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Three essays on social mobility: mobility dimensions, welfare evaluation and questionnaires evidence

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Introduction

The thesis concerns social mobility. Social mobility defines the way in which people's socio-economic positions evolve over time or among generations.

The aim of this work is twofold. Firstly, it aims at answering questions like: when and how does a different level of intergenerational economic mobility make a society more ethically preferable than another? Second, the thesis investigates how people socially evaluate and perceive several important mobility dimensions. As a result, the thesis focuses on specific mobility concepts analysed by the welfare literature, while it does not provide a comprehensive review of the economic literature about mobility measures.

The thesis is composed of three chapters.

Chapter 1 discusses the relevance of quadratic social welfare function provided by Epstein and Segal (1992) in a dynastic society. As a result, the chapter extends the social choice approach provided by Harsanyi (1953, 1955, 1977) to dynastic society. Moreover, the chapter discusses how in the dynastic setting, appropriate parametrization allows the quadratic welfare function to embed the principal contributions provided by the welfare literature on intergenerational mobility, including utilitarianism, origin independence, reversal and randomization.

Chapter 2 provides an experimental questionnaire about people's value of social mobility, considering both the intergenerational mobility scenario and the intragenerational one. This chapter investigates people's value about different mobility dimensions proposed by the welfare literature. Furthermore, the questionnaire aims at capturing whether mobility evaluations differ based on the source of inequality: life chances randomly distributed versus natural ability genetically transmitted. The questionnaire is implemented in Amazon MTurk platform.

Chapter 3 provides a further experimental questionnaire aimed at capturing people's perception about two fundamental mobility aspects: structural mobility and exchange mobility, focusing on the intergenerational mobility scenario. Furthermore, the chapter provides several mobility dimensions that may affect people's mobility perception about these features. The questionnaire is implemented in Amazon MTurk platform.

Chapter 1

Valuing social mobility with quadratic social welfare function[1]

Abstract

In this paper we discuss the relevance of quadratic social welfare function provided by Epstein and Segal (1992) in a dynastic society. As a result we extend the social choice approach provided by Harsanyi (1953, 1955, 1977) to dynastic society and review the principal contributions of the welfare literature on intergenerational mobility using the Harsanyi's framework.

Keywords: Intergenerational mobility, Utilitarianism, Randomization, Fairness.

JEL Classification: J62, D63, D71

[1]This chapter is based on joint work with Michele Bernasconi

1.1 Introduction

Loosely defined, economic mobility refers to the mechanism governing the evolution of people's socio-economic positions over times or across generations. Economic mobility is an issue of a great theoretical and practical importance, but with a very multi-faceted nature. Fields and Ok (1999), Fields (2008), Jantty and Jenkins (2015) present recent reviews of the literature which document the very different notions and methods used in the analysis of economic mobility by different researchers. In this paper we follow the approach to conceptualize economic mobility across generations in terms of social welfare. This means that we aim to answer questions like: "when and how does a different level of intergenerational economic mobility make a society more ethically preferable than another?".

Previous literature has addressed the above question following a seminal approach initiated by Atkinson (1981) of extending to a dynastic context measures of welfare based on inequality aversion (see below for references and discussion of this literature).

In this paper we take a slightly different route. In particular, although our analysis has also implications for dynastic inequality, we start from three more basic ideas in the theory of social justice. The first idea is Harsanyi (1953; 1955)'s original approach of deriving social welfare starting from individual and ethical preferences defined on lotteries over social states. The second idea is Diamond (1967)'s and others' criticism to Harsanyi, against the assumption that ethical preferences over social state lotteries satisfy the axioms of expected utility. The third idea, representing in fact the main bulk of our proposal, is the axiomatization of quadratic social welfare function developed by Epstein and Segal (1992) in substitution of so called utilitarian expected utility to address and resolve Diamond (1967)'s criticism.

In greater detail, in the theory of social justice utilitarian expected utility corresponds to the notion that social welfare must conforms to a weighted sum of individual utilities over social state lotteries. As well known, this results is obtained by Harsanyi (1953; 1955; 1977) either taking the position of an impartial observer who determines the social preferences on lotteries over social states behind a veil of ignorance (Harsanyi 1953; 1977), or using an aggregation theorem of individual preferences inspired by the Pareto principle (Harsanyi, 1953). The assumption of expected utility for ethical preferences is central for both approaches. Several authors, however, including Diamond (1967), Sen (1973), Elster (1989), have expressed criticisms against expected utility for social preferences, arguing that it overlooks problems of fairness and equality of opportunities in the process of allocating social outcomes. This is because the linearity of preferences in probability implied by the independence axiom of expected utility forces social preferences to value only the total sum of utilities obtained by people in the final states and it is instead neutral with respect to the process of allocating social positions and about the distribution of individual utilities in those final states.

Nevertheless, Harsanyi's notion of social state lotteries is very rich in terms of the interpretation they offer for the probabilities of the social states of being themselves objects of social concern. Exploiting this possibility, Epstein and Segal (1992) have proposed a variation of utilitarianism, which implements a very natural idea of fairness in the process of allocating social outcomes and which simply requires that individuals in similar positions should have equal chances of obtaining the different social outcome. They in particular show that this idea of fairness, sometimes called ex ante egalitarianism, implies a mathematical form for the social welfare function which is quadratic and strictly quasi-concave in individual utilities. Epstein and Segal (1982) develop the theory in the general abstract setting-up of Harsanyi. Notwithstanding, following the stream of discussions against the utilitarian rule initiated by Diamond (1967) and Sen (1973), the focus of the analysis is on problems of fairness in a society with a single generation.

In this paper we show that the same interpretation of fairness and the same quadratic welfare function can be relevant in the context of societies with dynastic linkages and in fact used to address several issues debated in the literature on intergenerational mobility. This may be not surprising at first since the idea of ex ante fairness as equal life's chances for individuals in similar positions are notions well debated in the literature on economic mobility (Jantti and Jenkins, 2015). However, the application of the idea in dynastic societies adds obvious complications. Moreover, other principles of justice may come into play. In dynastic societies, the notion of equal life's chances for individuals in similar positions may be very difficult to define due to the several circumstances that contribute to define similar individuals (Roemer and Trannoy, 2015; Ferreira and Peragine, 2015). The notion is not fully aligned with the idea of fairness as origin independence (Shorrocks, 1978b), simply specified as a situation in which the economic positions of the members of two generations are independent across dynasties. Attention to dynastic inequalities has inspired much literature initiated by Atkinson (1981) and pursued by Markandya (1982); Dardanoni (1993); Chakravarty et al. (1985); Gottschalk and Spolaore (2002); Decancq et al. (2014). Often, this literature advocates for a reversal of income positions across dynasties, rather than independence between income positions.

In fact, the above various ideas has inspired a very large literature and various approaches to value intergenerational mobility in a society, which the quadratic social welfare function can bring to effective synthesis. An important property of the quadratic welfare function is its solid axiomatic foundation. A central implication of the axiomatization is that society should be willing to toss a fair coin between two social state lotteries when it is indifferent between the two and there is at least one individual which is not. The axiomatization was firstly developed for individual decision making under risk (Chew, 1983) and then exported in Harsanyi's framework for social decision (Epstein and Segal, 1992).

In the context of individual decision making, the quadratic utility is used to fully separate the attitude towards risk aversion and the attitude towards randomization. In the same way, the application of quadratic social welfare function separates the attitude towards economic inequality from the attitude towards randomization in the sense of fairness.

The paper is organized as follows. We start in section 2 to recast in a dynastic society the notion of Harsanyi's social state lotteries and discuss their relationships with various concepts discussed in the literature on intergenerational mobility. In section 3 we review the axiomatic foundations of quadratic social welfare function as developed by Epstein and Segal (1992), which in section 4 we adapt to the dynastic set-up. In section 5 we introduce and discuss the implications of a three parameters specialization of the quadratic welfare function which is flexible to embody various notions of social justice in the dynastic set-up. Section 6 discusses further implications of the quadratic form and gives concluding remarks.

1.2 Harsanyi's social state lotteries in a dynastic economy

In Harsanyi's (1953, 1955, 1977) approach to social choice the objects of choice are lotteries over a set of social states. Such lotteries can be interpreted as social policies inducing probabilities distributions over social outcomes. Let $X = \{x^1, ..., x^M\}$, with $M \geq 2$, be the set of certain social outcomes or states. A typical social state lottery corresponds to a probability vector $P = (p_1, ..., p_M)$ which assigns a probability $p_m \geq 0$, with $m = 1, ..., M$ and $\sum p_m = 1$, to all social states in X. The lottery which gives social state x^m with certainty is denoted as e^m: it is the degenerate lottery $e^m = (e_1^m, ..., e_M^m)$ where $e_s^m = 1$ if $s = m$ and $e_s^m = 0$ if $s \neq m$. Remark that the set of all degenerate lotteries $\{e^1, ..., e^M\}$ identifies univocally the set X of certain social states.

The set of all lotteries on X, denoted by L, is the $(M-1)$-dimensional simplex, which we define with the standard mixture operation: for any pair of lotteries $P, Q \in L$ and any scalar $\lambda \in [0, 1]$, the mixture operation $\lambda P + (1-\lambda)Q$ represents the lottery in L, which gives social state x^m with probability $\lambda p_m + (1-\lambda)q_m$.

In the abstract approach a typical social state $x \in X$ provides a complete description of the situation of each agent in the economy and for this reason X can be a finite set of any kind. Nevertheless, in the debate surrounding Harsanyi's construction (see below), the social set-up has been generally taken to describe a society with a single generation.

Now we give an interpretation useful to study social preference in a dynastic society. In particular, we consider a society with a fix number of dynasties, indexed by $h = 1, ...H$. Each dynasty is composed by two individuals and live for two generations: one wellspring, active in period $t = 1$, denoted by h_w; and one offspring, active in period $t = 2$, denoted by h_o. We impose an Harsanyi (1955)'s type of framework in this dynastic society. Mainly, with $X = \{x^1, ..., x^M\}$ still denoting the set of certain social states, we take that each social state $x \in X$ provides a description of all agents' socio-economic status in the respective generations and also of their intergenerational links.

For sake of comparisons with the social welfare literature on income mobility, we use income as relevant indicator for socio-economic status of both generations and assume that there are N income levels in both generations.[2] In this dynastic society we represent a typical social state $x \in X$ as $x = [z, y]$, where z and y are the vectors for the certain income positions of wellsprings and offspring, respectively, and where the positions in the vectors income levels are denoted with subscript letters.[3] For example, Figure 1.1 shows three pure social states $\{x^I, x^R, x^O\}$ in a society with two dynasties. In states x^I and x^R there are two income classes in each generation with half population with a low (l) income and half population with a high (h) income. The societies differ in that: in x^I there is immobility of social positions since rich offspring are associated to rich wellsprings and poor offspring to poor wellsprings; whereas in x^R there is a reversal of social positions so that rich offspring are associated to poor wellsprings and poor offspring to rich wellsprings. Social state x^O is different since in it all offspring obtain the high income y_h.

A typical lottery on the three social states $\{x^I, x^R, x^O\}$ is $P = (p_I, p_R, p_O)$. The set of all lotteries on $\{x^I, x^R, x^O\}$ corresponds to the probability simplex with the vertices in the three degenerate lotteries $e^I = (1, 0, 0)$, $e^R = (0, 1, 0)$ and $e^O = (0, 0, 1)$. The simplex is shown in Figure 1.2.

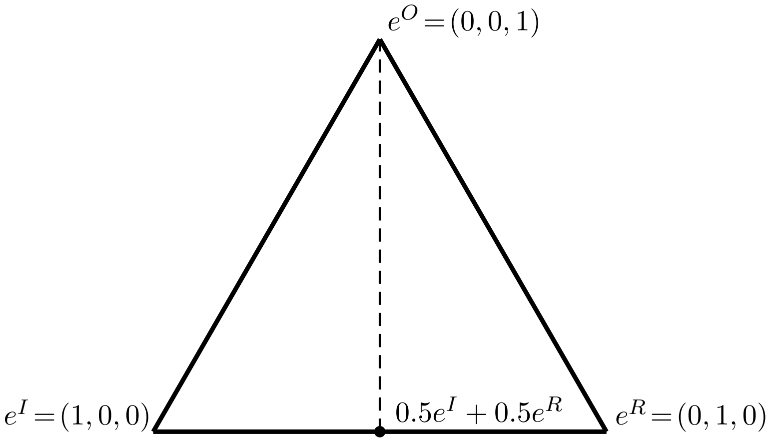
[2] This is useful for comparison with social mobility matrices below. Nevertheless, we do not exclude that some income classes may be empty for either generation, so that the numbers of income classes with a positive number of individuals may in fact be different between generations (see for example social state x^O below).

[3] In fact, the latter notation is generally used by the scholars who concentrate on the development of various mobility indexes focussed on the transformation $z \to y$. This literature deduces statistical and ethical measures $m(z, y)$ satisfying specific properties considered relevant in the interpretation and conceptualization of mobility. Notable examples of research in this stream include Shorrocks (1978a); Chakravarty (1984); Chakravarty et al. (1985); Cowell (1985); Fields and Ok (1996); Mitra and Ok (1998); D'Agostino and Dardanoni (2009); Tsui (2009); Cowell and Flachaire (2018). This literature is especially interested in measuring the changes between z and y, and less in the uncertainty inherent in the transformation $z \to y$. Accordingly, also the concept of Harsanyi's social state lotteries is generally extraneous to these approaches.

Figure 1.1: Three pure social states in a society with two types of dynasties

	e^I	e^R	e^O
$\{1_w, ..., (\frac{H}{2})_w\}$	z_l	z_l	z_l
$\{(\frac{H+1}{2})_w, ..., H_w\}$	z_h	z_h	z_h
$\{1_o, ..., (\frac{H}{2})_o\}$	y_l	y_h	y_h
$\{(\frac{H+1}{2})_o, ..., H_o\}$	y_h	y_l	y_h

Figure 1.2: The probability simplex over the three social states $\{e^I, e^R, e^O\}$



In the simplex: a) vertical movements concern *structural mobility*; b) horizontal movements concern *exchange mobility*; c) movements along the lower edge in the direction of e^I correspond to *diagonalizing switches*; c) the bisector (dashed line) corresponds to *origin independence*.

Lotteries depicted in the simplex correspond to the situations most typically considered by the literature on social mobility, which generally look at societies at time t = 1, when the social state for the members of the wellsprings' generation has been obtained, while the social state for the members of the offsprings' generation has yet to be determined. While the framework presented in this paper can be applied to the situations in which uncertainty can affect the social positions of both generations (in fact of any finite number of generations), most of our discussion will also focus on situations such as those depicted in the simplex.[4]

[4] Also notice that the fact the simplex has a vertex in e^O where all offsprings have high income is not a limit for the set of lotteries that can be analyzed with reference to a society with two social classes (and a fixed marginal distributions for wellsprings). In fact, simply notice that it would be possible to represent all possible lotteries in a society with two income classes putting a specular simplex with vertex in a state x^L where all offsprings have low income and which shares the lower edge with simplex $\{e^I, e^R, e^O\}$. Such more exhaustive representation wouldn't however add to the discussion.

Nevertheless, somehow differently from the present set-up, a relevant part of the literature looking at welfare measures of social mobility takes as objects of analysis the joint distributions of wellsprings' and offsprings' incomes, often expressed in terms of transition matrices for the vectors of the dynasties' marginal income distributions (discussion and references in Fields and Ok 1999). [5]

There are relationships between social state lotteries of dynastic societies and income transition mobility matrices. In particular, from any social state lottery $P = (p_1, ..., p_M)$ of a dynastic society it is always possible to compute the vectors with the frequencies of wellsprings' and offsprings' marginal income distributions, denoted respectively by ν_w^P and ν_o^P. Likewise, it is possible to compute the transition matrix, which we denote by $\Pi^P = \left|\pi_{ij}^P\right|$ with $\pi_{ij}^P \geq 0$ and $\sum_{i=1}^{n} \pi_{ij}^P = 1$, where each entry π_{ij}^P gives the conditional probability induced by lottery P for an offspring with the wellspring in income class z_i to move to income class y_j.[6] Likewise, it is possible to compute the frequencies of the vectors of wellsprings' and offsprings' marginal income distributions, denoted respectively by ν_w^P and ν_o^P, with the low of large number which entails $\nu_o^P = \nu_w^P \Pi^P$. For example, the transition matrix $\Pi^{\lambda e^I+(1-\lambda)e^R}$ associated to a lottery $\lambda e^I + (1-\lambda)e^R$ lying on the lower edge of the simplex in Figure 1.2 is given by:

$$\Pi^{\lambda e^I+(1-\lambda)e^R} = \begin{matrix} & y_l & y_h \\ z_l & \lambda & 1-\lambda \\ z_h & 1-\lambda & \lambda \end{matrix}$$

with the frequencies for wellsprings' and offsprings' marginal income distributions given by $v_w^{\lambda e^I+(1-\lambda)e^R} = v_o^{\lambda e^I+(1-\lambda)e^R} = (0.5; 0.5)$.[7]

Transitions matrices with the associated marginal income distributions are useful tools in the analysis of income mobility. First of all they allow to separate, at a conceptual level at least, two ideas of income mobility that have been distinguished in the literature: structural mobility, which is meant to capture any change occurring between the wellsprings' and offsprings' marginal distributions of income; and exchange mobility, which instead refers to movements of individuals among social

[5] See Van de Gaer and Palmisano (2018) for recent a analysis of the relationships between income growth, income inequality and income mobility in a welfare axiomatic framework.

[6] The relationships between social state lotteries and transitions matrices are more formally discussed in the Appendix with their application to quadratic social welfare functions.

[7] The matrix $\Pi^{\lambda e^I+(1-\lambda)e^R}$ is also a bistochastic matrix, namely with non-negative entries such that both rows and columns sum to unity. Not all transition matrices in the simplex are bistochastic. In fact, only the matrices corresponding to lotteries on the lower edge of simplex are bistochastic. The others are not. For example, $\Pi^{e^O} = \begin{matrix} & y_l & y_h \\ z_l & 0 & 1 \\ z_h & 0 & 1 \end{matrix}$ (see also discussion below).

classes that leave unchanged the marginal distributions of both wellsprings and offsprings.[8] Such type of structural changes for instance correspond in the simplex of Figure 1.2 to vertical movements: up movements to economic improvements, and down movement to economic decline.[9]

However, there are many ways in which a marginal distribution for the offspring can be obtained from a given marginal distribution of the wellsprings. Exchange mobility represents intergenerational movements among social classes that leave unchanged the marginal distributions of both wellsprings and offsprings. Transitions matrices are useful tools in the analysis of exchange mobility. Atkinson (1981), in particular, has proposed an income mobility order based on so called diagonalizing switches. Diagonalizing switches are operations conducted on bistochastic mobility matrices, applying to societies in which a fixed percentage of population is assigned to each class. As example, all matrices $\Pi^{\lambda e^I+(1-\lambda)e^R}$ for $\lambda \in [0,1]$ are bistochastic matrices. They correspond to the lotteries on the lower edge of the simplex. Diagonalizing switches are transformations of bistochastic mobility matrices such that, while leaving unchanged the marginal distributions of wellsprings and offsprings, bring to a concentration of the probability mass on the diagonal cells of a transition matrix thus increasing the frequencies of dynasties with wellsprings and offsprings in the same income classes. Diagonalizing switches in matrix $\Pi^{\lambda e^I+(1-\lambda)e^R}$ are given by increments of λ over interval $[0,1]$. In the simplex, they correspond to movements along the lower edge from the state of reversal x^R towards the state of immobility x^I. For this reason, Atkinson (1981) and various other authors ever since have considered that diagonalizing switches reduce mobility. Whether they also affect welfare depends on the index one uses to evaluate it. For example, whereas with a standard utilitarian (i.e. symmetric and additively separable) social welfare function diagonalizing switches leave welfare unchanged, Atkinson and Bourguignon (1982) (see also Markandya, 1982, 1984;

[8] The importance of the distinction between structural and exchange mobility in the analysis of social mobility is well known in the sociological literature since at least classical analyses, such as Rogoff (1953) and Bartholomew (1967). In economics the distinction have been brought to emphasis by Markandya (1982). Since then, several mobility indices proposed in the literature have also developed methods to decompose in the two sources of changes the total mobility occurring in a transformation $z \to y$ (see e.g. Fields and Ok, 1996; Ruiz-Castillo, 2004; Schluter and Van de Gaer, 2011; Tsui, 2009; Cowell and Flachaire, 2018). Notwithstanding, given the very multidimensional nature that the transformations can take, it is very difficult to provide an unified framework applicable in any possible situation (reviews and discussions in the surveys by Fields and Ok, 1999; Fields, 2008; Jantti and Jenkins, 2015).

[9] Obviously, there may be several other types of movements affecting structural mobility, which concern the second, third, fourth, and any other moments of the offsprings' marginal income distribution for a fix marginal income distribution of wellsprings. This is indeed the reason why it is so difficult to obtain unique measures of social mobility even only considering structural mobility.

Chakravarty et al., 1985) have proposed a dynastic utilitarian framework (in the sense that utility is with the dynasties rather than with the individuals) in which diagonalizing switches are harming for welfare whenever the welfare index implies an aversion to income inequality (between dynasties) greater than an aversion to income fluctuations (within dynasties); instead they improve welfare when the welfare index implies an aversion to income fluctuations greater than the aversion to income inequality.

