7)	2.44** (1.32)	2.66*** (1.32)	3.60*** (1.28)	3.42** (1.60)	3.67*** (1.87)	6.00*** (2.42)
Attend College (b_8)	0.78 (1.66)	−0.08 (1.65)	0.36 (2.08)	−0.64 (1.41)	−1.42 (1.74)	−2.54* (1.95)
Flexible College Field Choice (b_9)	7.69*** (1.84)	7.88*** (2.01)	6.96*** (2.09)	9.23*** (2.55)	9.12*** (2.63)	8.43*** (2.55)
Liked Job after Graduation (b_{10})	3.40*** (1.01)	3.25*** (1.01)	3.55*** (1.24)	3.83*** (1.40)	3.58** (1.40)	2.09* (1.89)
Parent Happy (b_{11})	–	2.53 (1.10)	2.32** (1.04)	–	3.43 (1.54)	3.66*** (1.69)
JHS Suggestion RP	–	–	–	3.13*** (3.06)	3.08*** (2.12)	3.30*** (3.12)
JHS Suggestion SP	–	–	–	0.51 (2.88)	0.35** (1.79)	−4.33** (2.57)
RP Dummies	No	No	Yes	No	No	Yes
SP Scale	0.608*** (0.122)	0.586*** (0.124	0.348*** (0.089)	0.511*** (0.120)	0.488*** (0.126)	0.272*** (0.073)
Constants	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-161.119	-156.909	-116.437	-132.824	-128.487	-93.125
Sample Size		219			205	

***: significant at 1%, **: significant at 5%, *: significant at 10%

Table 12: "Child Chooses After Listening to the Parent" (Child's Version) – Parents' SP Model

Variables	(S1)	(S1d)	(S3)	(S3d)
Like Subjects (b_1)	4.07^{***} (0.49)	2.76^{***} (0.49)	4.02^{***} (0.53)	2.96^{***} (0.51)
Daily Homework $\geq$ 2.5h (b_2)	-0.65 (0.74)	-0.80 (0.68)	-0.45 (0.78)	-0.48 (0.73)
Graduate in Regular Time (b_4)	-0.32 (0.76)	-0.64 (0.71)	-0.39 (0.77)	-0.43 (0.71)
In School with Friend(s) (b_6)	0.03 (0.44)	0.04 (0.42)	-0.15 (0.48)	-0.12 (0.41)
Flexible College-Work Choice (b_7)	1.37^{***} (0.55)	1.34^{***} (0.55)	1.50^{***} (0.57)	1.56^{***} (0.56)
Attend College (b_8)	0.20 (0.64)	-0.06 (0.59)	0.22 (0.66)	-0.16 (0.62)
Flexible College Field Choice (b_9)	1.56^{**} (0.75)	1.55^{**} (0.72)	1.52^{**} (0.73)	1.47^{**} (0.71)
Liked Job after Graduation (b_{10})	2.34^{***} (0.58)	2.35^{***} (0.58)	2.33^{***} (0.61)	2.30^{***} (0.60)
JHS Suggestion	–	–	0.42^{**} (0.23)	0.02 (0.29)
RP Dummies	No	Yes	No	Yes
Constants	Yes	Yes	Yes	Yes
Log-likelihood	-268.705	-244.8485	-244.111	-221.891
Sample Size	219		205	

***: significant at 1%, **: significant at 5%, *: significant at 10%

Serial Correlation. TBA

5.4 Child and Parent Make a Joint Decision ($k = 3$)

Finally, I estimate the following model of child-parent joint decision in which child and parent aggregate their expected utilities outcome by outcome but without distinction between expectations' revision and negotiation over preferences:

$$\begin{cases} (RP,3): \quad \Gamma^3_{fj} \equiv EU^{RP,3}_{cj} = \alpha^{RP,3}_j + \sum_{n=1}^N \phi^{c,3}_n \cdot \left[P_{cjn} \cdot \Delta u^{c,3}_n\right] + (1-\phi^{c,3}_n) \cdot \left[P_{pjn} \cdot \Delta u^{p,3}_n\right] + \\ \qquad +\delta^{f,RP,3} \cdot 1_f\{j \text{ suggested}\} + \lambda^{c,3} \cdot \xi^3_{cj} + \lambda^{p,3} \cdot \xi^3_{pj} + \eta^{RP,3}_{fj} \\ (c\text{-}SP,3): \quad EU^{SP,3}_{cy} = \alpha^{c,SP,3}_y + \sum_{n=1}^N P_{cyn} \cdot \Delta u^{c,3}_n + \delta^{c,SP,3} \cdot 1_c\{y \text{ suggested}\} + \xi^3_{cy} + \nu^{SP,3}_{cy} \\ (p\text{-}SP,3): \quad EU^{SP,3}_{py} = \alpha^{p,SP,3}_y + \sum_{n=1}^N P_{pyn} \cdot \Delta u^{p,3}_n + \delta^{p,SP,3} \cdot 1_p\{y \text{ suggested}\} + \xi^3_{py} + \nu^{SP,3}_{py}, \end{cases} \tag{13}$$

where $\xi^3_{cj} \sim N(0,1)$, $\xi^3_{pj} \sim N(0,1)$, and $\eta^{RP,2}_{fj}$, $\nu^{SP,3}_{cj}$, and $\nu^{SP,3}_{pj}$ are i.i.d. Type-I Extreme Value, with scale parameters $\mu^{RP,3}$, $\mu^{c,SP,3}$, and $\mu^{p,SP,3}$.

The identification argument for (13) is analogous to that for (11), but it requires the additional restriction of equal relative scales for (c-SP,3) and (p-SP,3) (see also Ben-Akiva et al. (1994)).

rate among the latter renders the observed sample of $k = 1$ parents far from being representative of that group.

Basic Model without Correlation across RP and SP Data. I show estimates for the basic model without correlation across data sources in table 13. Again, only few aggregation weights in the top panel of the table are estimated precisely. Reported estimates refer to the weights on children's utility components, $\{\widehat{\phi_n^{c,3}}\}_{n=1}^N$. The weight on the child's utility component of child likes the subjects is estimated precisely, and ranges between 0.15 and 0.3. A weight of 0 is rejected for all specifications as well as any weight greater or equal to 0.5. Weights on making a flexible college field choice and on finding a liked job after graduation are larger for the child; however, only values close to 0 can be rejected, given estimates' precision. Estimated weights for the remaining outcomes are imprecise and compatible with a large range of values including 0 and 1.

As for preferences, child likes the subjects is steadily the most important outcome both for children and for parents. For children this outcome is followed by attend college and make a flexible college field choice, which feature very similar coefficients. Graduating in the regular time has a large positive coefficient, but is not significantly different from 0 in any specification. Parents, instead, display relatively stronger preferences for finding a liked job after graduation, followed by making a flexible college field choice and graduating in the regular time, though the latter is not significant. Hence, these estimates display significant differences from those obtained for members, especially children, of families using different decision protocols.

Serial Correlation. TBA

6 Counterfactual Analysis (UNDER REVISION)

In this section I provide an illustration of how elicited probabilistic expectations together with estimated preferences and interaction weights may be used to simulate counterfactual environments and quantify the impact of different policy interventions affecting individual beliefs of family members.

In the top panel of table TBA I simulate a scenario in which individual subjective probabilities that the child likes the subjects in the math and science curriculum of the general track increase by 0.1.

COMMENTS TBA.

In the bottom panel of table TBA I consider a similar situation in which individual beliefs that the "child likes the subjects" in the curricula of the artistic track decrease by 0.1.

COMMENTS TBA.

Admittedly, although these scenarios are possible and interesting per se, they may not be immediately related to concrete measures of educational policy. In table TBA, I consider two scenarios that can be more easily related to actual policy actions. In the top panel of table TBA I simulate a policy that provides either the children, or the parents, or both with information on curriculum-specific graduation rates from high school following a regular path for a cohort of students recently graduated. In the simulation I assume that the information provided are the statistics of AlmaDiploma (2007*a*), which I show and discuss in Giustinelli (2010), and that the recipients "comply" and make a full use of such information as if they were the actual graduation probabilities for the child. In the bottom panel I additionally simulate a scenario in which all students are guaranteed to be passed to the next grade on their first try in all grades. In practice, individuals are assumed to hold subjective probabilities that the child graduates in the regular time equal to 1 for all curricula, keeping expectations on the other outcomes fixed.

COMMENTS TBA.