Nevertheless, in the literature on mobility there has always been a tension between the concept of mobility as the amount of reversal and mobility considered in terms of life chances and fair opportunities. The latter focus obtains if one emphasizes the role of transition matrix as ex ante probabilities for the offsprings to reach the different income classes conditional on the incomes' classes of the respective wellsprings.[10] In such a sense it is possible to interpret the transition probabilities in terms of opportunities offered by the society to the individuals (Markandya, 1982). For example, following a line of thought initiated in sociology (Prais, 1955), Shorrocks (1978b) is the first to axiomatize an index assigning the maximum of mobility to a transition matrix where all rows are identical, since under the above interpretation such a matrix induces perfect origin independence between offsprings and wellsprings social positions. In matrix $\Pi^{\lambda e^I+(1-\lambda)e^R}$ origin independence occurs when $\lambda = 1/2$, which corresponds to the lottery $0.5e^I + 0.5e^R$ at the midpoint of the lower edge in the simplex. More generally, we notice that in the simplex all lotteries lying on the bisector between $0.5e^I + 0.5e^R$ and the upper vertex e^o represent situations of origin independence for different marginal distributions of the offsprings (that is, including distributions not consistent with bistochastic matrices). Other scholars have developed ethical indices or social welfare models which value origin independence (including Dardanoni, 1993; Gottschalk and Spolaore, 2002, see below).[11]

[10] In addition to the ex ante perspective, the literature has also enlightened an ex post view on fairness. The ex post approach can be traced back to Roemer's (1998) distinction between circumstances and efforts. Now it is best understood as linked to two principles (e.g. Peragine 2004): that inequality in outcomes should be eliminated only to the extent that it derives from people's different circumstances (so called compensation principle); and that inequality due to unequal people's effort should be considered acceptable (responsibility principle). The actual separation between the two principles is however difficult to implement due to the complexity to distinguish between inequalities generated by effort and inequalities generated by circumstances (Ooghe et al., 2007; Checchi and Peragine, 2010; Fleurbaey, 2010).

[11] Dardanoni (1993) presents a social welfare function which is a weighted sum of the expected welfares of the individuals. He focuses on the class of monotone matrices with the same steady-state income distribution. His restrictions also imply that the analysis is delimited to bistochastic transition matrices characterized by positive income association between generations. For this class of matrices he shows that any social welfare function which is averse to between dynasties inequality implies maximal value to origin independence. Considering the full class of bistochastic matrices, Gottschalk and Spolaore (2002) also obtain a social welfare function which can assign

The extent to which origin independence can be considered an index of equality of opportunities is a further important issue (surveys in Roemer and Trannoy, 2015; Ferreira and Peragine, 2015; Ramos and Van de Gaer, 2016). Several authors argue that it cannot (Roemer, 2004). Summarizing the literature Jantti and Jenkins (2015) notes that "the degree of origin independence is a direct measure of inequality of opportunity only if two rather special conditions apply (Roemer, 2004). First, the advantages associated with parental background (over which it is assumed that an individual had no choice) are entirely summarized by parental income. Second, the concept of equality of opportunity that is employed views as unacceptable any income differences in the children's generation that are attributable to differences in innate talents (which might be partly genetically inherited)", (p. 815). The second condition can in principle be amended looking for transition matrices which rather than implementing a condition of equal life chances to all individuals, makes each individual's life chance to match some further criterion which depend also on the interpretation to give to various forms of people' luck in life, including for example the luck due to the genetic probability for an individual of receiving a given talent.[12]

The first condition is more complex and it involves the very same use of income transition matrices as a mathematical tools to analyze social mobility.[13] From a technical point of view the problem is that different dynastic social state lotteries can generate the same income transition matrix and even the same marginal income distributions, but nevertheless represent situations that one would not like to

maximum value to origin independence. Their model extends Atkinson and Bourguignon (1982) by creating an extra tension between the attitude to income fluctuations and to between dynasties inequality coming from an aversion restricted to offsprings' income risk. In particular they show that if the latter aversion, which increases with origin independence, is lower than the former two, then origin independence is positive valued; moreover origin independence gets maximum social value when aversion to income fluctuations and aversion to inequality exactly balance in terms of their impact for welfare.

[12]See Van de Gaer et al. (2001) for a careful discussion of the three definitions of mobility as income movements, equality of life chances and equality of opportunities based on properties of transition matrices.

[13]There is also a debate in the mobility literature about the appropriateness of income transition matrices to summarize all relevant information useful in the analysis of mobility (Fields and Ok, 1999). On the one side, they make transparent and easily interpretable the income links between offsprings and wellsprings. On the other side, however, the simplicity provided by transition matrices comes at a cost of a loss of information. Moreover, in some cases the transition matrices admitted to the analysis have to be restricted to special classes (e.g. bistochastic, monotone, matrices with positive association) in order to allow for the derivation of unambiguous theoretical results. This suggest that "great care should be taken when conducting a transition matrix analysis, and perhaps the analysis must be supplemented by mobility measures that utilize directly the data from the distributional transformations" (Fields and Ok, 1999).

treat as equivalent. To illustrate, suppose that in the society with half population poor and half rich in each generation, there is also a social state $e^{5I+.5R}$ where half of the dynasties are immobile and half reverse. Perhaps, the different dynasties refer to two different regions of the same country or to two different ethnic groups. Clearly, the income transition matrix $\Pi^{.5I+.5R}$ obtained from the latter social state $e^{.5I+.5R}$ and the income transition matrix $.5\Pi^I + .5\Pi^R$ obtained from the non-degenerate mixture lottery $.5e^I + .5e^R$ are equal, that is $\Pi^{.5I+.5R} = .5\Pi^I + .5\Pi^R$. Nevertheless, one may object that even if the income mobility matrices are equal, only $.5e^I + .5e^R$ offers the same opportunities to all offsprings, whereas in $e^{.5I+.5R}$ offsprings' income positions depend deterministically from wellsprings'. Therefore, the two lotteries $.5e^I + .5e^R$ and $e^{.5I+.5R}$ (or the social policies that induce the two lotteries) should not be treated as equivalent. For this reason, we keep on with Harsanyi's set L of social state lotteries as objects of social preferences. We go back to further discuss their relationships with income mobility matrices in the concluding section.

1.3 Axiomatic foundations of utilitarianism and of quadratic social welfare functions

In this section we review Harsanyi's derivation of the utilitarian social welfare function and, especially, the extension proposed by Epstein and Segal (1992) to amend to the criticisms to utilitarianism that we consider also relevant in the social mobility literature. The review is based on Harsanyi's standard abstract setting, where there are no distinctions between people of different dynasties. We come back to the analysis of dynastic societies afterwards.

Harsanyi develops two approaches to social choice which both lead to weighted utilitarian rule. The approach reviewed here goes back to Harsanyi (1955; 1977) and is also called the aggregation theorem (Weymark, 1991),

Let I be the total number of individuals in the society (in our dynastic society it will therefore be $I = 2H$). For each individual $i = 1, ..., I$, let $U_i(P)$ be a continuous utility function representing preference of i on L. Both Harsanyi (1955; 1977) and Epstein and Segal (1992) also maintain that the individual utility functions take the expected utility form:

$$U_i(P) = \sum_{m=1}^{M} p_m u_i(x^m) \tag{1.1}$$

for lottery $P \in L$ and where $u_i(x^m)$ is the von Neumann-Morgenstern utility function defined by $u_i(x^m) = V_i(e^m)$ (that is, it is the utility number assigned to receiving x^m with certainty). Accordingly, we follow the utilitarian approach assuming as object of intergenerational mobility individuals' utility [14]. We also assume that $u_i(x^m) = u_j(x^n)$ whenever the consequence obtained by agent i in social state m is equal to the consequence obtained by agent j in state n. The assumption ensures the conditions of measurability and comparability for individual utilities required in the discussion below. For example it means that when the individual care only to the incomes received in a given social state, the expected utility of a lottery P offering income y_j to individual i with probability p_{ji}^m when state x^m occurs, is given by $U_i(P) = \sum_{m=1}^{M} p_{ji}^m u(y_j)$. As it is well-known, these conditions are necessary in welfare economics to bypass Arrow's impossibility theorem. Our assumption of measurability and comparability is stronger than what strictly required by utilitarianism, which is cardinal measurability with unit comparability (that is, it allows for transformations of individual utilities of the form $u_i \to a_i + bu_i$, with $b > 0$, for all i). For some of properties of the quadratic welfare function discussed below, Epstein and Segal (1992) requires the stronger restriction of ratio-scale measurability with full comparability (which imposes $a_i = 0$ for all i in the transformations admitted by utilitarianism). However, our measurability and comparability assumption satisfies both requirements and it is in fact commonly taken in practical discussions on utilitarianism and its extensions. [15]

A social welfare function is an aggregator of the individual utilities. Let D the subset of the I-dimensional Euclidean space spanned by the individual utility functions on L, namely $D \equiv \{(V_1(P), ..., V_I(P)) : P \in L\} \subset E^I$. Let $V(P)$ be a continuous social preference function representing the society's preference on L.

Definition. A social welfare function W on D is defined by

$$W(u_1, ..., u_I) \equiv V(p) \quad \text{for any } P \in L \text{ such that } V_i(P) = u_i \text{ for all } i \tag{1.2}$$

Harsanyi's aggregation theorem establishes the conditions for the social welfare to be a weighted sum of individual utilities (denoted as W_U).

Harsanyi's aggregation theorem. Suppose that both individual utility U_i's and society's utility V satisfy the independence axiom of expected utility. Suppose also that the condition of Pareto indifference is satisfied (namely, if for each pair of lotteries P, Q such that $U_i(P) = U_i(Q)$ for all i, then $V(P) = V(Q)$). Then, there are numbers $\{\alpha_1, ..., \alpha_I\}$ and β such that the social welfare of any lottery $P \in L$

[14] That is, in our model the individuals' utility among generations defines the intergenerational element. In this perspective our approach is different from the models proposed by Atkinson & Bourguignon (1982) and Markandya (1982). In fact, in both models the dynasties' utility defines the intergenerational element.

[15] It also resembles Harsanyi's similarity postulate in which interpersonal utility comparisons can be reduced to intrapersonal comparisons by a process of empathetic identification.

is given by:

$$W_U(u_1, ..., u_I) = \sum_{i=1}^{I} \alpha_i u_i + \beta \tag{1.3}$$

In the aggregation theorem the Pareto condition is used to inform social preference of individual preferences. In fact, it is the only way to inform social preference. As it is well-known, there have been nevertheless several disputes about Harsanyi's construction and its relationships with the moral theory of utilitarianism (in particular the debate initiated by Sen 1976; 1977). Several technical and conceptual issues are involved. They are thoroughly discussed by Weymark (1991).[16] Without entering into details, in order to give a more coherent utilitarian interpretation to form (1.3) in the following we will assume that all individual weights are equal to one, i.e. $\alpha_i = 1$ for all i, so that the form reduces to the familiar utilitarian expression $\sum u_i$.

The main focus in the present paper is on the expected utility assumption in Harsanyi's aggregation theorem. It imposes that both the individuals' and the society's utility functions are linear in probabilities. Linearity in probabilities is in particular entailed by the cornerstone of expected utility, the independence axiom. It establishes that for any three lotteries P, Q, R and any number $\lambda \in (0, 1]$, lottery P is indifferent to Q if and only if the lottery obtained by the mixture $\lambda P + (1-\lambda)R$ is indifferent to the mixture $\lambda Q + (1 - \lambda)R$.

Independence: $P \sim Q \Rightarrow \lambda P + (1 - \lambda)R \sim \lambda Q + (1 - \lambda)R$.

Since the famous Allais paradox, the axiom has been often severely criticized on the descriptive ground since its often violated by people actual behaviours (Starmer, 2000). Nevertheless, it is usually maintained at level of individual utility in normative decision theories as expression of individual rationality. At societal level, on the other hand, the axiom has been considered deficient also for normative reasons.

In particular, an implication of the independence axiom, known as the betweenness property, is that the mixture lottery $\lambda P + (1 - \lambda)Q$ is always between P and Q in preference; and that if P and Q are indifferent, then $\lambda P + (1 - \lambda)Q$ is also indifferent.

Betweenness: $P \sim Q \Rightarrow \lambda P + (1 - \lambda)Q \sim P$.

Thus, the independence axiom with the implication of betweenness implies neutrality towards randomization between two indifferent lotteries. There may be however criticisms against neutrality towards randomization. At level of societal preferences, betweenness may indeed be considered to contrast with principles of fair social decisions.

[16] See Fleurbaey and Mongin (2016) for a recent contribution in the debate.

In Diamond's (1967) famous example there are two individuals equally deserving one indivisible good. A government is indifferent between two alternative policies, say A and B, of giving the good to either of the two individuals. Nevertheless, considerations of fairness may advise the society to strictly prefer a randomization based on lottery $.5A + .5B$, which gives equal chances of receiving the good to both individuals. The above example has for instance been made particularly appealing by Machina (1989) invoking the ultimate normative authority of Mom, who strictly prefers a coin flip to decide to assign a single indivisible treat to either daughter Abigail or son Benjamin.

More generally, the circumstances that make a society indifferent between two lotteries P and Q do not seem to give sufficient reasons for the society to be indifferent between any randomization of the two. Nevertheless, a weaker, but more compelling idea considered by Epstein and Segal (1992) is perhaps that the society should be at least indifferent between symmetric randomizations, as stated in the following axiom.

Mixture symmetry. The society is indifferent between any pair of lotteries P and Q, namely $V(P) = V(Q)$, if and only if it is indifferent between symmetric mixtures, that is if and only if $V(\lambda P + (1-\lambda)Q) = V((1-\lambda)P + \lambda Q)$ for any $\lambda \in (0, 1)$.

The argument for mixture symmetry is the idea that if the are reasons to consider the social claims behind two lotteries P and Q equally valid (as in the case of Abigail and Benjamin both claiming the treat with certainty), then it seems natural that the society judges as equivalent and it is therefore indifferent between any pairs of policies consisting in symmetric randomizations of P and Q, like for example according to probabilities $20\% - 80\%$ and $80\% - 20\%$, or $40\% - 60\%$ and $60\% - 40\%$. At the same time, the axiom does not necessarily impose (as betweenness does) that a randomization with probabilities $20\% - 80\%$ is also indifferent to one with probabilities $40\% - 60\%$. In fact, considerations of ex ante fairness inspired by Diamond's and others' examples suggest that the society's favor towards randomizations of form $\lambda P + (1-\lambda)Q$ increases as λ increases in the interval $(0, 0.5]$ and gets the best randomization at $\lambda = 0.5$. The argument is made explicit by Epstein and Segal (1992) in the following axiom:

Randomization preference. For each pair of lotteries P and Q that are socially indifferent, if there is at least one individual who strictly prefers P to Q and at least another who strictly prefers Q to P, then the mixture $.5P + .5Q$ is strictly socially preferred to P, that is if $V(P) = V(Q)$ with $U_i(P) > U_i(Q)$ and

$U_j(Q) > U_j(P)$ for some individuals i and j, then $V(.5P + .5Q) > V(P)$.[17]

Thus, randomization preference introduces a further criterion in addition to the Pareto principle to inform social preference with individual preferences. In particular, notice that the axiom invokes randomization as a choice criterion only when the society is indifferent between two competing claims of two or more individuals. It is not called for when all individuals are indifferent between two alternatives because in such a case no issue of fairness is involved. Nevertheless, we acknowledge that there are in the literature ever going disputes about the normative value of randomization as a criterion for social decision. We will consider some arguments of the disputes below in connection with the application of the randomization idea to the literature on social mobility. Here we go on with the more technical aspects and in particular on the following question: is there a social aggregator of the individual utilities that implies the mixture symmetry axiom, but that it is not necessarily restricted by betweenness and independence, and which further includes randomization preference as social choice criterion?

The answers to this question is very elegant on mathematical ground and it turns to be a natural extension of the utilitarian rule. It is given by the following theorem due to Epstein and Segal (1992) :

Quadratic Social Welfare Function. Suppose that individual utility U_i's satisfy the independence axiom of expected utility. Then the continuous social preference $V(P)$ on L satisfies the mixture symmetry axiom, the condition of strong Pareto (namely, if for each pair of lotteries P, Q such that $U_i(P) \geq U_i(Q)$ for all i, then $V(P) \geq V(Q)$; furthermore if there exists an individual j such that $U_j(P) > U_j(Q)$, then $V(P) > V(Q)$) and randomization preference if and only if there is a quadratic social welfare function (indicated as W_Q and defined up to ordinal equivalence) which is strictly increasing and strictly quasi-concave on domain D, that is:

$$W_Q(u_1, ..., u_I) = \sum_{i=1}^{I} \sum_{j=i}^{I} a_{ij} u_i u_j + \sum b_i u_i \tag{1.4}$$

for some constant weights $\{a_{ij}, b_i\}$, with $i, j = 1, ...I$, and $a_{ij} = a_{ji}$, which means that the matrix $|a_{ij}|$ for the terms of order two is symmetric.

As explained by Epstein and Segal (1992) , the theorem is obtained as a corollary of a representation result for models of choice under risk developed by Chew

[17]Literally, the axiom does not say that the randomization with $\lambda = .5$ between P and Q with when $V(P) = V(Q)$ and $U_i(P) \neq U_i(Q)$ for some individual i is the *best* randomization. The fact that $.5P + .5Q$ is the unique best randomisation follows from both randomisation preference and mixture symmetry invoking also the Pareto principle.

et al. (1991). That paper in particular studies the relationships between the axiom of mixture symmetry and quadratic functional forms. Among other things, it shows that whereas the quadratic functional form satisfies mixtures symmetry (as it can be readily verified), mixture symmetry does not fully characterize quadratic functional forms. This is because betweenness conforming theories, which obviously satisfy mixture symmetry, are not necessarily quadratic (Chew, 1983). For example, if in equation (1.4) all weights a_{ij} (for all i, j) are set equal 1 (and $b_i = 0$), the expression reduces to $(\sum u_i)^2$ which is ordinally equivalent to the utilitarian rule. Nevertheless, if preferences are also assumed strictly quasi-concave (or strictly quasi-convex), then mixture symmetry characterises quadratic functional forms in a more proper sense, namely they are not ordinally equivalent to betweenness conforming theories on any part of their domain. Such full characterisation is obtained in the present context through the assumption of randomisation preference implying strict quasi-concavity. Notwithstanding, we consider a virtue the flexibility of the quadratic form in equation (1.4) to choose the weights $\{a_{ij}, b_i\}$ so to reflect specific social or ethical values (possibly even in partial deviation of randomisation preferences). And in the following section we will exploit this flexibility to illustrate several concepts relevant in the context of social mobility.

Before moving to such analysis, it is finally important to emphasize that the quadratic form also realizes a full separation between attitude towards inequality and attitude towards randomisation. In particular, whereas as indicated the latter attitude is captured by the choice of the weights $\{a_{ij}, b_i\}$, the attitude towards inequality can still be captured in the model as in classical utilitarianism by the shape of von Neumann-Morgenstern utility index. For example, in case individual incomes are the only determinants of people's utility in a given social state, the model implies aversion towards inequality in the sense of aversion to a mean preserving spread whenever the individual von Neumann-Morgenstern utility index is concave.

1.4 Quadratic social welfare functions in dynastic economies

In this section we discuss the relevance of quadratic social welfare functions in an economy with dynastic lineages and consider the implication of Epstein and Segal (1992)'s theorem in the dynastic economy illustrated in Section 2. To this end we first of all recall that in a dynastic society a generic individual i is in fact denoted as h_g, where in particular $h = 1, ..., H$ identifies the dynasty which the individual belong to and where $g = w, o$ (for wellspring and offspring, respectively) identifies the individual's generation; so that, for example, h_w and h_o refer to the wellspring and the offspring of the same dynasty h; and h_w and k_o refer to the wellspring and the offspring of two different dynasties (h and k, respectively). We also recall that a typical social state $x \in X$ is given by $x = [z, y]$, where z and y are the vectors for the certain income positions of wellsprings and offsprings, respectively.

In the dynastic set-up a social welfare function W is therefore defined on domain $D \equiv \{(U_{1_w}(P), U_{1_o}(P), ..., U_{H_w}(P), U_{H_o}(P)) : P \in L\}$ and it is given by $W = (u_{1_w}, u_{1_o}, ..., u_{H_w}, u_{H_o}) \equiv V(P)$ for any $P \in L$ such that $U_{h_g}(P) = u_{h_g}$ for all $h = 1, ..., H$ and $g = w, o$. Epstein and Segal (1992)'s quadratic social welfare function is written as:

$$W_Q(u_{1_w}, u_{1_o}, ..., u_{H_w}, u_{H_o}) = \sum_{h=1}^{H}\sum_{k=1}^{H} a_{h_w k_w} u_{h_w} u_{k_w} + \sum_{h=1}^{H}\sum_{k=1}^{H} a_{h_o k_o} u_{h_o} u_{k_o} + 2\left(\sum_{k=1}^{H} a_{h_w h_o} u_{h_w} u_{h_o} + \sum_{h \neq k} a_{h_w k_o} u_{h_w} u_{k_o}\right) + \sum_{h=1}^{H} b_{h_w} u_{h_w} + \sum_{h=1}^{H} b_{h_o} u_{h_o} \tag{1.5}$$

where $\{b_{h_g}\}$ (for $g = w, o$) are the constants multiplying the utility terms of order one for the two generations and where the weights for the terms of order two are distinguished in: the weights $\{a_{h_w k_w}\}$ for the utility products of the wellspring's generation; the weights $\{a_{h_o k_o}\}$ for the utility products of the offspring's generation; the weights $\{a_{h_w h_o}\}$ for the cross-generations utility products within-dynasty; and the weights $\{a_{h_w k_o}\}$ with $h \neq k$ for the cross-generations utility products between-dynasty. Notice that in form (1.5), the summations for latter two products are multiplied by 2 given the symmetry $a_{ij} = a_{ji}$.

As implied by the original theorem, the model identifies the class of quadratic social welfare function as the natural extension to amend weighted utilitarianism with considerations of fairness and justice in the dynastic society. Precisely which fairness and justice considerations, however, depend on the ethical weights. These are left partially unspecified by Epstein and Segal's (1992) representation theorem, in the sense that according to the theorem they need only to satisfy the restriction that the quadratic form has to be strictly quasi-concave on domain D.[18]

[18] Sufficient conditions for the quasi-concavity of W_Q on D can for example be looked for by checking for the negative semi-definiteness of the matrix $|a_{ij}|$ of the second order terms. Such conditions may be too restrictive or complicated to verify in some cases. A simple condition used by Epstein and Segal (1992) and below, holding when the individual utility functions are non negative (which does not imply negative semi-definiteness of $|a_{ij}|$), is that all the elements $\{a_{ii}\}$ on the main diagonal of $|a_{ij}|$ are less than 1, while all the off-diagonal elements $\{a_{ij}\}$ are equal or greater than 1.

We now discuss various possible choices of the ethical weights that highlight the great flexibility of the quadratic form to permit to implement several ideas discussed in the literature on social mobility. For the analysis we consider a natural specialization of the quadratic form in a dynastic economy which either treats symmetrically all individuals or allows for an asymmetric treatment only to the extent that individuals belong to dynasties with different income profiles. It is specified as:

$$\hat{W}_Q(u_{1_w}, u_{1_o}, ..., u_{H_w}, u_{H_o}) = a\left(\sum_{h=1}^{H} u_{h_w}^2 + \sum_{h=1}^{H} u_{h_o}^2\right) + \sum_{k\neq h}^{H} u_{h_w}u_{k_w} + \sum_{k\neq h}^{H} u_{h_o}u_{k_o} + 2\left(c_W\sum_{h=1}^{H} u_{h_w}u_{h_o} + c_B\sum_{h\neq k}^{H} u_{h_w}u_{k_o}\right) \tag{1.6}$$

with restrictions $0 \leq a \leq 1$, $c_W \geq 1$ and $c_B \geq 1$. In particular, the specialization uses (in addition to $b_i = 0$ for all i [19]): 1) $a = a_{h_wh_w} = a_{h_oh_o}$ for all h, that is all the weights on the main diagonal of $|a_{ij}|$ are equal to the constant $a \in [0, 1]$; 2) $1 = a_{h_wk_w} = a_{h_ok_o}$ for all $h \neq k$, that is all weights applying to the cross utility products within both generations are equal 1; 3) $c_W = a_{h_wh_o}$ for all h and $c_B = a_{h_wk_o}$ for all $h \neq k$, that is all the within-dynasty weights $\{a_{h_wh_o}\}$ and all the between-dynasty weights $\{a_{h_wk_o}\}$ are equal to the constants c_W and c_B, respectively, both equal or greater than 1.

The specification, which we refer to as the dynastically symmetric quadratic social welfare function, is a slight modification of a model considered by Epstein and Segal (1992).[20] As indicated in footnote 18, under the restrictions $0 \leq a < 1$, $c_W \geq 1$ and $c_B \geq 1$ (and assuming without loss of generality that the individual von Neumann-Morgenstern utility functions take only positive values), the above specification is strictly quasi-concave on all its domain D. When $a = 1$, it can be linear on some sub-space of D. As we shall see, such a case can also be interesting to analyze some benchmark preferences in a dynastic economy.

[19] This condition does not affect the social preferences ordering implied by W_Q. In fact, assuming $b_{h_w} = b_{h_o}$, $\sum_{h=1}^{H} b_{h_w}u_{h_w} + \sum_{h=1}^{H} b_{h_o}u_{h_o}$ is a linear aggregation of individuals' utility that does not depend on the probabilities vector P associated to the social states X.

[20] The actual model considered by Epstein and Segal (1992) for the one-generation set-up, takes the main diagonal elements less than one and all the diagonal elements equal to 1. As we shall see, such a specification treats symmetrically all individuals. As indicated, in the present dynastic set-up we want to leave the possibility to treat asymmetrically the individuals depending on the dynasty.

1.5 The dynastically symmetric quadratic social welfare function

In order to illustrate the implications for social mobility of the dynastically symmetric quadratic welfare function (1.6) it is useful to refer to the probability simplex over the three pure social sates $\{e^I, e^R, e^O\}$ discussed above. We in particular recall that in the simplex the lotteries e^I and e^R correspond respectively to the social states of immobility and reversal in societies where half of the population in each generation is rich and half is poor; and where e^O is a society with the same marginal incomes distributions as e^I and e^R for the wellsprings, but where all offsprings obtain the same high income. We also recall that the low and high levels of income for the wellsprings and the offsprings generation are denoted as (z_l, z_h) and (y_l, y_h), respectively.

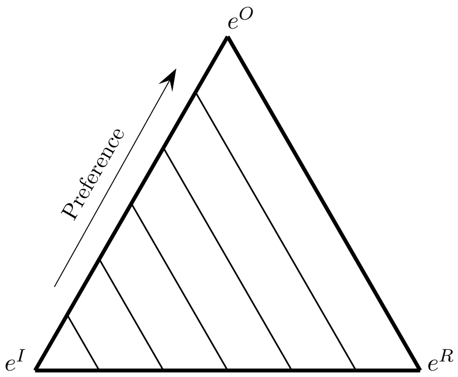
The simplex is reproduced in the two panels of Figure 1.3 with the indifference curves of the offsprings, distinguished between those with poor wellsprings and those with rich wellsprings: in panel 1.3.A the curves of the former offsprings and in panel 1.3.B the curves of the latter. The curves are based on expected utility which, as it is well known, implies linear and parallel indifference curves in a probability simplex. The directions of preference is however opposite for the offsprings in the two types of dynasties.[21] This follows from the fact that offsprings with poor wellsprings maintain the low income y_l in the immobile state e^I and receive the high income y_h in the state of reversal e^R; while offsprings with rich wellsprings receive high income y_h in state e^I and low income y_l in state e^R.

Differently from the offsprings, the expected utility of the wellsprings do not depend on which social state obtains. This is because at any lottery P of the simplex, half of the wellsprings receive income z_l with certainty and the other half receive income z_h with certainty. Thus their expected utility ($U_{h_w}(P) = u(z_l)$ and $U_{h_w}(P) = u(z_h)$, respectively) is constant in the simplex.

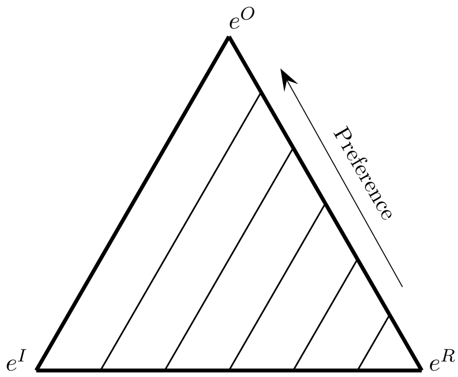
We now consider the social preference predicted in the simplex by the welfare function (1.5) depending on the weights $\{a, c_W, c_B\}$. The derivations of the curves make direct use of two general properties of the quadratic welfare functions. The first property is the symmetry of the indifference curves passing for the two lotteries P and Q around the unique best randomisation $.5P + .5Q$. The second property is an intuitive form of parallelism of the indifference surfaces implied by the quadratic form. In the simplex such parallelism in particular entails that all indifference

[21] In particular, at any lottery $P = (p_I, p_R, p_o)$ of the simplex, the expected utility of all offsprings h_o with poor wellsprings is given by: $U_{h_o}(P) = p_I u(y_l) + p_R u(y_h) + p_O u(y_h)$; and the expected utility of all offsprings h_o with rich wellsprings is given by $U_{h_o}(P) = p_I u(y_h) + p_R u(y_l) + p_O u(y_h)$. Thus, the former offsprings are indifferent between e^R and e^O, which are strictly preferred to e^I and any other lottery; whereas the latter offsprings are indifferent between e^I and e^O, which are preferred to any other lottery.

Figure 1.3: Offsprings' preferences in simplex $\{e^I, e^R, e^O\}$



1.3.A) Offsprings with poor wellsprings



1.3.B) Offsprings with rich wellsprings

curves can be obtained as parallel displacements of one another along expansions paths which go through the midpoints of the chords joining any two points on the indifference curves. Both implications are derived in the setting of risky lotteries by Chew et al. (1991). They are very appealing properties which among other things imply that knowing the form of the indifference curves along the lower edge of the simplex allow to know the indifference curves in the whole simplex.[22]In appendix we also derive the same predictions with attentions to income transition matrices in order to enlighten the similarity with concepts more commonly used used in the literature on social mobility.

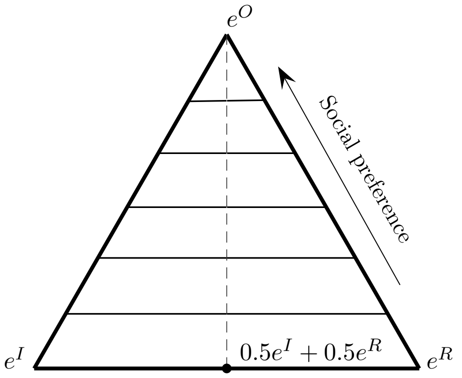
The predictions are derived with attention to the differences with respect to the benchmark theory of classical utilitarianism.

Utilitarianism ($a = c_W = c_B = 1$)

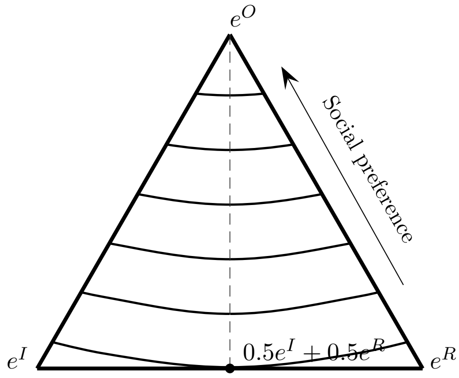
Utilitarianism is ordinally equivalent to a quadratic social welfare function in which all weights $\{a_{ij}\}$ for the terms of order 2 are equal. In equation (1.6) this corresponds to the case in which $a = c_W = c_B = 1$. It implies additively separable (that is, linear) social preference with a symmetric treatment of all individuals. In simplex $\{e^I, e^R, e^O\}$ utilitarianism sums the indifference curves of the offsprings from panels 1.3.A and 1.3.B with equal weights. Thus, the social indifference curves are parallel straight lines, with indifference between immobility e^I and reversal e^R and any other lottery in between, namely on chord $\lambda e^I + (1 - \lambda)e^R$. Indifference increase towards the Pareto superior social state e^O. Thus, as long recognized in the literature (see e.g. Markandya, 1982), the society is indifferent to

[22]In the general setting of quadratic functions for lotteries, though, the parallelism property holds only in the region of the simplex in which preferences are strictly quasi-concave (or quasi-convex) (Chew et al., 1991, Lemma A2.2.). .

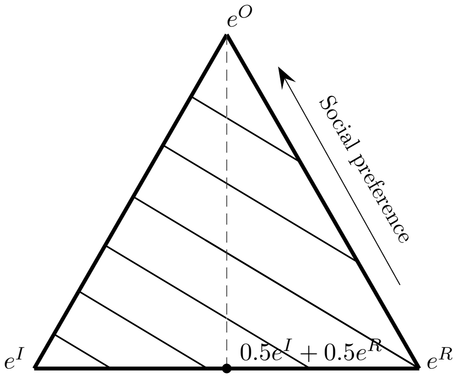
Figure 1.4: The quadratic social welfare function in simplex $\{e^I, e^R, e^O\}$



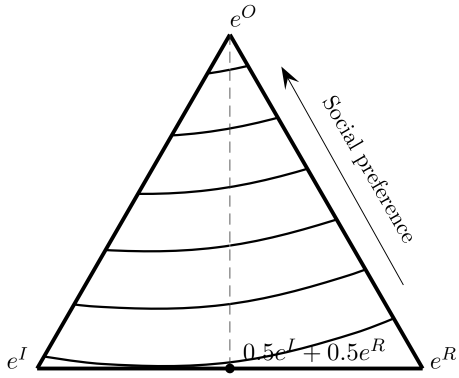
1.4.A) Utilitarianism ($a = c_W = c_B = 1$)



1.4.B) Preference for origin independence ($a < 1, c_W = c_B = 1$)



1.4.C) Preference for reversal ($a = 1, c_W = 1, c_B > 1$)



1.4.D) Preference with randomisation when reversal and immobility are not indifferent ($a < 1, c_W \neq c_B$)

exchange mobility, in the simplex corresponding to horizontal movements which do not change the marginal distributions of offsprings, while it values vertical movements corresponding to improvements in the sense of structural mobility.

Preference for origin independence ($a < 1, c_W = c_B = 1$)

As indicated, utilitarianism has been criticized by several authors in various contexts since it does not care to the process by which people are allocated to social states. It is argued that a fair society should instead give fair chances and provide equal opportunities to all individuals. In a dynastic society in which family background can play a pivotal role in affecting people's economic success, this idea of equality of opportunity is often interpreted to correspond to origin independence (Shorrocks, 1978b). This because under origin independence all individuals have the same chances to access any income position.

Preference for origin independence is obtained by a quadratic social welfare function which retains strict quasi-concavity and treats symmetrically all individuals and all dynasties. This holds in the dynastic specialization (1.6) when $0 \leq a < 1$ and $c_W = c_B = 1$. In fact, in such a case, given the symmetric treatment of all individuals, as under utilitarianism the society is indifferent between the case of immobility e^I and of reversal e^R where the distributions of expected utilities are the same. Moreover, since the quadratic form, the society is also indifferent between the symmetric mixtures $\lambda e^I + (1-\lambda)e^R$ and $(1-\lambda)e^I + \lambda e^R$ (similarly also to utilitarianism). However, given strict quasi-concavity and differently from utilitarianism, the society is willing to randomize between indifferent lotteries, with the most preferred randomization when $\lambda = 0.5$. This is shown in the simplex of Figure 1.4.B, with parallel indifference curves increasing in the direction of e^O.

Preference for reversal versus immobility and Atkinson's diagonalizing switches ($a = 1$, and $1 \leq c_w \neq c_b \geq 1$)

Both utilitarianism and origin independence treats symmetrically all individuals, irrespective of the dynasty they belong to. Starting with Atkinson (1981), on the other hand, various scholars have developed approaches which value individuals' incomes also taking into account the dynasties' income profiles. This can be done by defining an utility index on the whole income profile of a dynasty, for example and index $u([z, y]_h)$ for a dynasty h in which wellspring has income z and offspring has income y (Atkinson 1981; Atkinson and Bourguignon 1982; Markandya 1982) or by an approach which breaks symmetry by weighting differently individuals' utilities depending on the dynasty they belong to (Dardanoni, 1993). Moreover, often these approaches tend to value reversal which is viewed as a way to restate economic equality between dynasties. On the contrary, when reversal is considered creating too much income fluctuations within dynasties, immobility may be preferred to reversal. As also previously indicated, in societies with bistochastic mobility matrices, preference for reversal versus preference for immobility correspond to two opposite attitudes towards the so called Atkinson's (1981) diagonalizing switches.

In quadratic form (1.6) preferences for reversal of immobility is obtained by imposing $a = 1$ and both $c_W \geq 1$ and $c_B \geq 1$, but not equal, so that either $c_B > c_W \geq 1$ or $c_W > c_B \geq 1$. In particular, when $c_B > c_W$ society values more between dynasties inequality than income fluctuations within dynasties, so that it likes reversal and dislikes diagonalizing switches; the opposite when $c_W > c_B$. To see this, we note that under the restriction $a = 1$, the quadratic form (1.6) becomes:

$$W^S(u_{1_w}, u_{1_o}, ..., u_{H_w}, u_{H_o}) = \left(\sum_{h=1}^{H} u_{h_w}\right)^2 + \left(\sum_{h=1}^{H} u_{h_o}\right)^2 + \\ + 2\left[c_W \sum_{h=1}^{H} u_{h_w}u_{h_o} + c_B \sum_{h\neq k}^{H} u_{h_w}u_{k_o}\right] \quad (1.7)$$

It is in particular given by the sum of two squared additive (utilitarian) terms $(\sum u_{h_w})^2$ and $(\sum u_{h_o})^2$ for the utilities of the individuals of the two generations plus the sums of the cross generation utility products distinguished between the within $\{u_{h_w}u_{h_o}\}$ and between $\{u_{h_w}u_{k_o}\}$ dynasties products. This among other things implies that when the marginal income distribution of wellsprings is fixed (as in simplex $\{e^I, e^R, e^O\}$), the wellsprings' utility terms u_{h_w} acts as constant weights in both the cross generation utility products, within-dynasties $\{u_{h_w}u_{h_o}\}$ and between-dynasties $\{u_{h_w}u_{k_o}\}$. So the specification entails that when $c_W > c_B$, in order to maximize welfare it is necessary to increase the value of the sum of the within-dynasty products $\{u_{h_w}u_{h_o}\}$ rather than the sum of the between-dynasty products $\{u_{h_w}u_{k_o}\}$. The opposite when $c_B > c_W$. But increasing the sum of the within-dynasty utility products rather than that of the between-dynasty utility products is clearly equivalent to make the society more immobile, that is to make diagonalizing switches; whereas increasing the sum of the between-dynasty products is equivalent to make the society more mobile. For example, with respect to simplex $\{e^I, e^R, e^O\}$, this means that the social welfare function (1.7) implies that e^I is socially preferred to e^R when $c_W > c_B$, whereas e^R is socially preferred to e^I when $c_B > c_W$ (Figure 1.4 show the second case).

Preference for randomisation when reversal and immobility are not indifferent ($a < 1$, and $1 \leq c_W \neq c_B \geq 1$)

The concept of diagonalizing switches and the quadratic social welfare function (1.7), rather than with stochastic independence, are concerned with an idea of mobility as income movements. Indeed, when $1 \leq c_w \neq c_b \geq 1$ and $a = 1$, the function (1.7) is linear in the simplex $\{e^I, e^R, e^O\}$. It becomes again strictly quasi-concave when the weight for the own utility products returns to be less than 1, namely $a < 1$. In particular, in such a case, the direction of the inequality between c_W and c_B still determines whether the society prefers more immobility or more reversal (according to $c_W > c_B$ or to $c_B > c_W$), but there is also some preference for randomization.

There may be various reasons for the society to have preference for randomization and $c_W \neq c_B$. For example, when $c_B > c_W \geq 1$ and $a < 1$, a society may maintain a preference to reduce income inequality between dynasties, but not to the point of imposing a complete reversal of income positions between wellspring and offspring in the dynasties. Likewise, when $c_W > c_B \geq 1$ and $a < 1$, a society may be averse to large income fluctuations within the dynasties, but it also maintains a concern for some movements between wellsprings and offsprings. Clearly, in the simplex, the former case means that full reversal e^R is better than immobility e^I, but not necessarily better than any lottery $\lambda e^I + (1-\lambda)e^R$ for all $\lambda \in (0,1)$. And, symmetrically in the second case, e^I is preferred to e^R, but not necessarily better than any $\lambda e^I + (1-\lambda)e^R$ for all $\lambda \in (0,1)$. Moreover, given mixture symmetry and preference for randomization, in both cases there may be an optimal $\lambda^* \in (0,1)$ such that the randomisation $\lambda^* e^I + (1-\lambda^*)e^R$ is better than any other randomisation $\lambda e^I + (1-\lambda)e^R$. However, given that immobility e^I and reversal e^R are not indifferent, the optimal randomization between e^I and e^R will be different from the midpoint on the chord $\lambda e^I + (1-\lambda)e^R$. But it will the midpoint of the chord joining some other pair of lotteries. Or, put differently, the optimal point on chord $\lambda e^I + (1-\lambda)e^R$ will be different from the case of origin independence where $\lambda = 0.5$. In fact, it will be with $\lambda^* < 0.5$ when e^I is preferred to e^R and with $\lambda^* > 0.5$ when e^R is better than e^I (see Figure 1.4.D for the first case).

An optimal level of $\lambda \neq 0.5$ different from of origin independence and, hence, a justification for choosing ethical weights $c_W \neq c_B$ with $a < 1$, can also be explained with reasons more deeply rooted in the definition of fairness and equality of opportunity. Indeed, as previously noted, in the literature debating on the exact meaning of equality of opportunity, an important issue concerns how to deal with different circumstances and forms of luck that can affect people's attainment of social positions. For example, in a recent article Ferreira and Peragine (2015) review different kinds of luck considered in the literature and distinguish between forms of luck that society should compensate and correct for, in the sense that they should not affect people's chances in life, and forms of luck which instead should not be corrected for, even when they affect people' life chances. Among the former are forms of luck arising from people social background and social characteristics like race, religion, color, gender, family origin. Among the latter are forms of luck related to inborn characteristics such as ability and talent, which are also called genetic luck.

The two types of luck should be considered when deciding the optimal level of (ex ante) association between wellsprings' and offsprings' social positions and, from here, the ethical weights in the quadratic social welfare function. Consider for example a society in which genetic luck is distributed fully random among the population, including between the wellspring and the offspring of the same dynasties. In this case there seems to be no reason to deviate from a policy aimed at origin independence, namely making stochastically independent the life chances between wellsprings and offsprings, which requires $a < 1$ with $c_W = c_B$ in the quadratic social welfare function. As an alternative example, suppose that talent is instead genetically transmitted from wellsprings to offsprings. The ethical recommendation of not correcting for genetic luck in this case would then suggest to deviate from origin independence and to choose ethical weights in a way that the chances for an individual to access to the different economic positions are consistent with the genetic probabilities to receive the various levels of talent.