In table TBA I simulate two final policy interventions. The first policy intervention is one of information provision totally analogous to that shown in table TBA. This time the information given to decision makers are the curriculum-specific rates of college enrollment of the AlmaDiploma (2007*b*)'s sample. Instead, the second policy intervention is one that prevents access to university following a diploma of vocational type, similar to the Italian system before the 1969 reform that opened the access to university to students graduated from technical and vocational curricula. In practice, I assume that individuals hold a zero subjective probability of going to college after graduating from any vocational curriculum as well as zero subjective probabilities of facing the college-work choice and the choice of field in college flexibly.

COMMENTS TBA.

7 Conclusions

TO BE ADDED

References

Akabayashi, H. (2006), 'An Equilibrium Model of Child Maltreatment', *Journal of Economic Dynamics And Control* **30**, 993–1025.

AlmaDiploma (2007*a*), Le Scelte dei Diplomati. Indagine 2007, Technical report, AlmaDiploma.

AlmaDiploma (2007*b*), Profilo dei Diplomati. Indagine 2007, Technical report, AlmaDiploma.

Altonji, J.G. (1993), 'The Demand for and Return to Education When Education Outcomes Are Uncertain', *Journal of Labor Economics* **11**(1), 48–83.

Arcidiacono, P., V.J. Hotz and S. Kang (2010), Modeling College Choices Using Elicited Measures of Expectations and Counterfactual, Working Paper, Duke University.

Aribarg, A., N. Arora and H.O. Bodur (2002), 'Understanding the Role of Preference Revision and Concession in Group Decisions', *Journal of Marketing Research* **39**(3), 336–349.

Aribarg, A., N. Arora and M.Y. Kang (2010), 'Predicting Joint Choice Using Individual Data', *Marketing Science* **29**(1), 139–157.

Ariga, K., G. Brunello, R. Iwahashi and L. Rocco (2005), Why Is the Timing of School Tracking So Heterogeneous?, Discussion Paper 1854, IZA.

Ariga, K., G. Brunello, R. Iwahashi and L. Rocco (2010), 'On the Efficiency Costs of De-Tracking Secondary Schools in Europe', *Education Economics* **Forthcoming**.

Arora, N. and G.M. Allenby (1999), 'Measuring the Influence of Individual Preference Structures in Group Decision Making', *Journal of Marketing Research* **36**(4), 476–487.

Attanasio, O. and K. Kaufmann (2010), Educational Choices and Subjective Expectations of Returns: Evidence on Intra-Household Decisions and Gender Differences, Working paper, CESifo.

Bamberger, G. (1986), Occupational Choice: The Role of Undergraduate Education, Ph.D. Dissertation, University of Chicago.

Becker, S.G. (1974), 'A Theory of Social Interactions', *Journal of Political Economy* **82**, 1063–1094.

Becker, S.G. (1981), *A Treatise on the Family*, Harvard University Press.

Ben-Akiva, M., D. McFadden, K. Train, J. Walker, C. Bhat, M. Bierlaire, D. Bolduc, A. Börsch-Supan, D. Brownstone, D. Bunch, A. Daly, A. de Palma, D. Gopinath, A. Karlstrom and M.A. Munizaga (2002), 'Hybrid Choice Models: Progress and Challenges', *Marketing Letters* **13**(3), 163–172.

Ben-Akiva, M., D. McFadden, M. Abe, U. Böckenholt, D. Bolduc, D. Gopinath, T. Morikawa, V. Ramaswamy, V. Rao, D. Revelt and D. Steinberg (1997), 'Modeling Methods for Discrete Choice Analysis', *Marketing Letters* **8**(3), 273–286.

Ben-Akiva, M., D. McFadden, T. Gärling, D. Gopinath, J. Walker, D. Bolduc, A. Börsch-Supan, P. Delquié, O. Larichev, T. Morikawa, A. Polydoropoulou and V. Rao (1999), 'Extended Framework for Modeling Choice Behavior', *Marketing Letters* **10**(3), 187–203.

Ben-Akiva, M., M. Bradley, T. Morikawa, J. Benjamin, T. Novak, H. Oppewal and V. Rao (1994), 'Combining Revealed and Stated Preference Data', *Marketing Letters* **5**(4), 335–350.