This can be done with the quadratic welfare function. For instance, suppose that in the society where half of the population in each generation is rich and half is poor, there are also two levels of talent, high and low, and that with a genetic probability p a wellspring transmits the same talent to her offspring and with probability $(1 - p)$ transmits a different talent. Then, if one believes that economic positions in society should be determined by people talent, so that, from an ex ante perspective, better opportunities should go to people with chances of better talent, it follows that the probability of each offspring to maintain the class of her wellspring must be equal p and the probability to move to a different class must be equal $1 - p$. Consistently with this, an optimal policy should also work to implement an optimal level of randomization equals to $\lambda^* = q$, different from 0.5 and which requires weights $c_W \neq c_B$. In fact, it is shown in appendix that the ethical weights in this case must satisfy the relationships $p = 0.5\left[1 - \frac{c_W - c_B}{a-1}\right]$ and $a < 1$.

1.6 Further issues and concluding remark

In the previous sections we have considered the implications of the quadratic welfare function for social mobility focussing on situations suitable to be represented in the probability simplex. This has been useful to discuss various matters about modeling social preferences for social mobility most commonly considered in the literature. Nevertheless there are other relevant issues that deserve attention.

In general, the probability simplex has two main limitations that need to be considered. First of all, all lotteries in the probability simplex assume the same marginal income distributions of the wellsprings. Thus, one can wonder which are the implications of the quadratic welfare function when there is a change in the wellsprings' marginal income distribution. Secondly, implicit in the use of the simplex it is the assumption that the conditional probability induced by a social state lottery that the offspring of a given social class remains in the same class or moves to a different one is the same for all the offsprings of the same class. Effectively this is the assumption that the conditional probabilities of people moving between social classes are independent across individuals. We also recall that the assumption underlies the approaches to social mobility which take as object of analyses the income transition matrices. In this sense, the question which arises when one abandons the assumption concerns the implication of the quadratic social welfare function for evaluating two social state lotteries which generate the same income transition matrix.

The answers to both questions are in a sense straightforward and follow from the fact that Epstein and Segal's quadratic social welfare functions are defined on the same general set-up offered by the notion of Harsanyi's social state lotteries. Specifically, the notion and the derivation of the quadratic social welfare function do not restrict in any way the types of social lotteries one can consider. Thus, if for example a social state lottery P also involves some uncertainty for the wellsprings and if such social state uncertainty for wellspring h_w comes in the form of a lottery that gives income z_i with probability $p^m_{ih_w}$ when state x^m occurs, then the expected utility of the offsprings can be calculated (as $U_{h_w}(P) = \sum_{m=1}^{M} p^m_{ih_w} u(z_i)$) and included in the quadratic social welfare function (1.4) together with any other expected utility obtained by the offsprings in the same social state (i.e. $U_{h_o}(P) = \sum_{m=1}^{M} p^m_{ih_o} u(z_i)$).

Likewise, the application of the quadratic social welfare function to social state lotteries which violate the assumption that transition probabilities are independent across individuals is equally straightforward, but nonetheless instructive. To this end, consider the two social situations $0.5e^I + 0.5e^R$ and $e^{.5I+.5R}$ previously anticipated. Recall that the former corresponds to the case of origin independence, namely a non degenerate lottery where the chances for the offsprings of becoming rich or poor are equal across all individuals; whereas the second lottery is a degenerate lottery for a society in which half of the dynasties are immobile and half reverse. Obviously the expected utility of the offsprings are different in the two situations and whether the quadratic welfare function values more $0.5e^I + 0.5e^R$ or $e^{.5I+.5R}$ depends on the ethical weights. For example, it should be straightforward that with the dynastically symmetric specialization (1.6) the two situations are indifferent only when $a = c_W = c_B = 1$; when instead $a < 1$ and $c_W = c_B = 1$, the society $0.5e^I + 0.5e^R$ with origin independence is obviously better.

We also remark that despite of the clear intuition of the above predictions, several theories developed in the field of social mobility may have difficulty to distinguish the two cases. This is simply because most of the developments are based on the notion of income transition matrices which tend to impose the assumption of transition independence. More generally, by aggregating individuals in income classes, standard transition matrices make it difficult to keep trace of all the different circumstances that can affect people's opportunities in life. As we have emphasized, this is instead allowed by Harsanyi's notion of social state lottery, since each social state $x \in X$ is in fact to provide an exhaustive description of the situation of each agent in the economy.

In this paper we have focussed on family economic background and on the possibility to correct for family background when choosing a policy influencing people's life chances, but other circumstances can affect people's success in life, like gender, ethnicity, places of birth and the like, which could be equally included in a more exhaustive description of the situation of the agents in the economy. It is in this sense somehow ironic that notwithstanding this potential, Harsanyi's construction has been criticized when deriving a social welfare ranking of the social states precisely because of ignoring the different circumstances that can affect people's life chances. But this is due to the expected utility rule used by Harsanyi to aggregate individual utilities in the welfare rankings. We believe that the extension proposed by Epstein and Segal (1992) to use instead a quadratic welfare function gives the possibly to exploit the full potential of Harsanyi's construals also in the context of dynastic societies.

Chapter 2

Social Preferences for mobility: an experimental questionnaire

Abstract

In this paper we develop an experimental questionnaire to analyse people's social concern for different mobility dimensions. We consider two mobility scenarios: the wealth evolution among generations and periods. Moreover, we test whether people's social preferences change conditional to different sources of wealth inequality among generations (periods). We find that equality of opportunities in the mobility process has high social value in both mobility scenarios. However, people are not willing to tolerate high wealth inequality and fluctuation among generations (periods) in order to achieve equality of opportunities. Finally, the source of wealth inequality seems to affect differently people preferences for mobility in the two mobility scenarios.

Keywords: Intergenerational Mobility, Intragenerational Mobility, Welfare Evaluation, Experimental Questionnaire.

JEL Classification: D63, J62, C91, I30

2.1 Introduction

We can define "mobility" as the evolution of individuals' economic status over time. It represents an issue of great relevance both of economic literature and public debate. As pointed out by Friedman (1962): "consider two societies that have the same annual distribution of income. In one there is great mobility and change so that the position of particular families in the income hierarchy varies widely from year to year. In the other there is great rigidity so that each family stays in the same position year after year. The one kind of inequality is a sign of dynamic change, social mobility, equality of opportunity; the other, of a status society".

A first important distinction in the mobility analysis is the period of time over which the wealth evolution is valued. On the one hand, there is individuals' wealth evolution between one period and another during their lifetime; on the other hand there is individuals' wealth evolution between generations. The former defines the intragenerational mobility, while the latter points out the intergenerational one.

In the intergenerational mobility scenario, greater mobility in terms of low association between one generation and another is usually denoted as an important social goal. Indeed, as emphasized by Shorrocks (1978): "interest in mobility is not only concerned with movement but also predictability-the extent to which future positions are dictated by the current place in the distribution".

Following this approach, equality of opportunities is socially desirable because it does not predetermine the wealth evolution among generations. In this perspective, only people's ability and effort should determine their fortune rather than their parents' wealth position.

Roemer (1998) points out the normative consequences of this fair concept of the intergenerational mobility process. In his view the society should "levels the playing field" among individuals who compete for a position in order to bring out their abilities.

However, the normative implication of equality of opportunities may be controversial. Swift (2006) emphasizes the possible "radical" interpretation of equality of opportunities. In this view differences in the wealth distribution due to innate ability are view as unfair because they might be partially genetically inherited.

In the intragenerational mobility scenario, equality of opportunities among periods may be less socially significant. Indeed, considering one generation, the wealth distribution is likely to be determined by people's skills. Therefore, as long as these abilities persist over time the social value of low wealth association among periods may be less socially relevant.

In this perspective, the principal aim of the intragenerational mobility process is to decrease the wealth inequality in the long-run. This point was emphasized clearly by the former chairman of President Obama Council of Economic Advisor

A. Krueger (2012):"higher income inequality would be less of a concern if low-income earners became high-income earners at some point in their career, or if children of low-income parents had a good chance of climbing up the income scales when they grow up. In other words, if we had a high degree of income mobility we would be less concerned about the degree of inequality in any given year".

However, great mobility among periods determines high people's wealth fluctuation during their lifetime. Therefore, in this scenario, high mobility may be not socially desirable as it implies unpredictability and economic insecurity.

To sum up, a society characterized by great mobility is usually denoted as an important social aim. However, the social consequences of high levels of mobility may be controversial.

In this paper we present a questionnaire experiment about people's social concern for mobility. We are interesting in question like: do people value mobility? Has equality of opportunities the same social relevance in the intragenerational and intergenerational mobility scenario? Do different sources of wealth inequality affect people's preferences for mobility?

2.2 The different dimensions of mobility

Wealth evolution over time represents a very multifaceted concept that embodies different dimensions. Accordingly, we first provide a formal representation of the mobility process.

Consider a society characterized by two generations: parents and kids.

Let Z and Y represent parents' and kids' wealth distributions respectively. We describe the intergenerational mobility of a society as the joint distribution of the random variables Z and Y.

Next, assume that within each generation the wealth status (class) can take only two values: z_l and z_h for parents and y_l and y_h for kids. The sub-script l stands for low wealth, while h stands for high wealth. We use wealth as the pertinent socio-economic indicator [1].

We can summarize the intergenerational mobility of this society by a mobility

[1] Usually the economic literature uses income as pertinent socio-economic indicator. However, in our questionnaire experiment individuals' economic status is defined by their own wealth. This is because given our mobility representation in the questionnaire, wealth may represent a more comprehensive and intuitive measures of social mobility for the questionnaire's participants, especially when intergenerational mobility is considered

table (Table 2.1).

	y_l	y_h	Parents' m. d.
z_l	p_{ll}	p_{lh}	$p_{ll} + p_{lh} = p_{l.}$
z_h	p_{hl}	p_{hh}	$p_{ll} + p_{lh} = p_{h.}$
Kids' m. d.	$p_{ll} + p_{hl} = p_{.l}$	$p_{lh} + p_{hh} = p_{.h}$	

Table 2.1: 2 x 2 mobility table

In Table 2.1, p_{ij} represents the relative frequencies of families in the society with parents belonging to wealth status i and kids belonging to wealth status j, with $i, j = \{h, l\}$. Furthermore, given the low of large number, p_{ij} can also be view as an estimate of the chance of transition from wealth status i to j between the two generations.

The row sums, $p_{i.}$ points out parents' relative frequencies of wealth class i, while the column sums, $p_{.j}$ represents kids' relative frequencies of wealth class j. Moreover, $p_{i.}$ can be view as parents' chances to be in wealth class i, while $p_{.j}$ as kids' chance to be in wealth class j. Finally, $\sum_i p_{i.} = \sum_j p_{.j} = 1$.

Mobility representation in Table 2.1 is particularly meaningful because it allows to disentangle two important dimensions of the mobility process: how the wealth is distributed among generations as well as families' chances of interchange their wealth classes among generations.

A different way of representing mobility is provided by transition probability matrices (mobility matrices). In our set-up (Table 2.1), the corresponding transition probability matrix (Table 2.2) is obtained dividing the value of each cell (p_{ij}) by the row sum $(p_{i.})$. The resulting value $\pi_{ij} = p_{ij}/p_{i.}$ represents the relative frequencies of kids in wealth class j conditional to parents' wealth class i. Therefore, π_{ij} can be view as an estimate of the conditional probabilities of kids with parents in class i to move to class j.

	y_l	y_h
z_l	π_{ll}	π_{lh}
z_h	π_{hl}	π_{hh}

Table 2.2: 2 x 2 mobility matrix

Focusing on wealth distribution among generations, the mobility process in Table 2.2 does not explicitly illustrate the values of $p_{i.}$ and $p_{.j}$. However, the mobility analysis by mobility matrices usually assumes that the wealth is equally

	y_l	y_h	P. m. d.
z_l	0.25	0.25	0.5
z_h	0.25	0.25	0.5
K. m. d.	0.5	0.5	

(a) 2x2 mobility table

	y_l	y_h
z_l	0.5	0.5
z_h	0.5	0.5

(b) 2x2 mobility matrix

Table 2.3: mobility representations

distributed among generations. That is, $p_{i.} = p_{.j} = 0.5$.

Table 2.3 shows both mobility representations considering a simple example. In both societies (Tables 2.3a and 2.3b) each kid has the same chances of becoming rich or poor independently from their parents' wealth status. Moreover, Table 2.3(a) emphasizes the transition probabilities between wealth classes ($p_{ij} = 0.25$) given the wealth distribution between the two generations ($p_{i.} = p_{.j} = 0.5$). Conversely, Table 2.3(b) highlights the same transition probabilities ($\pi_{ij} = 0.5$) conditional to the wealth distributions between the two generations ($p_{i.} = p_{.j} = 0.5$).

Mobility tables and matrices are the most widely ways used in the literature to represent the transition probabilities among wealth status in the mobility process. Nevertheless, both mobility representations are based on the observed relative frequencies of individuals in each cell of Tables 2.1 and 2.2, p_{ij} and π_{ij}, respectively. Indeed, p_{hh} (π_{hh}) represents the fraction of families with parents and kids who belong to high wealth class, while p_{ll} (π_{ll}) denotes the fraction of families with parents and kids who belong to low wealth class. The same holds for p_{lh} (π_{lh}) and p_{hl} (π_{hl}). Then, given the law of large number, these fractions are interpreted as probabilities and the associated table (matrix) as mobility table (mobility matrix).

Thereby, probabilities of transition between wealth classes derive from ex post distribution of wealth: the observed one. However, the latter does not fully provide informations about ex ante individuals' opportunities in the mobility process.

In order to clarify properly the relevance of this point consider Societies A and B shown in Tables 2.4(a) and 2.4(b), respectively . Both societies are composed by two generations: parents and kids. Moreover, in both cases parents' wealth distribution consists of one wealth class (the poor), while kids' wealth distribution consists of two wealth classes (the rich and the poor). Finally, in societies A and B there are only two families: M and N.

Societies A and B differ in terms of (ex ante) kids' opportunities in the mobility process. In society A kids who belong to family M become rich for sure, while kids who belong to family N remain poor. Vice versa, in society B each kid has the same chances of becoming rich or poor independently from his family.

In terms of (ex post) mobility process (Table 2.4c), societies A and B are characterized by the same transition probabilities between wealth classes. Specifically,

	y_l	y_h	P. m. d.
z_l^M	0	0.5	0.5
z_l^N	0.5	0	0.5
K. m. d.	0.5	0.5	

(a) Society A ex ante opportunities

	y_l	y_h	P. m. d.
z_l^M	0.25	0.25	0.5
z_l^N	0.25	0.25	0.5
K. m. d.	0.5	0.5	

(b) Society B ex ante opportunities

	y_l	y_h	P. m. d.
z_l	0.5	0.5	1
z_h	0	0	0
K. m. d.	0.5	0.5	

(c) Societies A, B ex post transition probabilities

Table 2.4

the observed frequency of families with poor parents and rich kids is exactly the same in the two societies. In the same way, the observed frequencies of families with poor parents and poor kids is still the same in societies A and B. Indeed, in both societies, half of the population consists of families with poor parents and rich kids, while the remaining half consists of poor parents and poor kids.

Nevertheless, in society A the fraction of families with poor parents and rich kids belongs entirely to family M, while the fraction of families with poor parents and poor kids belongs entirely to family N. Vice versa, in society B the fraction of families with poor parents and rich kids as well as the fraction of families with poor parents and poor kids belong in equal proportion to families M and N.

Societies A and B determine different ex ante kids' wealth opportunities in the mobility process. However, they are characterized by the same ex post kids' transition probabilities between wealth classes. Accordingly, the difference between ex-ante and ex post mobility analysis may be relevant in terms of mobility evaluation. Indeed, the same (ex post) transition probabilities between wealth classes may result from different (ex ante) wealth opportunities.

Moving from mobility representations to mobility measures, many scholars have emphasized the relevance of two different aspects of the mobility process: structural mobility and exchange mobility (Markandya, 1982; Fields & Ok 1999; Jantti & Jenkins, 2015).

Structural mobility deals with variations between parents' and kids' wealth marginal distributions: $p_{i.}$ and $p_{j.}$. These variations include both changes of wealth supports between generations and changes of the relative frequencies in each support. In both cases, structural mobility determines variations of the entire economy such as economic growth or economic decline. Conversely, exchange mobility measures families' chances of interchange their wealth status in the mobility process,

	y_l	y_h	P. m. d.
z_l	0.15	0.35	0.5
z_h	0.15	0.35	0.5
K. m. d.	0.3	0.7	

(a) Society A: economic growth

	y_l	y_h	P. m. d.
z_l	0.25	0.25	0.5
z_h	0.25	0.25	0.5
K. m. d.	0.5	0.5	

(b) Society B: no structural mobility

Table 2.5: two societies with different levels of structural mobility

p_{ij} (π_{ij}), fixed parents' and kids' wealth distributions.

Table 2.5 shows two societies in which wealth supports do not change between parents' and kids' generation. Indeed, in both cases $y_j = z_i$ for all $i, j = \{h, l\}$. Nevertheless, Society A (Table 2.5a) consists of economic growth. In fact, the relative frequency of individuals in the high wealth status increases between parents' and kids' generations. That is, $p_{.h} = 0.5$ and $p_{h.} = 0.7$. Conversely, Table 2.5(b) shows a society in which both wealth supports and individuals' proportion in each support remain constant in the mobility process. Furthermore, mobility processes shown in Tables 2.5(a) and 2.5(b) determine different probabilities of transition between wealth classes. Indeed, the values of p_{ij} are different for all $i, j = \{l, h\}$ in Societies A and B of Table 2.4.

Table 2.6 shows three exchange mobility levels: Perfect Immobility (Table 2.6a), Complete Reverse (Table 2.6b) and Stochastic Independence (Table 2.6 c).

Perfect Immobility represents a society in which kids who belong to rich families remain rich, while kids who belong to poor families remain poor. That is, $p_{lh} = p_{hl} = 0$.

Complete Reverse determines a society in which kids who belong to rich families become poor, while kids who belong to poor families become rich. That is, $p_{ll} = p_{hh} = 0$.

Finally, Stochastic Independence means that each kid has the same chances of becoming rich or poor independently from their parents' wealth class. This condition implies: $\frac{p_{ij}}{p_{i.}} = p_{.j}$ for all $i, j = \{h, l\}$. In fact, the chances of transition between income classes in Table 2.6(c) are: $\frac{p_{ll}}{p_{l.}} = \frac{p_{lh}}{p_{l.}} = \frac{p_{hl}}{p_{h.}} = \frac{p_{hh}}{p_{h.}} = 0.5$.

Societies shown in Table 2.6 represent three extreme mobility levels. Nevertheless, they provide meaningful stylized mobility structures for investigating the social desirability of different mobility aspects.

Considering the intragenerational mobility scenario, the above discussion about mobility representations and measures holds exactly in the same way.

We can represent the wealth evolution of the same generation between two periods by the same mobility tables and matrices (Tables 2.1 and 2.2). In this setting X and Y represent the wealth distributions of the first and second period respectively, while p_{ij} is the relative frequency of individuals in the society who

	y_l	y_h	P. m. d.
z_l	0.5	0	0.5
z_h	0	0.5	0.5
K. m. d.	0.5	0.5	

(a) Perfect Immobility

	y_l	y_h	P. m. d.
z_l	0	0.5	0.5
z_h	0.5	0	0.5
K. m. d.	0.5	0.5	

(b) Complete Reverse

	y_l	y_h	P. m. d.
z_l	0.25	0.25	0.5
z_h	0.25	0.25	0.5
K. m. d.	0.5	0.5	

(c) Stochastic Independence

Table 2.6: three societies with different levels of exchange mobility

belong to wealth status i in the first period and j in the second one. Furthermore, the row sum $p_{i.}$ points out individuals' wealth marginal distribution in the first period, while $p_{.j}$ highlights individuals' wealth marginal distribution in the second one.

In the same way, we can represent the intragenerational mobility process by mobility matrices dividing the value of each cell by the corresponding row sum: $\pi_{ij} = p_{ij}/p_{i.}$. Finally, the two mobility measures previously presented (exchange and structural) underline the same movement issues when the object of the analysis is the wealth evolution of the same generation among periods.

The main difference between the two mobility scenarios (intergenerational and intragenerational) may be their social desirability.

Considering the intergenerational mobility scenario greater mobility in terms of low association between one generation and another is usually denoted as an important social goal. Following this approach, a society characterized by Stochastic Independence (Table 2.6c) is socially desirable because it does not predetermine the wealth evolution among generations. Moreover, Stochastic Independence implies equality of opportunity as long as all factors influencing sons' wealth position for which they can not be held responsible are summarized by parents' wealth status. In this view, Stochastic Independence provides a direct measure of equality of opportunity because sons' wealth positions depend solely on variables that are under their control (such as effort, commitment, etc.) rather than circumstances behind their control.[2]

[2] Jantti and Jenkins (2015) emphasize a second special condition for which origin independence provides a direct measures of equality of opportunity. That is, any income differences in sons' generation that are attributable to differences in innate talents (which might be partly genetically inherited) are considered as unacceptable. This issue represents an essential part of our experimental questionnaire that we will discuss in the next section

	y_l	y_h	P. m. d.
z_l	0.35	0.15	0.5
z_h	0.15	0.35	0.5
K. m. d.	0.5	0.5	

(a) Partial Immobility

	y_l	y_h	P. m. d.
z_l	0.15	0.35	0.5
z_h	0.35	0.15	0.5
K. m. d.	0.5	0.5	

(b) Partial Reverse

Table 2.7

The opposite scenario to the previous one is provided by Perfect Immobility (Table 2.6a). This mobility level implies a rigid society in which parents' wealth distribution determines the fortune of their offspring. In this scenario, kids' ability and effort do not play any economic role. Nevertheless, the social desirability of Perfect Immobility lies in the absence of wealth fluctuation among generations. Indeed, a wealth evolution among generations characterized by perfect positive association may be socially desirable as it reduces uncertainties associated with a fluctuating wealth stream among generations. However, this condition comes at a cost to preserve the wealth inequality among generations.

Finally, Complete Reverse (Table 2.6b) determines a setting in which parents' wealth positions still define the fortune of their offspring but in the opposite way than Perfect Immobility. Indeed, society shown in Table 2.5(b) implies a complete negative association between the wealth distributions of the two generations. Although this scenario has no empirical evidence, it emphasizes the possible social desirability of wealth reversal as it reduces the wealth inequality among generations. However, this condition comes at a cost to increase the wealth fluctuation among generations.

As emphasized above, Perfect Immobility, Complete Reverse and Stochastic Independence represent three extreme exchange mobility levels. Table 2.7 shows two intermediate cases of wealth association (positive and negative) between generations.

Table 2.7(a) implies a mobility structure in which kids who belong to rich families have 70% chances of remaining rich, while kids who belong to poor families have 70% chances of remaining poor ($\frac{p_{ll}}{p_{l.}} = \frac{p_{hh}}{p_{h.}} = 0.7$). Conversely, Table 2.7(b) shows a symmetric negative wealth association between generations ($\frac{p_{lh}}{p_{l.}} = \frac{p_{hl}}{p_{h.}}$ $= 0.7$). Therefore, in Table 2.7(a) the higher wealth fluctuation than Perfect Immobility is partially compensated with lower wealth inequality between the two generations. Similarly, in Table 2.7(b) the higher wealth inequality than Complete Reverse is partially compensated with lower wealth fluctuation between the two generations. Finally, in both societies (Tables 2.7a and 2.7b) the mobility process implies more intergenerational mobility than Perfect Immobility and Complete Reverse, but less than Stochastic Independence.

Considering the intragenerational mobility scenario, the social relevance of the mobility levels previously shown may chance substantially.

Firstly, Stochastic Independence may be less socially relevant in the intragenerational mobility scenario. Indeed, considering the wealth evolution over time of the same generation, the wealth distribution in the first period is likely to be determined by individuals' skills. Therefore, as long as these abilities persist over time the social value of low wealth association among periods may be less appealing.

Conversely, Complete Reverse may have greater social relevance in the intragenerational scenario than the intergenerational one as long as social aversion to wealth inequality is higher when considered along the same generation. In this view the primary goal of the mobility process is the reduction of the long-term wealth inequality rather that guarantee equality of opportunities among periods. However, as pointed out above, Complete Reverse implies large wealth fluctuation. Therefore, high levels of wealth reversal among periods may be not social desirable as it implies unpredictability and economic insecurity.

Thereby, the role played by Perfect Immobility may be greater in the intragenerational mobility scenario as long as it reduces uncertainties associated with a fluctuating wealth stream among periods. Indeed, mobility in terms of wealth reversal implies transitory wealth variations that correspond to great wealth risk, and great risk is undesirable for risk-adverse individuals.

The mobility welfare literature has provided three principal models that summarize the mobility concepts presented above: Markandya (1982), Atkinson and Bourguignon (1982) and Gottschalk and Spolaore (2002).

The model proposed by Markandya (1982) implies the following welfare specification:

$$W = \sum_i \sum_j U(z_i, y_j) p_{ij} \tag{2.1}$$

In equation (2.1) the first sum denotes parents' (first period) generation, while the second sum represents kids' (second period) generation. Moreover, $U(.)$ points out individual utility, while p_{ij} defines the transition probabilities between wealth classes.

There are two possible specifications of equation (2.1). Firstly, assuming separable utility functions among generations (periods), the social value of mobility is indifferent to any variations of transition probabilities between wealth classes (p_{ij}), fixed the supports of the wealth distribution in each generation (periods) and individuals' proportion in each support. Accordingly, assuming separable utility functions, equation (2.1) determines the following preferences relation between the mobility levels previously presented: Complete Reverse $\sim$ Partial Reverse $\sim$ Stochastic Independence $\sim$ Partial Immobility $\sim$ Perfect Immobility.

Vice versa, assuming not separable utility functions among generations (periods), the values of p_{ij} affect the social value of mobility. Specifically:

$$\text{if } \frac{\partial U}{\partial z_i \partial y_j} < 0 \text{ any increase of } p_{lh} \text{ and } p_{hl} \text{ is welfare improving} \tag{2.2}$$

$$\text{if } \frac{\partial U}{\partial z_i \partial y_j} > 0 \text{ any increase of } p_{ll} \text{ and } p_{hh} \text{ is welfare improving} \tag{2.3}$$

Therefore, if condition (2.2) holds, any increase of negative association between parents' (first period) and kids' (second period) wealth status is welfare improving. Vice versa, if condition (2.3) holds, any increase of positive association between parents' (first period) and kids' (second period) wealth status is welfare improving.

The model provided by Atkinson and Bourguignon (1982) assumes as object of analysis the dynasty (individual) wealth evolution among generations (periods). Accordingly, the utility function, $U(.)$, is assumed not separable among generations (periods). Specifically, $U(.)$ is a concave transformation of individuals' utility in each generation (period): $U(z_i, y_j) = Q[J(z_i)+J(y_j)]$. The related mobility welfare evaluation implies:

$$W = \sum_i \sum_j \{Q[J(z_i) + J(y_j)]\} p_{ij} \tag{2.4}$$

In equation (2.4), $Q(.)$ defines the social aversion to wealth inequality between generations (periods), while $J(.)$ determines the social aversion to wealth fluctuation among generations (periods). Therefore, considering equation (2.4), conditions (2.2) and (2.3) are reinterpreted in terms of aversions to wealth inequality and fluctuations among generations (periods), respectively.

If condition (2.2) holds, then aversion to wealth inequality exceeds aversion to wealth fluctuation. Therefore, societies with higher levels of wealth reversal among generations (periods) are socially preferred. This condition implies the following preferences relation between the mobility levels previously presented: Complete Reverse $\succ$ Partial Reverse $\succ$ Stochastic Independence $\succ$ Partial Immobility $\succ$ Perfect Immobility.

Vice versa, if condition (2.3) holds, then aversion to wealth fluctuation exceeds aversion to wealth inequality. Therefore, societies with higher levels of wealth immobility among generations (periods) are socially preferred. This condition implies the following preferences relation between the mobility levels previously presented: Perfect Immobility $\succ$ Partial Immobility $\succ$ Stochastic Independence $\succ$ Partial Reverse $\succ$ Complete Reverse.

In any case, both Markandya (1982) and Atkinson and Bourguignon (1982) models do not provide conditions for which Stochastic Independence has social value.

Next, the model provided by Ghottschalk and Spolaore (2002) adds to equation (2.4) a specific form of inequality aversion restricted to kids' generation (second period) . The related social evaluation implies the following welfare function:

$$W = \sum_i p_{i.} Q\{J[z_i, \sum_j H(y_j)\frac{p_{ij}}{p_{i.}}]\} \tag{2.5}$$

In equation (2.5), $Q(.)$ and $J(.)$ define the same social aversions of equation (2.4), while $H(.)$ represents kids' (second period) wealth inequality aversion. Furthermore, $p_{i.}$ defines parents' chance to be in the low or high wealth class, while p_{ij} represents the transition probabilities between wealth classes.

In terms of mobility evaluation, welfare function in (2.5) differs from equation (2.4) only if kids' inequality aversion exceeds aversions to wealth inequality and fluctuations. Indeed, if the latter condition holds together with $Q(.) = J(.)$, then Stochastic Independence has social value.

Finally, we introduce a novel intuition regarding social preferences for mobility.

In the theoretical models presented above, people's social preferences for mobility are driven by aversions to wealth inequality and fluctuations. Consequently, in Atkinson and Bourguignon (1982) welfare approach Stochastic Independence has no social relevance, while in the model provided by Gottshalck and Spolaore (2002) equality of opportunities has social value only if wealth inequality aversion offsets aversion to wealth fluctuation, that is $Q(.) = J(.)$.

Our intuition starts from the social relevance of mobility as Stochastic Independence. Indeed, Stochastic Independence is the only mobility level that determines equality of opportunities in the wealth evolution among generations (periods).

In the intergenerational mobility scenario it means that kids' final wealth position is independent from their parents' wealth class. Following this perspective, Perfect Immobility and Complete Reverse may be evaluated socially equivalent. Indeed, the former determines a perfect positive association between parents' and kids' wealth positions, while the latter implies a perfect negative association between the two. However, in both cases parents' wealth positions determine the fortune of their offspring.

Therefore, our intuition implies that societies characterized by Perfect Immobility and Complete Reverse may have the same social value. Vice versa, Stochastic Independence may represent the social preferred level of mobility because it implies independence among generations' (periods') wealth distributions.

However, as emphasized above, the social relevance of equality of opportunities may be greater in the intergenerational mobility scenario than the intragenerational one. Indeed, in the intragenerational mobility scenario Complete Reverse and Perfect Immobility may have grater social value. Therefore, our intuition regarding social preferences for mobility may be primarily pertinent in the intergenerational mobility context.

To sum-up, individuals' wealth evolution over time represents a very multifaceted issue that embodies several important dimensions. In this section we have underlined some of them.

First, mobility representations typically used in the literature (mobility tables and matrices) do not fully provide informations of ex ante individuals' wealth opportunities in the mobility process. Therefore, a primary important issue concerns ex-ante and ex post mobility evaluation. That is, are people social indifferent between two societies characterized by the same ex post mobility table but different ex ante individuals' wealth opportunities?

Second, there are two important mobility dimensions: exchange mobility and structural one. Thus, a relevant issue regards people social preferences toward different levels of both dimensions.

Next, the mobility welfare literature has emphasized two important dimensions of mobility evaluation: aversions to wealth inequality and fluctuation among generations (periods). Are these aspects relevant in determining people social choices between different mobility processes? Moreover, has mobility as Stochastic independence any social role in moderating these social aversions?

Finally, an important mobility distinction regards the period of time over which the wealth evolution is analysed. Indeed, mobility social value may change considering intergenerational and intragenerational scenarios. Therefore, further relevant questions are: do social preferences for mobility change considering the wealth evolution over periods and generations? Have aversions to wealth inequality and fluctuations the same social relevance in the two mobility scenarios? Has mobility as Stochastic Independence the same social importance in the two contexts?

The principal aim of our study is to highlight people's social concern toward these different mobility dimensions through a questionnaire experiment.

2.3 Static wealth distribution and the source of wealth inequality

Many scholars have emphasized how the origin of wealth inequality affects individuals' and socials' preferences for redistribution.

Individuals' social preferences express the idea that other variables rather than self-interest determine individuals' preferences for redistribution (Charness and Rabin, 2002). Vice versa, social preferences assume as object of analysis the preferences expressed by a "neutral observer" or by an hypothetical individual "behind the veil of ignorance" (Harsanyi, 1953; 1955).

Focusing on individuals' social preferences, both theoretical and empirical studies have emphasized the relevance of people's beliefs.

Alesina and Angeletos (2005) provide a model with two equilibria. In the America equilibria people believe that individuals' effort determines their final position in the income distribution. The related equilibria implies low redistribution and low taxes. Conversely, in the European equilibria the society believes that factors behind individuals' control (such as luck, birth and connections) determine individuals' income position. The associated equilibria implies high redistribution and taxes.

Benabou and Tirole (2006) develop a model in which the ideologies affect individuals' beliefs in terms of effort's return. In the European Pessimism equilibria, the poor end up with pessimistic beliefs. This determines a high tax rate that reinforces their beliefs and discourages individuals' high effort. Conversely, in the America Believe in a Just Word equilibria, people tend to ignore bed news about the effort's return. This condition implies low tax rate expectation and a high level of individuals' effort. The same equilibria hold when considering beliefs about intergenerational mobility.

Fong (2001) using the 1990 General Social Survey (GSS) points out that people's beliefs about the source of income inequality affect preferences for redistribution. In particular, people who believe that poverty status is determined by lack of effort are less prone to redistribution than who believe that lack of effort is not important.

Corneo and Gruner (2002) extend the analysis to twelve countries using the International Social Survey Program. The authors highlight that people who believe that income is very elastic to effort are less likely to agree with political redistribution. The opposite holds if people believe that families' wealth is essential in the individuals' income achievement.

Finally, Alesina and Giuliano (2011) pinpoint the same empirical evidence using several waves of the GSS and extending the analysis to the Word Value Survey.

As shown before, many studies highlight the social relevance of two different sources of income inequality (effort and luck) in determining individuals' preferences for redistribution. However, the empirical analysis based on survey data does not allow a proper test of the models based on social preferences (Harsany, 1953; 1955). Indeed, the latter imply two specific settings in terms of social choices. In the first one (neutral observer) individuals' income status is not affected by their preferences. Vice versa, in the second one (behind the veil of ignorance), individuals are not aware of their position in the income distribution.

Accordingly, several experimental studies have pointed out the relevance of effort and luck when the object of analysis are social preferences.

Krawczyk (2010) analyses the preferences for redistributions expressed by individuals "behind the veil of ignorance". The author shows that when individuals' monetary payoff are determined by performance in a task, the average income transfer is 20% lower than sessions where the monetary payoff are determined by luck.

The experimental design proposed by Durante et al. (2014) provides both types of social analysis: “external observer” and “behind the veil of ignorance”. In their analysis, individuals are assigned to four treatments. In two out of four, the income is determined by completing a task (effort treatments), while the third treatment implies a random distribution of incomes (luck treatment). When individuals express preferences from a neutral position, subjects choose a tax rate that is on average 11.6 % lower in the effort treatments than the luck one. This difference increases when subjects state preferences “behind the veil of ignorance” (17.8 %).

The studies early presented pinpoint the relevance of fairness' perception in the determination of individuals' wealth distribution. Indeed, when inequality arises because of variables that are behind individuals' control, people tend to prefer higher level of redistribution. Vice versa, when inequality is due to variables that are under individuals' control the associated level of redistribution is lower.

In terms of fairness' perception of income inequality, a further relevant variable not well investigated by the literature is individuals' natural ability. The latter consists of people's natural endowment such as talent, attitudes and skills. The bearing of natural ability is due to its double nature in terms of fairness. Indeed, people's natural endowment may be perceived as something “un-earned” and thus unfair in the determination of income inequality. Vice versa, people may believe that individuals with higher talent and skills deserve higher income compared to the others.

While several studies have pointed out the role played by fairness' perception in determining individuals' preferences for redistribution, the economic literature on social mobility has reserved little attention to this topic.

Roemer (1998) provides a normative approach to intergenerational mobility that points out the relevance of fairness in the mobility process. The author emphasizes how the society should “levels the playing field” among individuals who compete for any position. In the mobility scenario, it means that variables that are behind individuals' control (such as parents' income position, family background, etc.) should not matter in the determination of their wealth position. The latter should be determined only by variables that are under people's control (such as effort, commitment, etc.). Accordingly, Stochastic Independence represents a fair process in terms of intergenerational mobility as long as variables behind individuals' control are entirely summarized by parents' wealth status.

However, in this view a controversial issue regards people's natural ability. Indeed, mobility as Stochastic Independence may be less social appealing if people's talent and skills are not randomly distributed among the population. This consideration holds especially if natural ability is partially genetically inherited . In fact, people's natural endowment may be perceived as a variable behind individuals' control and thus unfair in terms of wealth opportunity among generations. Vice versa, natural ability may be perceived as a fair mechanism to allocate wealth opportunity among generations. Accordingly, people endowed with higher talent and skills may deserve greater wealth opportunities in the mobility process.

In our experimental questionnaire we test whether Stochastic Independence provides a direct measure of equality of opportunity even if people's natural ability is genetically transmitted among generations. In particular, a further aim of our study is to test whether natural ability is perceived as a fair mechanism to allocate wealth opportunities among generations.

2.4 The approach

Our study is an empirical investigation of individuals' concern about several mobility dimensions. The empirical analysis of both social preferences and fairness principles represent an essential aspect of the economic approach to social theory. Indeed, as emphasized by Gaertner and Schokkaert (2012):"thinking about the content of justice without the desire of making the word most just, is like pouring out a glass of water and then refusing to drink....Empirical research on the acceptance of notion of justice by different social class is therefore essential to understand the social environment in which policy decisions are taken".

Starting from the pioneering work of Amiel and Cowell (1992), many studies have used the questionnaire approach to test models regarding social choices (Harrison & Seidl, 1994; Amiel et al., 2001; Bernasconi, 2002; Amiel et al., 2015).

There are several reasons whereby questionnaires represent an optimal tool to test social theory. First of all, empirical strategies based on social survey do not isolate properly preferences for ethical norms to other variables involved in the wealth distribution and evolution. Furthermore, the empirical analysis using field data involves preferences that can be inferred, but not directly tested.

On the other hand, the experimental approach does not provide an optimal empirical setting because of the object of analysis. Indeed, when we focus on individuals preferences, the monetary consequences of individuals' decisions represent an essential features of the empirical investigation. Vice versa, when we focus on social preferences, the main research interest is to test individuals' concerns about social norm for which individuals do not bear the consequences of their choices.

Most of the studies regarding empirical social choices are based on preferences expressed by students. There are several reasons whereby the university population represent a good object of investigation. First of all, they are used to reasoning about abstract questions. Furthermore, as pointed out by Gaertner and

Schokkaert (2012), students represent the future social and economic elite of a country. Therefore, they have higher chances to affect the public policy debate.

Nevertheless, there are two main critical issues regarding the empirical investigations using students population without financial payoff.

First, the absence of monetary incentives could lead to inaccurate responses by some individuals. This holds especially when the questionnaire is long and composed by hard questions. Moreover, students are not representative of the entire population. Indeed, they are used because they are easily recruited.

In order to overcome these points, we run our questionnaire by Amazon Mechanical Turk (MTurk). In the recent years an increased number of economic studies have used this on-line platform to conduct empirical analysis about social preferences (Saez & Stancheva, 2013; Kuziemco et al., 2015).

In the field of social choices, the relevance of MTurk is twofold. First, it provides an optimal environment in terms of financial incentives. Indeed, using MTurk, individuals' return for completing the questionnaire is a fixed monetary amount (previously agreed). This incentives subjects to focus on the task during the course of the questionnaire. In fact, final payment is only made to individuals who show that they understand the questionnaire. Nevertheless, individuals' final payoff does not depend on the choices involved in the questionnaire.

Accordingly, the financial incentives provide by MTurk allow to encourage the individuals to do not give inaccurate response. Simultaneously, the social preferences made by subject have no monetary consequences for them.

The second advantage of MTurk is the representativity of sample population. This is true especially when the U.S. population is considered. Indeed, as reported by Paolacci et al. (2010), MTurk workers are representative of the U.S. population at least in terms of age, gender, race and education.

2.5 The experimental design

Our experimental questionnaire involves social preferences toward two mobility scenarios: intergenerational mobility and intragenerational one. Moreover, we test whether these preferences change conditional to different sources of wealth inequality: life chance and natural ability. Accordingly, there are four experimental variables. Table 2.8 shows the treatments associated to the combination of each variable.

	Intergenerational mobility	Intragenerational mobility
Life chance	Treatment 1	Treatment 3
Natural ability	Treatment 2	Treatment 4

Table 2.8: experimental design

The experimental questionnaire is divided in three sections: introduction, individuals' choices and a final demographic survey.

The introduction characterizes properly each treatment. It defines the mobility scenario (intergenerational or intragenerational mobility) and the source of wealth inequality (life chance or natural ability).

Individuals' choices consist of five parts. Each part is composed by three comparisons between couples of hypothetical societies. Moreover, in the first part there is an additional question. Finally, there are three control questions. Thus, in total there are 19 questions.

The demographic survey includes informations about gender, age, education, marital status and family composition.

2.5.1 Treatment 1: intergenerational mobility and life chance

Treatment 1 consists of the combination of two experimental variables: intergenerational mobility and life chance. Treatments' features are indicated in the questionnaire introduction. The latter consists of three parts.

The first one points out to the participants the meaning of social preferences in our experimental scenario. Social preferences are defined as the preferences expressed towards societies characterized by different wealth distributions without being directly involved in the wealth distribution of those societies.

The second part of the introduction describes the relevance of two dimensions of the mobility process: how the wealth is distributed among generations and the way in which parents' wealth position transfers to their own offspring. Moreover, the second part describes how these features are represented in the questionnaire: Figure 2.1. The latter represents an hypothetical society composed by two generations: the parents and their offspring. The top line shows parents' wealth distribution, while the bottom line shows kids' wealth distribution. Kids' and parents' wealth distributions are characterized by two classes: the rich and the poor. Moreover, parents and kids who belong to the same family are depicted in the same colour. Parents depicted in blue have kids depicted in blue, while parents depicted in red have kids depicted in red.

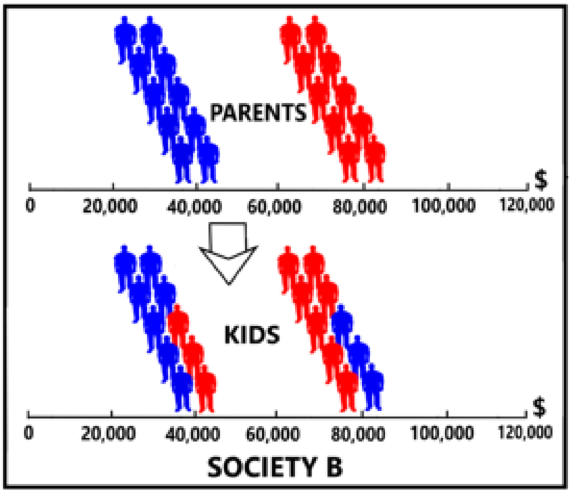


Figure 2.1

Accordingly, Figure 2.1 includes informations about the wealth distribution in each generation as well as the level of intergenerational mobility. Specifically, Figure 2.1 shows a society characterized by Partial Immobility (Table 2.6a) as exchange mobility level.