Ben-Akiva, M. and T. Morikawa (1990), Estimation of Travel Demand Models from Multiple Data Sources, *in* 'Transportation and Traffic Theory: Proceedings of the Eleventh International Simposium on Transportation and Traffic Theory, Held July 18-20 in Yokohama, Japan', Koshi, M. edn, New York: Elsevier, pp. 461–476.

BenAkiva, M., T. Morikawa and F. Shiroishi (1991), 'Analysis of the Relaiability of Preference Ranking Data', *Journal of Business Research* **23**, 253–268.

Bergstrom, T. (1989), 'A Fresh Look at the Rotten Kid Theorem – And Other Household Mysteries', *Journal of Political Economy* **97**(5), 1138–1159.

Berry, J. (2009), Child Control in Education Decisions: An Evaluation of Targeted Incentives to Learn in India, Job Market Paper, M.I.T.

Bisin, A., G. Topa and T. Verdier (2004), 'Cooperation as a Transmitted Cultural Trait', *Rationality and Society* **16**(4), 477–507.

Bisin, A. and T. Verdier (2001), 'The Economics of Cultural Transmission and the Dynamics of Preferences', *Journal of Economic Theory* **97**, 298–319.

Brunello, G. and D. Checchi (2007), 'Does School Tracking Affect Equality of Opportunity? New International Evidence', *Economic Policy* **52**, 781–861.

Brunello, G. and M. Giannini (2004), 'Stratified or Comprehensive? The Economic Efficiency of School Design', *Scottish Journal of Political Economy* **51**(2), 173–193.

Brunello, G., M. Giannini and K. Ariga (2007), Optimal Timing of School Tracking, *in* 'Schools and the Equal Opportunity Problem', P. Peterson and L. Wossmann edn, MIT Press.

Bumpus, M.F., A.C. Crouter and S.M. McHale (2001), 'Parental Autonomy Granting During Adolescence: Exploring Gender Differences in Context', *Developmental Psychology* **37**(2), 163–173.

Bursztyn, L. and L.C. Coffman (2009), The Schooling Decision: Family Preferences, Intergenerational Conflict, and Moral Hazard in the Brazilian *Favelas*, Job Market Paper, Littauer Center, Harvard University.

Burton, P., S. Phipps and L. Curtis (2002), 'All in the Family: a Simultaneous Model of Parenting Style and Child Conduct', *The American Economic Review* **92**(2), 368–372.

Checchi, D. (2008), Il Passaggio dalla Scuola Media alla Scuola Superiore, INVALSI Report, University of Milan.

Checchi, D. and L. Flabbi (2007), Intergenerational Mobility and Schooling Decisions in Germany and Italy: the Impact of Secondary School Tracks, Discussion Paper 2876, IZA.

Chen, M.K. and J. Risen (2010), 'How Choice Affects and Reflects Preferences: Revisiting the Free-Choice Paradigm', *Journal of Personality and Social Psychology* **Forthcoming**.

CISEM-IARD, Instituto (2007), *La Scuola Vista dai Protagonisti. Rapporto 2006 sulla Scuola Secondaria Superiore e la Formazione Professionale nella Provincia di Milano*, Vol. 226.26, Biorcio, R. edn, Franco Angeli.

CISEM-IARD, Instituto (2009), *Scegliere la Scuola Superiore. I Percorsi Sscolastici degli Studenti della Provincia di Milano tra Motivazioni e Condizionamenti Sociali*, Vol. 226.31, Giovannetti, G. edn, Franco Angeli.

Cosconati, M. (2009), Parenting Style and the Development of Human Capital in Children, Ph.D. Dissertation, University of Pennsylvania.

Cosslett, S.R. (1993), *Estimation from Endogenously Stratified Samples*, Vol. 11 of *Handbook of Statistics*, Maddala, G.S. and C.R. Rao and H.D. Vinod edn, Elsevier Science Publishers B.V., chapter 1, pp. 1–43.

Dauphin, A., A.-R. El Lahga, B. Fortin and G. Lacroix (2008), Are Children Decision-Makers Within the Household?, Discussion Paper 3728, IZA.

Del Boca, D. and C.J. Flinn (2006), Modes of Spousal Interaction and the Labour Market Environment, Working Paper 14, Fondazione Collegio Carlo Alberto.

Del Boca, D. and C.J. Flinn (2010), Endogenous Household Interaction, Working Paper, University of Turin and New York University.

Delavande, A. (2008), 'Pill, Patch or Shot? Subjective Expectations and Birth Control Choice', *International Economic Review* **49**(3), 999–1042.

Doepke, M. and F. Zilibotti (2008), 'Occupational Choice and the Spirit of Capitalism', *The Quarterly Journal of Economics* **123**(2), 747–793.

Dominitz, J. and C.F. Manski (1996), 'Eliciting Student Expectations of the Return to Schooling', *Journal of Human Resources* **31**, 1–26.

Dominitz, J. and C.F. Manski (1997), 'Using Expectations Data to Study Subjective Income Distribution', *Journal of the American Statistical Association* **87**, 855–867.

Dominitz, J., C.F. Manski and B. Fischhoff (2001), *Who Are the Youth "At Risk"? Expectations Evidence in the NLSY97*, Social Awakening, R. Michael edn, New York: Russel Sage Foundation, Sixth World Congress 8, pp. 230–257.

Dornbusch, S.M., J.M. Carlsmith, S.J. Bushwall, P.L. Ritter, H. Leiderman, A.H. Hastorf and R.T. Gross (1985), 'Single Parents, Extended Households, and the Control of Adolescents', *Child Development* **56**(2), 326–341.

Dosman, D. and W. Adamowicz (2006), 'Combining Stated and Revealed Preference Data to Construct and Empirical Examination of Intrahousehold Bargaining', *Review of Economics of the Household* **4**, 15–34.

Erdem, T., M. Keane, T.S. Öncü and J. Strebel (2005), 'Learning About Computers: an Analysis of Information Search and Technology Choice', *Quantitative Marketing and Economics* **3**, 207–246.

Figlio, D.N. and M. Page (2002), 'School Choice and the Distributional Effects of Ability Tracking: Does Separation Increase Inequality?', *Journal of Urban Economics* **51**(3), 497–514.

Fischhoff, B., A. Parker, W. Bruine De Bruin, J. Downs, C. Palmgren, R. Dawes and C. Manski (2000), 'Teen Expectations for Significant Life Events', *The Public Opinion Quarterly* **64**(2), 189–205.

Flabbi, L. (2001), 'Secondary Schooling Decisions in Italy', *Rivista di Politica Economica* **7/8**.

Friedberg, L. and A. Webb (2006), Determinants and Consequences of Bargaining Power in Household, Working Paper 13, CCR at Boston University.

Gilboa, I., D. Samet and D. Schmeidler (2004), 'Utilitarian Aggregation of Beliefs and Tastes', *The Journal of Political Economy* **4**(112), 932–938.

Giustinelli, P. (2010), Decision Making in Education: Returns to Schooling, Uncertainty, and Child-Parent Interactions, Ph.D. Dissertation, Northwestern University, http://proquest.umi.com.turing.library.northwestern.edu/pqdweb?index=0&did=2040487461 &SrchMode=1&sid=1&Fmt=2&VInst=PROD&VType=PQDRQT=309&VName=PQD&TS =1287409873&clientId=30032.

Hao, L., V.J. Hotz and G.Z. Jin (2008), 'Games Parents and Adolescents Play: Risky Behaviour, Parental Reputation and Strategic Transfer', *The Economic Journal* **118**, 515–555.

Harbaugh, W.T., K. Krause and L. Vesterlund (2002), 'Risk Attitude of Children and Adults: Choices Over Small and Large Probability Gains and Losses', *Experimental Economics* **5**(1), 53–84.

Harbaugh, W.T., K. Krause and T.R. Berry (2001), 'GARP for Kids: on the Development of Rational Choice Behavior', *The American Economic Review* **91**(5), 1539–1545.

Harsanyi, J.C. (1955), 'Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility', *Journal of Political Economy* **63**, 309–321.

Hensher, D.A., J. Louviere and J. Swait (1999), 'Combining Sources of Preference Data', *Journal of Econometrics* **89**, 197–221.

Hensher, D.A., J.M. Rose and W.H. Greene (2005), *Applied Choice Analysis. A Primer*, Cambridge University Press.

IARD, Istituto (2001), *Scelte Cruciali. Indagine IARD su Giovani e Famiglie di Fronte alle Scelte alla Fine della Scuola Secondaria*, Vol. CDLXXXI of *Studi e Ricerche*, Cavalli, A. and C. Facchini edn, Il Mulino.