Finally, the third part of the introduction points out treatments' features in terms of origin of wealth inequality. In particular, the introduction of Treatment 1 pinpoints to the participant that only different life chances have determined parents' wealth distribution: rich parents in red and poor in blue. That is, parents' wealth classes (rich or poor) do not depend on their own natural abilities such as aptitude, talent and skills. Furthermore, the introduction specifies that people's natural abilities are randomly distributed among both parents' and kids' generations in all societies of the questionnaire.

Subjects' choices consist of five parts. Each part is composed by three comparisons between couple of societies as in Figure 2.2. Only in the first part there is an additional question. For each couple, subjects have to state their preferences between Society A and Society B. The choice is expressed by the following question: "image you are a neutral observer. Which society do you think is socially preferable between Society A and Society B?". Accordingly, subjects express their preferences from a neutral position. It means that they assume the role of an external observer that is not directly involved in both wealth distribution and evolution of the society (Harsanyi, 1953).

We show below the description of each part of the questionnaire. Furthermore, for each one we report the associated societies' pairwise comparison and the main theoretical predictions.

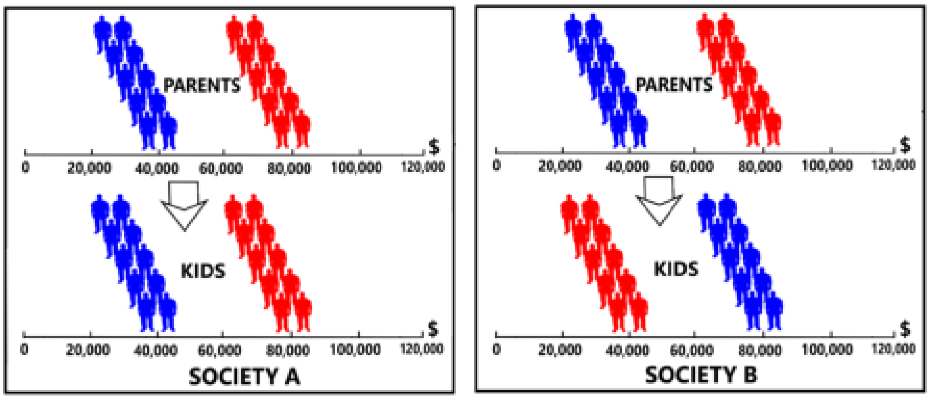


Figure 2.2

Table 2.9 shows the societies' pairwise comparisons of Part 1. Each couple consists of two societies characterized by different levels of exchange mobility. Perfect Immobility versus Partial Immobility in Question 1, Stochastic Independence versus Partial Reverse in Question 2 and Stochastic Independence versus Complete Reverse in Question 3. Moreover, in this part of the questionnaire there is an additional question: Question 4. The latter asks subjects the most preferred level of mobility among the preferences expressed in the initial three choices.

The aim of questionnaire Part 1 is threefold. First, we investigate whether different levels of exchange mobility are evaluated socially equivalent. Second, we test the social relevance of aversions to wealth inequality and fluctuation among generations considering the welfare implications of the model provided by Atkinson and Bourguignon (1982). Finally, we analyse the social value of mobility as Stochastic Independence.

The first point is formalized by equation (2.1) assuming separable utilities functions among generations. This condition implies that exchange mobility level does not affect the value of the welfare function. If this is the case, subjects should be indifferent between Society A and Society B in each pairwise comparison of Table 2.9.

Conversely, assuming not separable utility functions among generations, the welfare function provided by Atkinson and Bourguignon (1982), equation (2.4), involves two different theoretical predictions.

First, if condition (2.2) holds, then social preferences should be mainly driven by aversion to wealth inequality among generations. Accordingly, in each pairwise comparison of Part 1, subjects should prefer societies with higher wealth reversal between the two generations. This condition implies: Society B in Question 1, Society B in Question 2 and Society A in Question 3. Moreover, Society B in

Part 1: different levels of exchange mobility with low wealth inequality and fluctuation

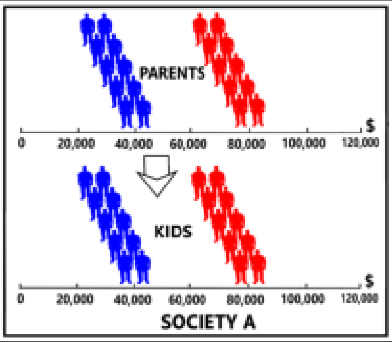
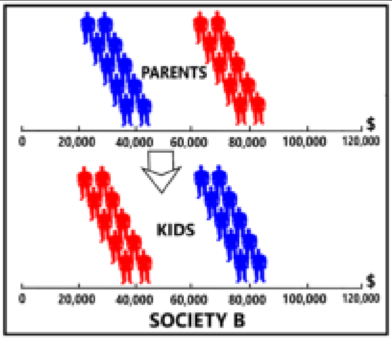
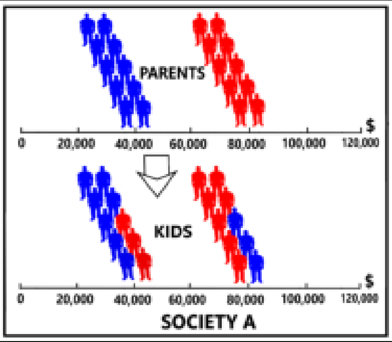
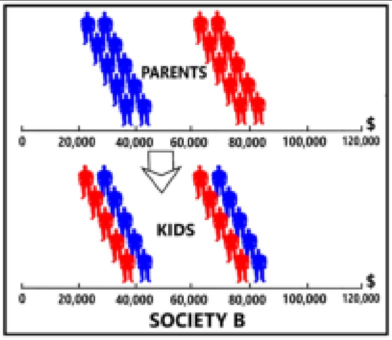
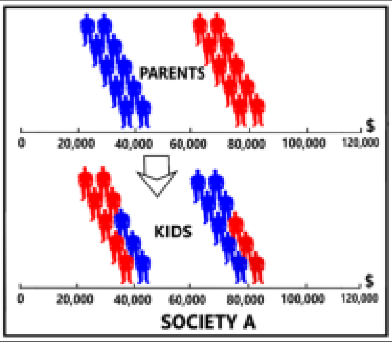
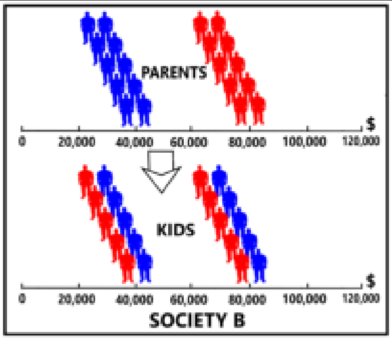
Choices		
		**Question 1:** Perfect Immobility in A; Complete Reverse in B.
		**Question 2:** Partial Immobility in A; Stochastic Independence in B.
		**Question 3:** Partial Reverse in A; Stochastic Independence in B.

Table 2.9

Question 1 should be the preferred one.

Second, if condition (2.3) holds, then social preferences should be mainly driven by aversion to wealth fluctuation among generations. Thus, in each pairwise comparison of Part 1, subjects should prefer societies with higher wealth immobility between the two generations. This condition implies: Society A in Question 1, Society A in Question 2 and Society B in Question 3. Furthermore, Society A in Question 1 should be the preferred one.

Finally, if equality of opportunities has social value in the intergenerational mobility process, then subjects should prefer Society B in Questions 2 and 3. Moreover, following our intuition, Perfect Immobility and Complete Reverse may be evaluated socially equivalent. Indeed, in both cases kids' wealth position is determined by their parents' wealth class. If this is the case, subjects should be indifferent between Society A and Society B in Question 1.

Table 2.10 shows questionnaire Part 2. The latter provides a setting in which mobility processes consist of higher wealth inequality and fluctuation among generations than Part 1.

The aim of Part 2 is to test whether the preferences expressed in Part 1 change when the mobility process is characterized by higher wealth inequality and fluctuation among generations. Specifically, we investigate whether the increase of wealth inequality and fluctuation affects the social relevance of Stochastic Independence as well as the aversions to wealth inequality and fluctuation among generations.

Considering the preferences predictions implied by equations (2.1) and (2.4), subjects' choices between Parts 1 and 2 should not change. In fact, assuming separable utility functions among generations, subjects should be still indifferent between Society A and Society B in each pairwise comparison of Table 2.9. Furthermore, assuming not separable utility functions among generations together with condition (2.2), subjects should still prefer societies with higher wealth reversal between the two generations. That is, Society B in Question 1, Society B in Question 2 and Society A in Question 3. Finally, if condition (2.3) holds, subjects should still prefer societies with higher wealth immobility between the two generations. That is, Society A in Question 1, Society A in Question 2 and Society B in Question 3.

Vice versa, the introduction of higher wealth inequality and fluctuation among generation may affect subjects' preferences. In fact, subjects may be less prone to tolerate wealth immobility in the mobility process and therefore high wealth inequality among generations. In the same way, they may be less willing to tolerate wealth reversal among generations and thus high wealth fluctuation. Thereby, the introduction of high wealth inequality and fluctuation may determine higher preferences for equality of opportunities in Part 2 than Part 1. Conversely, the introduction of high wealth inequality and fluctuations may reinforce both social aversions and therefore determines higher preferences for wealth immobility or wealth reversal in Part 2 than Part 1.

Questionnaire Part 3 (Table 2.11) introduces complete equality for parents' wealth distribution. Indeed, the latter consists of one wealth class. Vice versa, kids' wealth distribution is characterized by wealth inequality (the rich and the poor). Moreover, each society provides the same transition probabilities between wealth classes but different kids' opportunities to become rich or poor. Indeed, Part 2: different levels of exchange mobility with high wealth inequality and fluctuation among generations

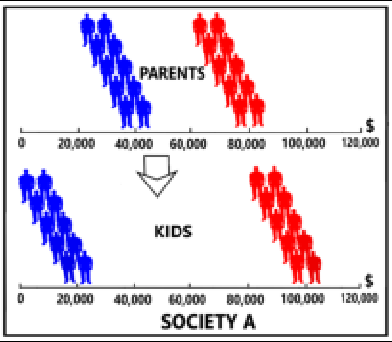
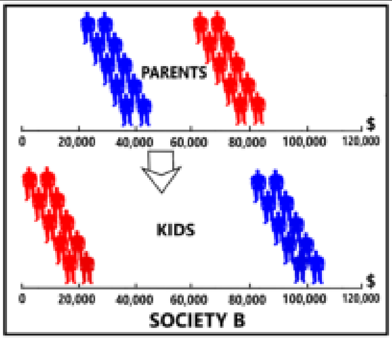
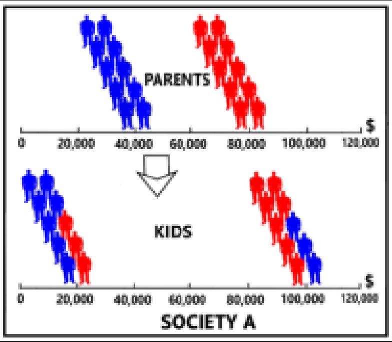
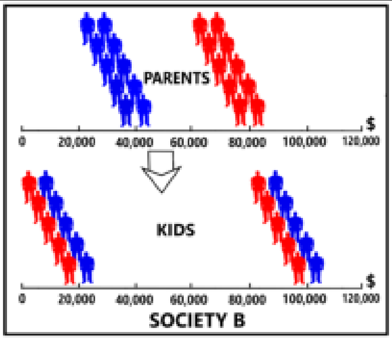
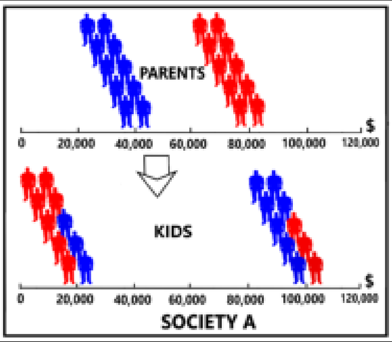
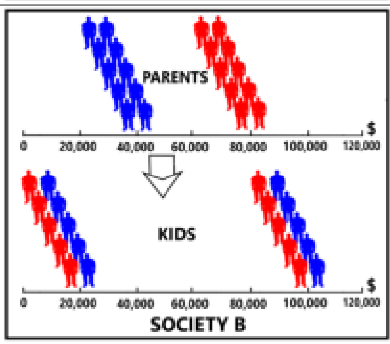
Choices		
		**Question 1:** Perfect Immobility in A; Complete Reverse in B. Greater inequality in kids' wealth distribution than parents' one.
		**Question 2:** Partial Immobility in A; Stochastic Independence in B. Greater inequality in kids' wealth distribution than parents' one.
		**Question 3:** Partial Reverse in A; Stochastic Independence in B. Greater inequality in kids' wealth distribution than parents' one.

Table 2.10

each societies' couple of Part 3 is characterized by the same ex post mobility level and different ex ante kids' wealth opportunities.

As emphasized in Section 2, both mobility tables and matrices do not fully provide informations about ex ante individuals' opportunities in the mobility process. Therefore, the aim of Part 3 is to analyse the social relevance of ex ante individuals' wealth opportunities.

Accordingly, if subjects are indifferent between societies characterized by the

Part 3: different ex ante kids' opportunities and same ex post mobility level

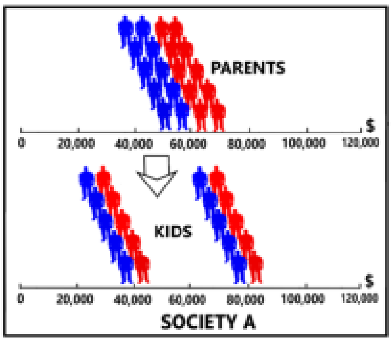
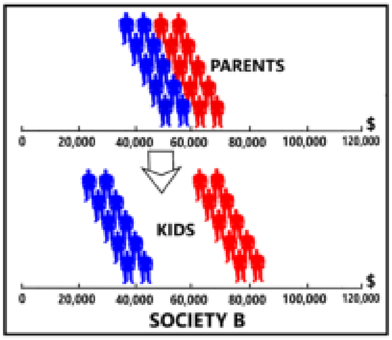
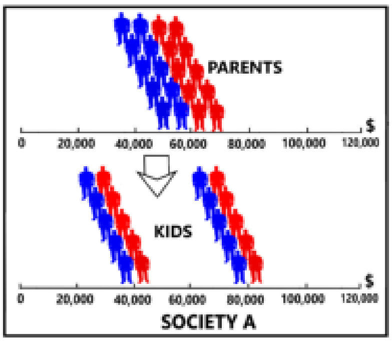
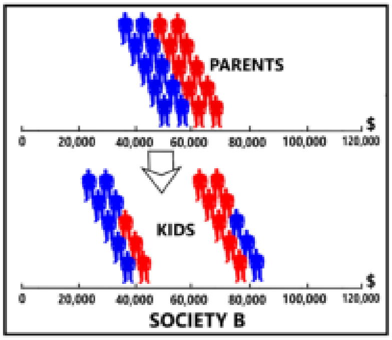
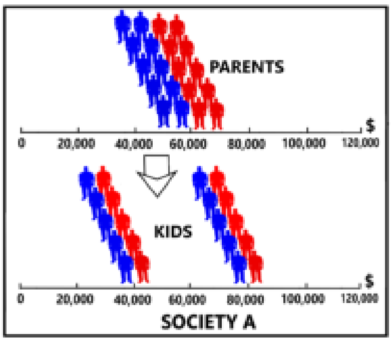
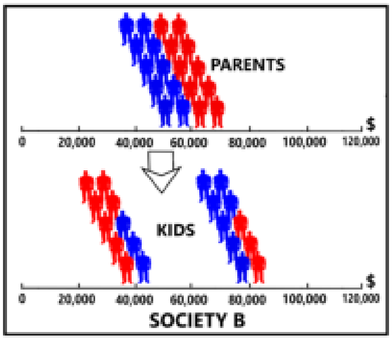
<table>
<tr><th colspan="2">Choices</th><th></th></tr>
<tr><td>
</td><td>
</td><td>Question 1: ex ante kids′ opportunities: Stochastic Independence in A, Perfect Immobility in B; ex post kids′ opportunities : Stochastic Independence in A and B</td></tr>
<tr><td>
</td><td>
</td><td>Question 2: ex ante kids′ opportunities: Stochastic Independence in A, Partial Immobility in B; ex post kids′ opportunities : Stochastic Independence in A and B</td></tr>
<tr><td>
</td><td>
</td><td>Question 3: ex ante kids′ opportunities: Stochastic Independence in A, Partial Reverse in B; ex post kids′ opportunities : Stochastic Independence in A and B</td></tr>
</table>

Table 2.11

same ex post mobility level but different ex ante individuals' wealth opportunities, then they should be indifferent between Society A and Society B in each pairwise comparison of Table 2.11. Vice versa, if equality of opportunities has social value also considering the ex ante opportunities in the mobility process, then subjects' should choose Society A in Questions 1, 2 and 3.

Next, Part 4 (Table 2.12) is characterized by different levels of exchange mobility and alternative values of wealth inequality and fluctuation. The aim of this part is to highlight the social aversion to wealth inequality and fluctuations among generations per se.

PART 4: different mobility levels and different values of wealth inequality and fluctuation

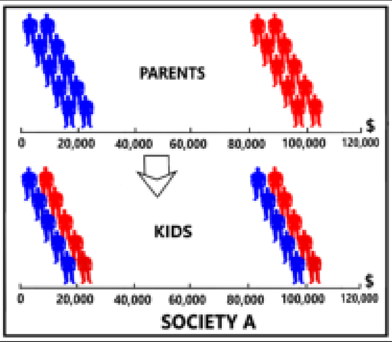
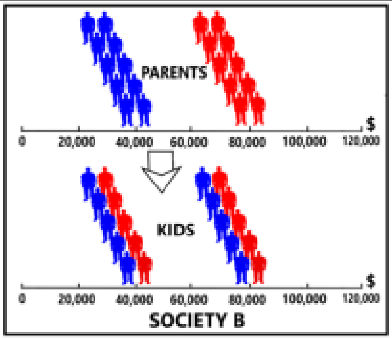
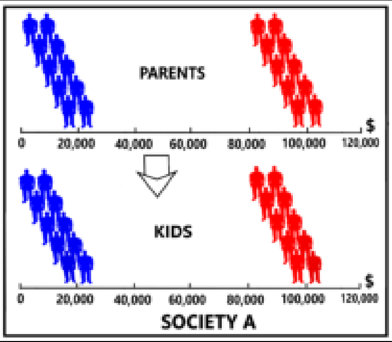
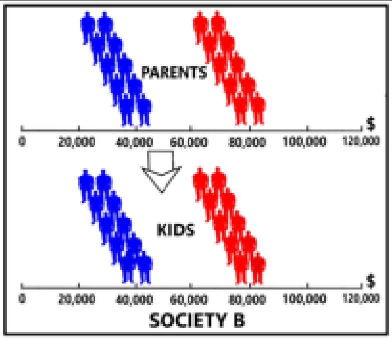
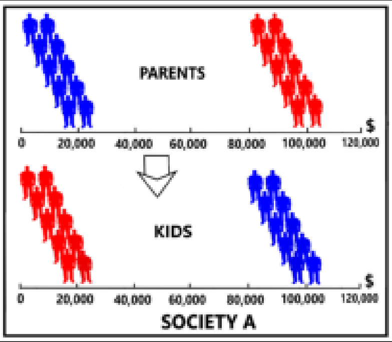
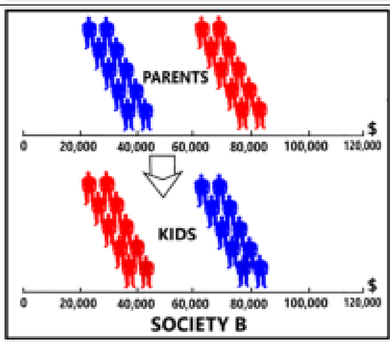
Choices		
		**Question 1:** Stochastic Independence in A and B; more wealth inequality and fluctuation between generations in A
		**Question 2:** Perfect Immobility in A and B; higher wealth inequality in A; no wealth fluctuation between generations both in A and B
		**Question 3:** Complete Reverse in A and B; higher wealth fluctuation in A; no wealth inequality between generations both in A and B

Table 2.12

Starting from Question 2, both societies are characterized by no wealth fluctuations between the two generations, while wealth inequality is higher in Society

A than Society B. Vice versa, both societies in Question 3 are characterized by no wealth inequality between the two generations, while wealth fluctuation in Society A is higher than Society B. Therefore, if subjects are adverse to both wealth fluctuation and wealth inequality among generations, then they should prefer Society A in Questions 2 and 3, respectively.

A further goal of Part 4 is to highlight whether mobility as Stochastic Independence moderates the social aversions to wealth inequality and fluctuation. Indeed, both societies in Question 1 are characterized by Stochastic Independence as exchange mobility level. Vice versa, both wealth inequality and wealth fluctuation between the two generations are higher in Society A than Society B.

Finally, Table 2.13 shows the three choices of Part 5. The aim of this part is twofold. First, we analyse the social preference between Perfect Immobility and Complete Reverse when the latter is characterized by high wealth fluctuation between generations (Question 1). Second, we investigate the social trade-off between mobility as Stochastic Independence and low wealth fluctuation (Question 2) and wealth inequality (Question 3) between the two generations.

Therefore, Questions 2 and 3 investigate whether subjects are willing to tolerate high levels of wealth fluctuation and inequality among generations in order to achieve Stochastic Independence. If this is the case, then subjects should prefer Society B in Questions 2 and 3. Conversely, if aversions to wealth fluctuation and inequality among periods are more socially relevant than Stochastic Independence, then they should choose Society A in Questions 2 and 3, respectively.

2.5.2 Treatment 2: intergenerational mobility and natural ability

Treatment 2 consists of three features. First, the object of preferences is the mobility between two generations. Second, parents' wealth position is due to different levels of natural ability. Finally, the latter is transmitted genetically.

As emphasized in the previous section, in our experimental design the questionnaire introduction defines treatments' features.

Treatment 2 introduction points out to the participants that parents' natural ability such as aptitude, talent and skills has determined their own wealth classes: rich parents in red and poor in blue. That is, parents in red are characterized by a high level of natural ability, while parents in blue are characterized by a low level of aptitude, talent and skills. Furthermore, the introduction specifies that this natural ability is transmitted genetically. Thus, kids who belong to red families are characterized by high aptitude, talent and skills. Conversely, kids who belongs to blue families are characterized by a low level of natural ability.

In terms of social choices Treatments 1 and 2 are exactly the same. The

Part 5:
low wealth fluctuation and inequality among generations versus equality of opportunities

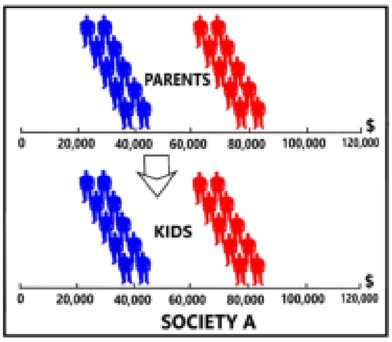
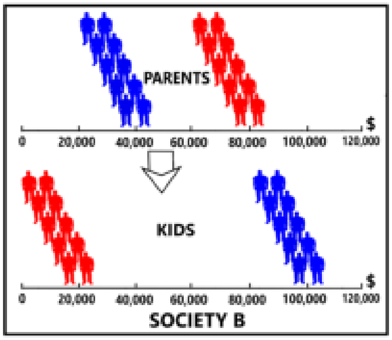
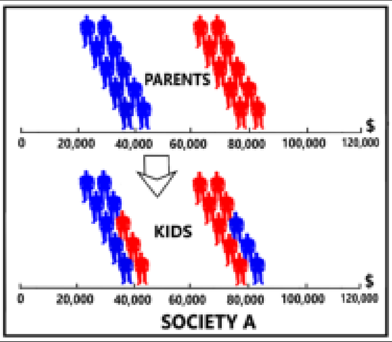
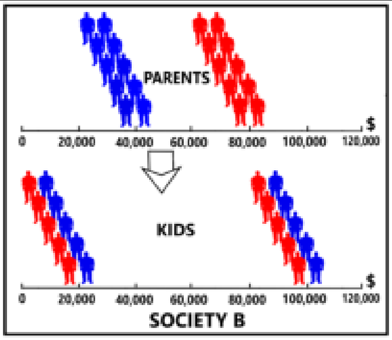
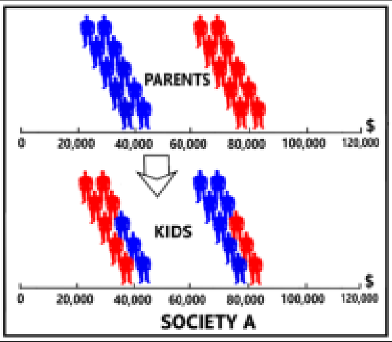
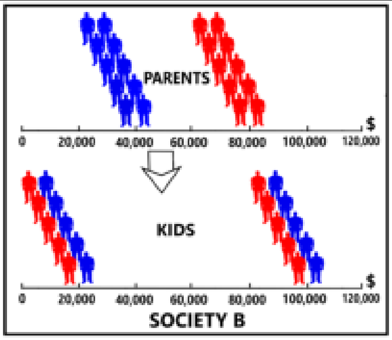
Choices		
		**Question 1:** Perfect Immobility In A, Complete Reverse in B; more wealth fluctuation between generation in B; more wealth inequality between generations in A
		**Question 2:** Partial Immobility in A; Stochastic Independence in B; more wealth fluctuation and inequality between generations in B
		**Question 3:** Partial Reverse in A; Stochastic Independence in B; more wealth fluctuation and inequality between generations in B

Table 2.13

questionnaire consists of the same five parts presented in the previous section: Part 1 (Table 2.9), Part 2 (Table 2.10), Part 3 (Table 2.11), Part 4(Table 2.12) and Part 5 (Table 2.13).

The aim of Treatment 2 is to investigate if the genetic transmission of natural ability among generations affects subjects' preferences for mobility.

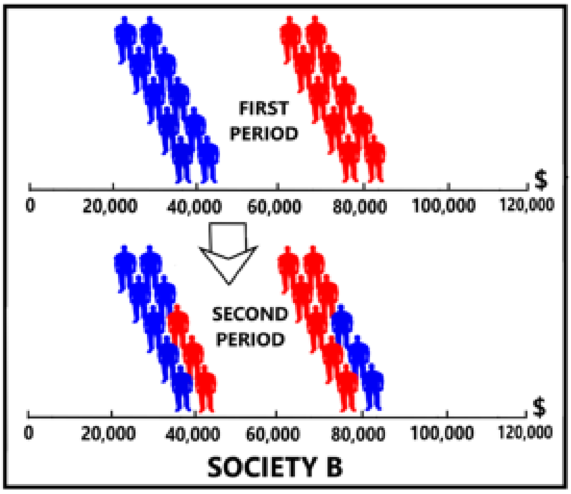


Figure 2.3

Accordingly, if life chance and natural ability are perceived as equivalent mechanism to allocate wealth opportunities among generations, then subjects' preferences should not change between Treatments 1 and 2. Conversely, if wealth inequality between generations due to individuals' natural ability is perceived as fairer than life chance, then subjects may prefer societies characterized by higher wealth immobility among generations in Treatment 2 than Treatment 1.

2.5.3 Treatment 3: intragenerational mobility and life chance

Treatment 3 introduces a different mobility scenario. Indeed, in this treatment the object of social preferences is the wealth evolution between two periods of the same generation. As in the previous treatments, the questionnaire introduction illustrates treatment features.

The introduction describes two important dimensions of the mobility process: how the wealth is distributed among periods and the way in which individuals' wealth position in the first period transfers to the second one. Furthermore, the second part explains how these mobility dimensions are represented in the questionnaire: Figure 2.3. The latter represents an hypothetical society composed by one generation who lives for two periods. The top line shows people's wealth distribution in the first period, while the bottom line shows people's wealth distribution in the second one. Moreover, people's wealth distribution in both periods is characterized by two classes: the rich and the poor. Individuals who are rich in the first period are depicted in red, while individuals who are poor in the first period are depicted in blue.

Finally, the third part of the introduction points out to the participants that only different life chances have determined people's wealth classes in the first period: rich people in red and poor in blue. That is, people's wealth classes in the first period (rich or poor) do not depend on their natural ability such as aptitude, talents and skills. Moreover, the introduction specifies that people's natural ability is randomly distributed among people in all societies of the questionnaire.

Considering subjects' choices, Treatments 3 is composed by the five parts shown in Treatment 1: Part 1 (Table 2.9), Part 2 (Table 2.10), Part 3 (Table 2.11), Part 4 (Table 2.12) and Part 5 (Table 2.13).

As emphasized in Section 2 the social desirability of mobility may chance moving from intergenerational scenario to intragenerational one.

Firstly, mobility as Stochastic independence may be less social appealing considering the wealth evolution of the same generation among periods. Thus, a first important purpose of this treatment is to analyse whether Stochastic Independence has the same social relevance in the two mobility scenarios.

Moreover, social aversion to wealth inequality among periods may be more relevant in this context than the intergenerational one. Indeed, aversion to wealth inequality may be higher considering people lifetime than the wealth evolution among generations. In the same way, aversion to wealth fluctuation may have a greater impact on social preferences in the intragenerational scenario than the intergenerational one. Indeed, wealth reversal between periods may be perceived as riskier than wealth reversal between generations.

The welfare predictions of equation (2.4) emphasized in Treatment 1 are equally valid in the intragenerational mobility scenario. Therefore, if aversion to wealth inequality among periods exceeds aversion to wealth fluctuation, then subjects should prefer societies characterized by higher wealth reversal between the two periods. Conversely, if aversion to wealth fluctuation among periods exceeds aversion to wealth inequality, then subjects should prefer societies characterized by higher wealth immobility between the two periods.

Next, the aim of Part 2 is to test whether the social relevance of Stochastic Independence as well the social aversions to wealth immobility and reversal among periods change when the mobility process is characterized by higher wealth inequality and fluctuation among periods.

Similarly, Part 3 analyses the social value of ex ante individuals' wealth opportunities in the intragenerational mobility process.

In questionnaire Part 4 we investigate the social aversions to wealth inequality and fluctuation among periods per se. Furthermore, we investigate whether mobility as Stochastic Independence mitigates both social aversions in the intragenerational mobility scenario.

Finally, Part 5 highlights the social trade off between mobility as Stochastic

Independence and low wealth inequality and fluctuation considering the wealth evolution among periods.

2.5.4 Treatment 4: intragenerational mobility and natural ability

Treatment 4 consists of two features. First the object of social preferences is the mobility between two periods of the same generations. Second, individuals' wealth position in the first period is due to their natural ability.

Treatment 4 introduction points out to the participants that people's natural ability such as aptitude, talent and skills has determined their own wealth classes in the first period: rich people in red and poor in blue. That is, people in red are characterized by a high level of natural ability, while people in blue are characterized by a low level of aptitude, talent and skills.

The principal aim of Treatment 4 is to analyse whether the introduction of natural ability as source of wealth inequality affects social preferences for intragenerational mobility.

Therefore, if life chance and natural ability are perceived as equivalent mechanism to allocate wealth opportunities between periods, then subjects' preferences in Treatment 3 and 4 should not change substantially. Conversely, if wealth inequality between periods due to individuals' natural ability is perceived as fairer than life chance, then subjects should prefer societies characterized by higher wealth immobility among periods in Treatment 4 than Treatment 3.

Treatment	*Number of Subjects*
Treatment 1	128
Treatment 2	114
Treatment 3	108
Treatment 4	109

Table 2.14: number of subjects that correctly completed each treatment

2.6 The sample

The questionnaire was completed in January 2019 by 500 subjects. The latter were recruited by Amazon Mechanical Turk. They were from U.S. population.

The questionnaire includes three control questions. The latter were not correctly completed by 41 individuals. Thus, the final sample is composed by 459 subjects. Participants were randomly assigned to the four treatments. Table 2.14 shows the number of individuals that correctly completed each one.

Subjects take on average 12 minutes to complete the questionnaire. The individuals' payment for completing the questionnaire was 1$ that corresponds to the minimum U.S.wage for hour. Furthermore, it represents the standard monetary reward in Amazon Mechanical Turk.

Table 2.15 shows the characteristics of our sample. The latter is composed by young people. Moreover, the female gender is slightly under represented, while the level of education is high. In fact, 55% of subjects own at least a bachelor's degree. Vice versa, our sample seems to be representative about the principal ethnic groups of the U.S. population. Furthermore, there is a good balance between married (or domestic partner) and single subjects, while there is a low proportion of divorced individuals. Finally, there is a low level of unemployment because all subjects are Mturk workers.

All in all, our sample replicates the main demographic characteristics of MTurk U.S. population. The latter consists of younger subjects' than the U.S. population, with a higher level of education as emphasized by Paolacci et al. (2010).

Variable	*Percentage*	*Mean*	*s.d.*
Age		36.88	10.76
Gender			
Female	44%		
Ethnicity			
African American	7%		
Asian	7%		
Hispanic	4%		
White	82%		
Marital status			
Single	49%		
Married or domestic part.	44%		
Divorced	7%		
Education			
High School Diploma	56%		
Bachelor's Degree	33%		
Master's Degree	12%		
Work			
Student	2%		
Employed	83%		
Out of Work	7%		
Other	8%		

Table 2.15: sample characteristics

2.7 Results

2.7.1 Treatment 1

We show subjects' preferences in two tables. Table 2.16 pinpoints the preferences expressed in Parts 1,2,3,4 and 5 of the questionnaire, while Table 2.17 deals with Question 4 of Part 1.

In Table 2.16 the first column highlights the questionnaire parts and the associated questions. The second and the third one pinpoint the aggregate proportions of preferences expressed for "Society A" and "Society B" in each question. The fourth column shows the proportion of preferences for "Indifference" between the previous two choices. Finally, the fifth and sixth columns provide the values of two difference-of-proportion test: d and r. The d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, while the r test is for the null hypothesis of aggregate random answers.

Starting from Part 1, subjects' preferences seem to point out that exchange mobility has social value. Indeed, the values of the d test reject the hypothesis of equal proportion of preferences between Society A and Society B in all questions of Part 1. This result seems to highlights that transition probabilities between wealth classes in the intergenerational mobility process are socially relevant. Accordingly, preferences predictions of equation (2.1) assuming not separable utility functions among generations do not seem to correspond to subjects' preferences.

Next, assuming not separable utility functions among generations, we test the preferences predictions of equation (2.4) considering both condition (2.2) and condition (2.3). Specifically, if condition (2.2) holds, then aversion to wealth inequality among generations exceeds aversion to wealth fluctuation. Accordingly, subjects should prefer societies with higher wealth reversal between the two generations. Thus, Society B in Question 1, Society B in Question 2 and Society A in Question 3. Vice versa, if condition (2.3) holds, then aversion to wealth fluctuation among generations exceeds aversion to wealth inequality. Thereby, subjects should prefer societies with higher wealth immobility between the two generations. Thus, Society A in Question 1, Society A in Question 2 and Society B in Question 3.

Subjects' answers in Part 1 do not seem to confirm either of the preferences predictions implied by equation (2.4).

Moreover, subjects' choices in Part 1 point out the social appealing of mobility as Stochastic Independence. Indeed, equality of opportunities (Society B) is considerably preferred to Partial Immobility (Society A) in Question 2 and to Partial Rigidity (Society A) in Question 3. The importance of mobility as Stochastic Independence is confirmed also by the analysis of subjects' answers to Question 4. Table 2.17 shows that 48% of subjects asses that mobility as Stochastic Independence is the preferred level of mobility between the three pairwise comparison of

Part 1.

Treatment 1

Part 1	**Soc. A**	**SOC. B**	**Indif.**	d	r
Question 1	38%	22%	40%	5.72^{**}	7.60^{**}
Question 2	19%	72%	9%	39.86^{***}	87.25^{***}
Question 3	13%	77%	10%	57.96^{***}	111.85^{***}
Part 2	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	27%	28%	45%	0.014	7.23^{**}
Question 2	16%	75%	9%	49.79^{***}	100.75^{***}
Question 3	6%	84%	10%	85.22^{***}	145.79^{***}
Part 3	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	78%	11%	11%	64.00^{***}	115.56^{***}
Question 2	82%	9%	9%	72.96^{***}	132.25^{***}
Question 3	82%	11%	7%	69.58^{***}	136.89^{***}
Part 4	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	5%	81%	14%	83.78^{***}	129.39^{***}
Question 2	7%	79%	14%	76.94^{***}	120.57^{***}
Question 3	6%	79%	15%	79.34^{***}	136.89^{***}
Part 5	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	78%	15%	7%	55.13^{***}	116.73^{**}
Question 2	69%	30%	1%	19.84^{***}	87.43^{***}
Question 3	62%	31%	7%	12.78^{***}	57.67^{***}

Table 2.16: subjects' preferences in Treatment 1; *,**,***, denote rejection at 10, 5, 1% significance levels; "Soc. A." and "Soc. B." stand for Society A and Society B respectively, while "Indif." stands for indifference; the d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, that is $H_0 : p(A) = p(B) = \frac{1}{2}$; the r test is for the null hypothesis of aggregate random answers, that is H_0: $p(A) = p(B) = p(I) = \frac{1}{3}$.

Finally, there is a considerable proportion of preferences (40%) for "Indifference" between Perfect Immobility and Complete Reverse in Question 1. However, the value of the d test rejects the hypothesis of equal proportion of preferences between Perfect Immobility and Complete Reverse.

Question 4	
Question 1	14%
Question 2	10%
Question 3	13%
Questions 1 and 2 are equally socially preferable	5%
Questions 1 and 3 are equally socially preferable	3%
Questions 2 and 3 are equally socially preferable	48%
Questions 1, 2 and 3 are equally socially preferable	7%

Table 2.17: subjects' preferences expressed in Question 4 of Part 1; Question 4 is: "Consider your preferred societies in each Question from 1 to 3, in which question is there you most preferred society?"

Moving from Part 1 to Part 2, subjects' preferences for Perfect Immobility (Society A in Question 1) decrease from 38% to 27%. Conversely, subjects' preferences for Complete Reverse (Society B in Question 1) and "Indifference" increase by 5% and 6% respectively. Accordingly, the value of d test does not reject the hypothesis of equal proportion of preferences between Perfect Immobility and Complete Reverse in Question 1.

Moreover, the introduction of high wealth fluctuation and inequality among generations does not seem to affect significantly the high social value of Stochastic Independence. Indeed, equality of opportunities (Society B) is still considerably preferred to Partial Immobility (Society A) in Question 2 and to Partial Rigidity (Society A) in Question 3. Accordingly, subjects seem to be less prone to tolerate perfect positive association between parents' and kids' wealth status when the mobility process is characterized by high wealth inequality and fluctuation. Vice versa, equality of opportunities seems to have high social value both in Part 1 and Part 2.

Finally, subjects' preferences in Parts 1 and 2 seem to pinpoint that the aversions to wealth inequality and fluctuation among generations have not the same social importance. In fact, Stochastic Independence has higher preferences when compared to Partial Reverse (Question 3) than Partial Immobility (Question 2). Specifically, subjects' preferences for Stochastic Independence increase from 72%

to 77% between Questions 2 and 3 in Part 1. In the same way, subjects' preferences for Stochastic Independence increase from 75% to 84% between Questions 2 and 3 in Part 2. Therefore, subjects seem to be less willing to tolerate wealth reversal than wealth immobility when both mobility processes are compared with Stochastic Independence.

Questionnaire Part 3 investigates the relevance of individuals' ex ante wealth opportunities in the mobility process. Indeed, as emphasized in Section 5, each pairwise comparison of this part consists of the same ex post mobility level and different ex-ante kids' wealth opportunities.

Subjects' choices in Part 3 seem to point out the social relevance of people's' ex ante wealth opportunities in the mobility process. In particular, societies characterized by equality of opportunities as ex ante mobility level (Society A in Questions 1,2 and 3) are markedly preferred to the others one (Perfect Immobility in Question 1, Partial Immobility in Question 2 and Partial Rigidity in Question 3).

Subjects' preferences in Part 4 seem to confirm that social aversions to wealth inequality and fluctuations among generations are socially important. Answers to Question 2 seem to point out that subjects are adverse to wealth inequality among generations, while answers to Question 3 seem to highlight that subjects are adverse to wealth fluctuations among generations. Finally, subjects' choices in Question 1 pinpoint that mobility as Stochastic Independence does not moderate both social aversions. Indeed, 81% of subjects prefer low wealth inequality and fluctuation (Society B) despite both Society A and Society B are characterized by equality of opportunities as mobility level.

Finally, answers to Questions 2 and 3 of Part 5 seem to point out that subjects are not willing to tolerate high wealth inequality and fluctuations among generations in order to achieve equality of opportunities as mobility level. In fact, subjects seem to prefer low wealth fluctuations (Society A in Question 2) and low wealth inequality (Society A in Question 3) among generations even if in both cases the mobility process is characterized by some form of rigidity (Partial Immobility in Question 2 and Partial Reverse in Question 3). In the same way, the preferences expressed in Question 1 highlight that subjects are not willing to tolerate high wealth fluctuation in order to achieve low wealth inequality among generation (Society B). Indeed, they prefer low wealth fluctuation associated with high wealth inequality among generations (Society A).

2.7.2 Treatment 2

Treatment 2 introduces a different source of wealth inequality than Treatment 1. In fact, in this treatment parents' wealth distribution is due to their own natural ability. Furthermore, this natural ability is transmitted genetically. Therefore, kids who belong to rich families are endowed with high talent and skills, while kids who belong to poor families are characterized by low natural ability.

Table 2.18 shows the preferences expressed in Parts 1,2,3,4 and 5 of the questionnaire, while Table 2.19 shows answers to Question 4 of Part 1.

Firstly, answers in Part 1 confirm that subjects value exchange mobility in the intergenerational mobility scenario. Furthermore, mobility as Stochastic Independence seem to be still the social preferred level of mobility (Table 2.19). Therefore, none of the preferences predictions of equations (2.1) and (2.4) are consistent with subjects' choices in Part 1.

Moving from Part 1 to Part 2 there is still a 11% decreases of preferences for Perfect Immobility (Society A in Question 1), while preferences for "Indifference" increase from 35% to 47%. Thereby, the value of d does not rejects the hypothesis of equal proportion of preferences between Perfect Immobility and Complete Reverse both in Part 1 and Part 2. Accordingly, the introduction of high wealth inequality and fluctuations decreases subjects' preferences for Perfect Immobility, while it does not alter the social relevance of Stochastic Independence.

Subjects' choices in Part 3 confirm that people's ex ante wealth opportunities in the mobility process are socially relevant. Indeed, the majority of subjects still prefer societies characterized by equality of opportunities as ex ante mobility level in all pairwise comparison (Society A in Questions 1, 2 and 3).