IARD, Istituto (2005), *Cresecere a Scuola. Il Profilo degli Studenti Italiani*, Vol. 8 of *I Quaderni*, Buzzi, C. edn, Fondazione per la Scuola della Compagnia San Paolo.

Kapteyn, A. and P. Kooreman (1992), 'Household Labor Supply: What Kind of Data Can Tell Us How Many Decision Makers There Are?', *European Economic Review* **36**, 355–371.

Keating, D.P. (1990), *Adolescent Thinking*, At the Threshold - The Developing Adolescent, Feldman S.S., and G.R. Elliott edn, Harvard University Press, chapter 3, pp. 54–92.

Kezdi, G. and R.J. Willis (2008), Stock Market Expectations and Portfolio Choice of American Households, Working paper, Central European University and University of Michigan.

Lizzeri, A. and M. Siniscalchi (2008), 'Parental Guidance and Supervised Learning', *Quarterly Journal of Economics* **123**(3), 1161–1195.

Louviere, J.J., D.A. Hensher and J.D. Swait (2000), *Stated Choice Methods. Analysis and Applications*, Cambridge University Press.

Lundberg, S., J. Romich and K.P. Tsang (2007), Decision-Making by Children, Discussion Paper 2952, IZA.

Malamud, O. (2010), Breadth vs. Depth: Timing of Specialization in Higher Education, Working Paper 15943, NBER.

Manski, C.F. (1993), Adolescent Econometricians: How Do Youth Infer the Returns to Schooling?, *in* 'Studies of Supply and Demand in Higher Education', Clotfelter C.T. and Rothschild M. edn, Book, NBER, pp. 43–60.

Manski, C.F. (1999), 'Analysis of Choice Expectations in Incomplete Scenarios', *Journal of Risk and Uncertainty* **19**(1-3), 49–65.

Manski, C.F. (2000), 'Economic Analysis of Social Interactions', *The Journal of Economic Perspectives* **14**(3), 115–136.

Manski, C.F. (2002), 'Identification of Decision Rules in Experiments on Simple Games of Proposal and Responses', *European Economic Review* **46**, 880–891.

Manski, C.F. (2004), 'Measuring Expectations', *Econometrica* **72**(5), 1329–1376.

Manski, C.F. and D. McFadden (1981), *Alternative Estimators and Sample Designs for Discrete Choice Analysis*, Structural Analysis of Discrete Data with Economic Applications, Manski, C.F. and McFadden D. edn, MIT Press, Cambridge, MA, chapter 1, pp. 2–50.

Manski, C.F. and F. Molinari (2010), 'Rounding Probabilistic Expectations in Surveys', *Journal of Business and Economic Statistics* **28**(2), 219–231.

Manski, C.F. and S.R. Lerman (1977), 'The Estimation of Choice Probabilities from Choice Based Samples', *Econometrica* **45**(8), 1977–1988.

McFadden, D. (1996), On the Analysis of "Intercept & follow" surveys, Working paper, University of California at Berkeley.

Mongin, P. (2005), Spurious Unanimity and the Pareto Principle, Working Paper 5, CPNSS.

Morikawa, T. (1994), 'Correcting State Dependence and Serial Correlation in the RP/SP Combined Estimation', *Transportation* **21**(2), 153–165.

Morikawa, T., M. Ben-Akiva and D. McFadden (2002), Discrete Choice Models Incorporating Revealed Preferences and Psychometric Data, *in* 'Econometric Models in Marketing', Franses P.H. and Montgomery A.L. edn, Vol. 16 of *Advances in Econometrics*, Elsevier Science, pp. 29–55.

Morikawa, T., M. Ben-Akiva and K. Yamada (1991), 'Forecasting Intercity Rail Ridership Using Revealed Preference and Stated Preference Data', *Transportation Research Record* **1328**, 30–35.

NELS88 (1988), Second Follow Up - Student Questionnaire, Technical report, U.S. Department of Education, Institute for Education Science (NCES).

Pantano, J. and Y. Zheng (2010), Using Subjective Expectations Data to Allow for Unobserved Heterogeneity in Hotz-Miller Estimation Strategies, Working paper, Washington University in St. Louis.

Provantini, K. and A. Arcari (2009), *La Scelta Giusta. Orientarsi dopo la Terza Media*, Adolescenza, Educazione e Affetti, Franco Angeli.

Quadrel, M., B. Fischhoff and W. Davis (1993), 'Adolescent (In)vulnerability', *American Psychologist* **48**, 102–116.

Raiffa, H (1968), *Decision Analysis. Introductory Lectures on Choice Under Uncertainty*, Behavioral Science: Quantitative Methods, Random House NY.

Rosenzweig, M.R. and K.I. Wolpin (1993), 'Maternal Expectations and Ex Post Rationalizations: The Usefulness of Survey Information on the Wantedness of Children', *The Journal of Human Resources* **28**(2), 205–229.

Savage, L.J. (1954), *The Foundations of Statistics*, 2nd Revised Edition (1972) edn, Dover, New York.

Schlottmann, A. (2001), 'Children's Probability Intuitions: Understanding the Expected Value of Complex Gambles', *Child Development* **72**(1), 103–122.

Schlottmann, A. and N.H. Anderson (1994), 'Children's Judgments of Expected Value', *Developmental Psychology* **30**(1), 56–66.

Souza, P. (2010), Moral Hazard in the Family, Job Market Paper, Yale University.

Swait, J. and J. Louviere (1993), 'The Role of the Scale Parameter in the Estimation and Comparison of Multinomial Logit Models', *Journal of Marketing Research* **30**(3), 305–314.

Train, K. (2003), *Discrete Choice Methods with Simulation*, Cambridge University Press.

Train, K. and W.W. Wilson (2007), 'Estimation on Stated-Preference Experiments Constructed from Revealed-Preference Choices', *Transportation Research Part B: Methodology* **40**(4), 1469–1496.

van der Klaauw, W. (2000), On the Use of Expectations Data in Estimating Structural Dynamic Models: an Analysis of Career Choices, Working paper, University of North Carolina at Chapel Hill.

van der Klaauw, W. and K.I. Wolpin (2010), 'Social Security and the Retirement and Savings Behavior of Low-Income Households', *Journal of Econometrics* **145**, 21–42.

Weinberg, B.A. (2001), 'An Incentive Model of the Effect of Parental Income on Children', *The Journal of Political Economy* **109**(2), 266–280.

Xie, Y. and C.F. Manski (1989), 'The Logit Model and Response-Based Samples', *Sociological Methods and Research* **13**(3), 283–302.

Yee, D.K. and C. Flanagan (1985), 'Family Environments and Self-Consciousness in Early Adolescence', *Journal of Early Adolescence* **5**(1), 59–68.

Zafar, B. (2008), College Major Choice and the Gender Gap, Working Paper, New York Fed.

Zafar, B. (2010*a*), 'Can Subjective Expectations Data Be Used in Choice Models? Evidence on Cognitive Biases', *Journal of Applied Econometrics* **Forthcoming**.

Zafar, B. (2010*b*), Double Majors: One For Me, One For Mom and Dad?, Staff Reports 478, New York Fed.

Zhang, J., M. Kuwano, B. Lee and A. Fujiwara (2009), 'Modeling Household Discrete Choice Behavior Incorporating Heterogeneous Group Decision-Making Mechaninsms', *Transportation Research B* **43**, 230–250.

Table 13: "Child and Parent Make a Joint Decision" (Child's Version)

Variables	(S1)	(S2d)	(S3)	(S4d)	(S4d')
Child's Weights					
Like Subjects (b_1)	0.243*** (0.067)	0.197*** (0.076)	0.209*** (0.072)	0.161*** (0.068)	0.159*** (0.074)
Daily Homework $\geq$ 2.5h (b_2)	0.712 (1.031)	0.657* (0.436)	0.799 (1.331)	0.865 (0.701)	0.758* (0.570)
Graduate in Regular Time (b_4)	0.551 (0.549)	0.572 (0.487)	0.356 (0.497)	0.423* (0.284)	0.442* (0.289)
In School with Friend(s) (b_6)	0.480 (0.794)	−1.061 (6.300)	0.404 (0.491)	0.352 (0.463)	0.493 (0.452)
Flexible College-Work Choice (b_7)	0.307 (0.361)	−0.560 (1.167)	0.235 (0.473)	0.180 (1.138)	−0.657 (1.940)
Attend College (b_8)	0.071 (0.149)	0.016 (0.106)	−0.049 (0.191)	−0.040 (0.137)	−0.054 (0.138)
Flexible College Field Choice (b_9)	0.686** (0.356)	0.618*** (0.220)	0.721** (0.445)	0.685*** (0.245)	0.681** (0.295)
Liked Job after Graduation (b_{10})	0.979** (0.514)	1.032*** (0.188)	0.876 (0.756)	0.932*** (0.308)	0.916*** (0.361)
Child's Preferences:					
Like Subjects (b_1)	15.95*** (5.09)	17.98*** (6.83)	17.63*** (7.38)	19.75*** (7.57)	19.21*** (8.30)
Daily Homework $\geq$ 2.5h (b_2)	1.38 (1.37)	1.47 (1.43)	1.11 (1.51)	1.35 (1.25)	1.15 (1.38)
Graduate in Regular Time (b_4)	4.37* (2.73)	3.75* (2.90)	3.79* (2.34)	3.30 (2.62)	3.30 (2.80)
In School with Friend(s) (b_6)	1.12 (1.06)	−0.22 (1.26)	1.61* (1.13)	0.89 (1.61)	1.04 (1.40)
Flexible College-Work Choice (b_7)	1.55 (1.59)	−1.31 (2.38)	1.16 (1.93)	0.84 (5.26)	−0.53 (1.39)
Attend College (b_8)	4.51*** (1.93)	7.06** (3.67)	4.07** (2.26)	5.73* (3.65)	5.96** (3.47)
Flexible College Field Choice (b_9)	5.58*** (2.40)	5.38*** (2.29)	5.02** (2.70)	4.70** (2.12)	4.98** (2.33)
Liked Job after Graduation (b_{10})	1.64 (1.80)	1.21 (1.04)	2.25 (2.98)	2.06 (1.98)	2.07 (2.09)
Parent Happy (b_{11})	–	1.91** (1.00)	–	2.38** (1.36)	2.44** (1.20)
JHS Suggestion RP	–	–	1.22*** (0.50)	1.11** (0.49)	–
JHS Suggestion SP	–	–	0.17 (0.63)	−3.01* (1.86)	−2.76* (1.76)
RP Dummies	No	Yes	No	Yes	Yes
Parent's Preferences:					
Like Subjects (b_1)	8.80*** (2.00)	8.89*** (1.73)	8.01*** (2.19)	7.86*** (1.49)	7.77*** (1.52)
Daily Homework $\geq$ 2.5h (b_2)	−1.50 (1.85)	−2.69* (2.03)	−1.48 (2.11)	−2.37 (2.48)	−2.42 (2.13)
Graduate in Regular Time (b_4)	1.79 (2.98)	2.64 (3.73)	2.90 (3.20)	4.02* (2.72)	3.89 (3.12)
In School with Friend(s) (b_6)	−0.33 (1.16)	−0.40 (1.16)	−0.79 (1.23)	−1.44 (1.21)	−1.29 (1.37)
Flexible College-Work Choice (b_7)	1.97* (1.23)	1.41 (1.31)	1.82* (1.38)	2.18 (2.04)	1.38 (1.75)
Attend College (b_8)	0.79 (1.20)	0.28 (1.26)	0.72 (1.30)	0.35 (1.36)	0.35 (1.28)
Flexible College Field Choice (b_9)	3.32* (2.03)	4.80** (2.48)	3.38* (2.34)	4.79** (2.53)	4.74* (2.88)
Liked Job after Graduation (b_{10})	3.95** (1.84)	6.38*** (2.61)	4.01* (2.77)	6.11** (2.87)	6.07** (3.05)
JHS Suggestion RP	–	–	–	–	1.25*** (0.47)
JHS Suggestion SP	–	–	2.21** (1.11)	2.48** (1.28)	2.40** (1.32)
RP Dummies	No	Yes	No	Yes	Yes
SP Scale (Child≡Par)	0.479*** (0.133)	0.285*** (0.088)	0.452*** (0.164)	0.280*** (0.0864)	0.289*** (0.100)
Constants	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-502.383	-437.941	-457.802	-401.005	-399.629
Sample Size	238		223		

***: significant at 1%, **: significant at 5%, *: significant at 10%