Treatment 2

Part 1	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	44%	21%	35%	9.13***	9.05**
Question 2	19%	70%	11%	32.98***	83.86***
Question 3	8%	83%	9%	71.11***	128.23***
Part 2	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	33%	20%	47%	3.26*	12.68***
Question 2	22%	65%	13%	25.00***	53.91***
Question 3	12%	77%	11%	53.68***	98.73***
Part 3	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	78%	12%	12%	60.84***	102.78***
Question 2	71%	20%	9%	32.34***	75.21***
Question 3	82%	8%	10%	70.14***	123.84***
Part 4	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	4%	83%	13%	83.64***	129.84***
Question 2	4%	84%	12%	84.64***	120.57***
Question 3	4%	84%	12%	81.99***	133.63***
Part 5	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	87%	5%	8%	82.37***	147.00***
Question 2	79%	16%	5%	40.00***	108.63***
Question 3	69%	22%	9%	28.03***	69.31***

Table 2.18: subjects' preferences in Treatment 2; *,**,***, denote rejection at 10, 5, 1% significance levels; "Soc. A." and "Soc. B." stand for Society A and Society B respectively, while "Indif." stands for indifference; the d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, that is $H_0 : p(A) = p(B) = \frac{1}{2}$; the r test is for the null hypothesis of aggregate random answers, that is H_0: $p(A) = p(B) = p(I) = \frac{1}{3}$.

Next, preferences expressed in Part 4 confirm that subjects are adverse both to wealth inequality (Question 2) and wealth fluctuation among generations (Question 3). Moreover, mobility as Stochastic Independence does not moderate both social aversions (Question 1).

Finally, answers in Part 5 highlight that subjects seem to prefer societies characterized by some form of rigidity in the mobility process associated with low wealth inequality (Society A in Question 2) and low wealth fluctuation among generations (Society A in Question 3) than societies characterized by equality of opportunities associated with high wealth inequality and fluctuation (Society B in Questions 2 and 3).

Question 4	
Question 1	15%
Question 2	9%
Question 3	15%
Questions 1 and 2 are equally socially preferable	3%
Questions 1 and 3 are equally socially preferable	2%
Questions 2 and 3 are equally socially preferable	42%
Questions 1, 2 and 3 are equally socially preferable	14%

Table 2.19: subjects' preferences expressed in Question 4 of Part 1; Question 4 is: "Consider your preferred societies in each Question from 1 to 3, in which question is there you most preferred society?"

In order to test properly the difference between Treatments 1 and 2, we run a chi-square test of homogeneity (χ^2) for each part of the questionnaire. The null hypothesis for this test is that answers in Treatments 1 and 2 can be viewed as if draw from the same population. Table 2.20 shows questionnaire parts and the related questions for which the difference between Treatments 1 and 2 is significant (the remaining parts are reported in the appendix).

Results in Table 2.20 seem to show that the introduction of natural ability as source of wealth inequality determines an increase of preferences for Partial Immobility as ex ante mobility level by 11% (Question 2 in Part 3). Moreover, subjects' preferences for Perfect Immobility (Question 1 in Part 5) and Partial

Immobility (Questions 2 in Part 5) increase by 9% and 10% respectively .

Part 3	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 2				5.7*
Treatment 1	82%	9%	9%	
Treatment 2	71%	20%	9%	
Part 5	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 1				5.97**
Treatment 1	78%	15%	7%	
Treatment 2	87%	5%	8%	
Question 2				8.38**
Treatment 1	69%	30%	1%	
Treatment 2	79%	16%	5%	

Table 2.20: questions in which subjects' preferences are statistically different between Treatments 1 and 2; *,**,***, denote rejection at 10, 5, 1% significance levels; the χ^2 test of homogeneity is for the null hypothesis that answers in treatments 1 and 2 can be viewed as if draw from the same population.

The direction of these effects seems to highlights that people endowed with high natural ability deserve higher chances of remaining in the high wealth class than people endowed with low talent and skills. Indeed, results in Table 2.20 point out the higher proportion of preferences for immobility in the wealth evolution among generations in Treatment 2 than Treatment 1 at least in three questions.

2.7.3 Treatment 3

Treatment 3 consists of two features. First, the object of subjects' choices is the mobility between two periods of the same generation. Second, the wealth inequality is due only to life chance.

As in the previous treatments, we show subjects' preferences in two tables,

Table 2.21 and Table 2.22.

Treatment 3

Part 1	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	37%	28%	35%	1.42	1.55
Question 2	24%	68%	8%	22.31***	61.05***
Question 3	12%	79%	9%	52.89***	100.16***
Part 2	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	27%	31%	42%	0.39	3.72
Question 2	21%	65%	14%	23.75***	49.05***
Question 3	15%	71%	14%	40.01***	70.05***
Part 3	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	71%	13%	16%	43.61***	70.16***
Question 2	78%	11%	11%	54.00***	96.00***
Question 3	79%	9%	12%	59.21***	100.16***
Part 4	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	5%	80%	15%	69.56***	105.55***
Question 2	4%	80%	16%	75.60***	110.72***
Question 3	2%	79%	19%	79.18***	105.05***
Part 5	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	82%	10%	8%	59.88***	112.72***
Question 2	76%	19%	4%	36.12***	91.72***
Question 3	70%	25%	5%	23.31***	79.18***

Table 2.21: subjects' preferences in Treatment 3; *,**,***, denote rejection at 10, 5, 1% significance levels; "Soc. A." and "Soc. B." stand for Society A and Society B respectively, while "Indif." stands for indifference; the d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, that is $H_0 : p(A) = p(B) = \frac{1}{2}$; the r test is for the null hypothesis of aggregate random answers, that is H_0: $p(A) = p(B) = p(I) = \frac{1}{3}$.

Subjects' preferences in Part 1 seem to show that exchange mobility has social value also in the intragenerational mobility scenario. Accordingly, transition probabilities between wealth classes are socially relevant also considering the wealth evolution among periods of the same generations. This result implies that preferences predictions of equation (2.1) assuming not separable utility functions among periods do not seem to correspond to subjects' preferences in Part 1.

Next, none of the preferences predictions of equation (2.4) considering both condition (2.2) and condition (2.3) is consistent with subjects' choices in Part 1. Therefore, social preferences for mobility seem to be not primarily determined by aversions to wealth inequality and fluctuation among periods also in the intragenerational mobility scenario. Furthermore, subjects' preferences in the first part seem to highlight the social importance of Stochastic Independence also when considering the wealth evolution among periods. Indeed, 68% of subjects prefer Stochastic Independence (Society B) to Partial Immobility (Society A) in Question 2, while 79% of subjects prefer Stochastic Independence (Society B) to Partial Reverse (Society A) in Question 3.

Question 4	
Question 1	22%
Question 2	11%
Question 3	11%
Questions 1 and 2 are equally socially preferable	3%
Questions 1 and 3 are equally socially preferable	0%
Questions 2 and 3 are equally socially preferable	42%
Questions 1, 2 and 3 are equally socially preferable	12%

Table 2.22: subjects' preferences expressed in Question 4 of Part 1 (Treatment 3); Question 4 is: "Consider your preferred societies in each Question from 1 to 3, in which question is there you most preferred society?"

Moving from Part 1 to Part 2, the introduction of high wealth inequality and fluctuation among periods determines lower preferences for Perfect Immobility (Society A in Question 1), while mobility as Stochastic Independence has still high social value (Society B in Questions 2 and 3). Moreover, in Parts 1 and 2 the value of the d test does reject the hypothesis of equal proportion of preferences between Perfect Immobility and Complete Reverse. Finally, both in Part 1 and Part 2 subjects' preferences for Stochastic Independence is higher when compared to Partial Reverse than Partial Immobility.

Next, subjects' preferences in Part 3 pinpoint the relevance of people's ex ante wealth opportunities also in the intragenerational mobility scenario. Indeed, societies characterized by equality of opportunities as ex ante mobility level (Society A in Questions 1,2 and 3) are largely preferred to the others one (Society B in Questions 1, 2 and 3).

Subjects' choices in Part 4 highlight that aversions to wealth fluctuation (Question 2) and wealth inequality among periods (Question 3) are socially relevant also in the intragenerational mobility scenario. Furthermore, subjects' choices in Question 1 emphasize that mobility as Stochastic Independence does not moderate both social aversions. In fact, 81% of subjects prefer low wealth inequality and fluctuation (Society B) despite the wealth evolution among periods is characterized by equality of opportunities both in Society A and Society B.

Finally, answers in Part 5 pinpoint that subjects are not willing to tolerate high wealth fluctuation (Question 2) and inequality (Question 3) among periods in order to achieve Stochastic Independence as mobility level among periods. In fact, they prefer some level of rigidity in the mobility process associated with low wealth inequality and fluctuation (Society A in Questions 2 and 3) rather than Stochastic Independence associated with high wealth inequality and fluctuation (Society B in Questions 2 and 3). In the same way, subjects are not willing to tolerate high wealth fluctuations in order to achieve low wealth inequality among periods (Society B in Question 1).

Part 1	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 3				6.04**
Treatment 1	6%	84%	10%	
Treatment 3	15%	71%	14%	
Part 5	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 2				4.73*
Treatment 1	69%	30%	1%	
Treatment 3	76%	19%	4%	

Table 2.23: questions in which subjects' preferences are statistically different between Treatments 1 and 3; *,**,***, denote rejection at 10, 5, 1% significance levels; the χ^2 test of homogeneity is for the null hypothesis that answers in Treatments 1 and 3 can be viewed as if draw from the same population.

Table 2.23 shows questionnaire parts and the related questions for which the difference between Treatments 1 and 3 is significant (the remaining parts are reported in the appendix). The results point out the lower proportion of preferences for Stochastic Independence (Society B in Question 3) in the intragenerational mobility scenario than the intergenerational one when Stochastic Independence is compared with Partial Reverse. Moreover, the difference between Treatments 1 and 3 in Question 2 of Part 5 seems to go in the same direction. Specifically, in Treatment 3 there is a lower proportion of preferences for Stochastic Independence associated with high wealth inequality and fluctuation in Treatment 3 than Treatment 1.

Therefore, the introduction of intragenerational mobility scenario seems to decrease the social value of Stochastic Independence at lest in two questions between Treatments 1 and 3.

2.7.4 Treatment 4

Treatment 4 is characterized by two features. First the object of subjects' choices is the mobility between two periods of the same generation. Second, the wealth inequality in the first period is due to people's natural ability.

Firstly, the analysis of Part 1 confirms that subjects value exchange mobility in the intragenerational mobility scenario. Moreover, mobility as Stochastic Independence (Society B) is still preferred to Partial Immobility (Society A) in Question 2 and to Partial Reverse (Society B) in Question 3. Nevertheless, answers to Question 2 are characterized by a high proportion of preferences for Partial Immobility (31%). Accordingly, none of the preferences predictions implied by equations (2.1) and (2.4) is consistent with subjects' preferences in Part 1.

Moving from Part 1 to Part 2, the introduction of high wealth inequality and fluctuations among periods determines both lower preferences for Perfect Immobility and for Partial Immobility by 13% and 10%, respectively. Furthermore, subjects' choices in Parts 1 and 2 seem to confirm the asymmetric aversion to wealth inequality and fluctuations. Specifically, preferences for Stochastic Independence in Part 1 increase from 61% to 76% between Questions 2 and 3. Subjects' preferences in Part 2 go in the same direction. Finally, the value of d test does not rejects the hypothesis that preferences for Perfect Immobility and Complete Reverse are equally distributed in Question 1 of Parts 1 and 2.

Treatments 4

Part 1	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	40%	32%	28%	1.02	2.77
Question 2	31%	61%	8%	10.24***	44.93***
Question 3	15%	76%	9%	45.34***	90.40***
Part 2	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	27%	35%	38%	0.94	1.77
Question 2	21%	62%	17%	22.25***	41.74***
Question 3	12%	80%	8%	44.59***	70.05***
Part 3	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	76%	9%	15%	57.30***	90.40***
Question 2	68%	16%	16%	34.08***	58.58***
Question 3	73%	13%	14%	46.34***	78.73***
Part 4	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	5%	90%	5%	80.39***	105.55***
Question 2	2%	89%	9%	91.16***	110.72***
Question 3	4%	88%	8%	84.64***	105.05***
Part 5	**Soc. A**	**Soc. B**	**Indif.**	d	r
Question 1	81%	13%	6%	53.68***	110.88***
Question 2	72%	23%	5%	27.27***	76.64***
Question 3	73%	19%	8%	33.64***	77.13***

Table 2.24: subjects' preferences in Treatment 4; *,**,***, denote rejection at 10, 5, 1% significance levels; "Soc. A." and "Soc. B." stand for Society A and Society B respectively, while "Indif." stands for indifference; the d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, that is $H_0 : p(A) = p(B) = \frac{1}{2}$; the r test is for the null hypothesis of aggregate random answers, that is H_0: $p(A) = p(B) = p(I) = \frac{1}{3}$.

The analysis of subjects' preferences in Parts 3, 4 and 5 seem to confirm the results of the previous treatments. Specifically, the ex ante wealth opportunities in the mobility process are socially relevant (Part 3). Furthermore, subjects are adverse to both wealth inequality and fluctuation among periods, while they still prefer low wealth inequality and fluctuations also when both mobility processes are characterized by equality of opportunities (Part 4). Finally, subjects seem to prefer some form of rigidity in the mobility process associated with low wealth inequality and fluctuation than Stochastic Independence associated with high wealth inequality and fluctuation among periods (Part 5).

Question 4 (Part 1)	
Question 1	16%
Question 2	18%
Question 3	17%
Questions 1 and 2 are equally socially preferable	4%
Questions 1 and 3 are equally socially preferable	2%
Questions 2 and 3 are equally socially preferable	32%
Questions 1, 2 and 3 are equally socially preferable	11%

Table 2.25: subjects' preferences expressed in Question 4 of Part 1; Question 4 is: "Consider your preferred societies in each Question from 1 to 3, in which question is there you most preferred society?"

Table 2.26 shows the parts of the questionnaire for which the hypothesis of homogeneity between Treatments 3 and 4 is rejected.

Part 4	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 1				5.20^{*}
Treatment 3	5%	80%	15%	
Treatment 4	5%	90%	5%	
Question 3				6.13^{*}
Treatment 1	2%	79%	19%	
Treatment 4	4%	88%	8%	

Table 2.26: questions in which subjects' preferences are statistically different between Treatments 3 and 4; *,**,***, denote rejection at 10, 5, 1% significance levels; the χ^2 test of homogeneity is for the null hypothesis that answers in Treatments 3 and 4 can be viewed as if draw from the same population.

The introduction of natural ability as source of wealth inequality in the intragenerational mobility scenario seems to increase the social aversion to wealth inequality and fluctuation among periods when both societies are characterized by Stochastic Independence (Question 1 of Part 4). Moreover, the proportion of preferences for Stochastic Independence (Society A) in Question 3 increases by 9% when compared to Partial Immobility (Society B) between Treatments 3 and 4. This results seems to highlight the higher aversion to wealth fluctuation among periods when the wealth inequality is due to natural ability in Treatment 4 than Treatment 3.

Table 2.27 shows the only question for which the hypothesis of homogeneity between Treatments 2 and 4 is rejected. The results highlight that, given the same source of wealth inequality (natural ability), preferences for Complete Reverse (Society B) in Part 2 increase by 15% moving from intergenerational mobility scenario to intragenerational one. At the same time, there is a decrease of preferences both for Perfect Immobility (by 6%) and for Indifference (9%).

Part 2	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 1				6.80**
Treatment 2	33%	20%	47%	
Treatment 4	27%	35%	38%	

Table 2.27: questions in which subjects' preferences are statistically different between Treatments 2 and 4; *,**,***, denote rejection at 10, 5, 1% significance levels; the χ^2 test of homogeneity is for the null hypothesis that answers in Treatments 2 and 4 can be viewed as if draw from the same population.

Finally, Table 2.28 shows the parts of the questionnaire for which the hypothesis of homogeneity between Treatments 1 and 4 is rejected. The differences between these two treatments result from the variation of two experimental variables. In fact, Treatment 1 consists of intergenerational mobility and life chance, while Treatment 4 consists of intragenerational mobility and natural ability. Therefore, the differences in Table 2.28 may emphasize the sum of two experimental variables: mobility scenario and origin of wealth inequality.

Starting from Question 1 of Part 1, Treatment 4 is characterized by higher preferences for Complete Reverse (Society B) than Treatment 1. This result seems to be due to the intragenerational mobility scenario. In fact, the proportion of preferences for Complete Reverse in Part 1 does not change substantially between Treatments 1 and 2 as well as between Treatments 3 and 4. Conversely, subjects' preferences for Complete Reverse increase by 6% between Treatments 1 and 3, and by 11% between Treatments 2 and 4. Moreover, data in Table 2.27 highlight the same result considering subjects' preferences in Part 2.

Next, data regarding Question 2 of Part 1 point out the higher proportion of preferences for Partial Immobility (Society A) in Treatment 4 than Treatment 1. This result seems to be due to the sum of two experimental variables: intragenerational mobility scenario and natural ability as source of wealth inequality. Indeed, subjects' preferences for Partial Immobility in Part 1 do not change between Treatments 1 and 2. Vice versa, subjects' preferences for Partial Immobility increases by 5% between Treatments 1 and 3 and by a further 6% between Treatments 3 and 4.

Moving from Part 1 to Part 2, the differences in Questions 2 and 3 between Treatments 1 and 4 seem to be due to the low proportion of preferences for Partial Immobility (Society A in Question 2) and Partial Reverse (Society A in Question 3) in Treatment 1. In fact, the proportion of preferences for Partial Immobility is 22% in Treatment 2, 21% in Treatment 3 and 21% in Treatment 4. In the same way, the proportion of preferences for Partial Immobility is 12% in Treatment 2, 15% in Treatment 3 and 12% in Treatment 4.

Considering the difference in Part 3, the higher proportion of preferences for Partial Immobility (Society B) in Treatment 4 than Treatment 1 seems to be due to the origin of wealth inequality. Indeed, subjects' preferences for Partial Immobility as ex ante mobility level increases by 9% between Treatments 1 and 2. Furthermore, this difference is statistically significant (Table 2.19). In the same way, subjects' preferences for Partial Immobility as ex ante mobility level increases by 10% between Treatments 3 and 4. Conversely, the same preferences do not change substantially between Treatments 1 and 3 as well as between Treatments 2 and 4.

Finally, Table 2.28 shows the differences between Treatments 1 and 4 considering subjects' choices in Part 4. Starting from Question 1, the higher proportion of preferences for Stochastic Independence in Treatment 4 than Treatment 1 is mainly driven by natural ability as source of wealth inequality in the intragenerational mobility scenario. Indeed, subjects' preferences for Stochastic Independence do not change fundamentally between Treatments 1 and 2. Vice versa, the difference between Treatments 3 and 4 is statistically significant (Table 2.26). The same consideration holds also for the higher proportion of preferences for Stochastic Independence in Question 2 of Part 4. Specifically, preferences for Stochastic Independence increase from 79% to 84% moving from Treatment 1 to Treatment 2. Moreover, the same preferences increase from 80% to 89% between Treatments 3 and 4.

To sum-up, the between treatments analysis highlights three important results.

First, the origin of wealth inequality seems to affect differently subjects' preferences in the two mobility scenarios. Specifically, in intergenerational mobility scenario it determines lower preferences for equality of opportunities when the latter is characterized by high wealth inequality and fluctuation. Vice versa, in intragenerational scenario, it implies higher aversion to both wealth inequality and wealth fluctuation among periods when the mobility process is characterized by Stochastic Independence. However, both in intergenerational mobility scenario and intragenerational one, there is a higher proportion of preferences for some form of rigidity in the mobility process when the wealth inequality is due to people's natural ability.

Second, the intragenerational mobility scenario is characterized by lower aversion to wealth reversal among periods (generations) than the intergenerational one. This results holds independently from the origin of wealth inequality.

Finally, the high social value of Stochastic Independence does not change substantially between the four treatments.

Part 1	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 1				5.00^{*}
Treatment 1	38%	22%	40%	
Treatment 4	40%	32%	28%	
Question 2				4.93^{*}
Treatment 1	19%	72%	9%	
Treatment 4	31%	61%	8%	
Part 2	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 2				4.69^{*}
Treatment 1	16%	75%	9%	
Treatment 4	21%	62%	17%	
Question 3				6.44^{**}
Treatment 1	6%	84%	10%	
Treatment 4	12%	80%	18%	
Part 3	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 2				5.63^{*}
Treatment 1	81%	10%	9%	
Treatment 4	68%	16%	16%	
Part 5	**Soc. A**	**Soc. B**	**Indif.**	χ^2
Question 1				4.76^{*}
Treatment 1	6%	80%	14%	
Treatment 4	5%	90%	5%	
Question 2				5.33^{**}
Treatment 1	7%	79%	14%	
Treatment 4	2%	89%	9%	

Table 2.28: questions in which subjects' preferences are statistically different between Treatments 1 and 4; *,**,***, denote rejection at 10, 5, 1% significance levels; the χ^2 test of homogeneity is for the null hypothesis that answers in Treatments 1 and 4 can be viewed as if draw from the same population.

2.8 Final remarks

Subjects' preferences in our questionnaire experiment highlight several important results regarding mobility evaluation.

First of all, mobility as Stochastic Independence has high social value both in the intergenerational mobility scenario and in the intragenerational one. Therefore, a society characterized by Stochastic Independence as mobility level seems to be an important social goal considering both the wealth evolution among generations and periods. However, subjects are not willing to tolerate high levels of wealth inequality and fluctuation among generations (periods) in order to achieve Stochastic Independence as mobility level. Indeed, they prefer some form of rigidity in the mobility process associated with low wealth inequality and fluctuation rather than Stochastic Independence associated with high wealth inequality and fluctuation.

Furthermore, people's ex ante wealth opportunities in the mobility process are socially relevant. Specifically, Stochastic Independence has high social value also when considering ex ante people's wealth opportunities within each support of the wealth distributions. Thereby, we should be careful in the mobility analysis based on both mobility tables and matrices if people face different ex ante wealth opportunities within each support of the wealth distribution.

Finally, the introduction of natural ability as source of wealth inequality seems to affect differently subjects' preferences in the two mobility scenarios. Specifically, in the intergenerational mobility scenario it determines lower preferences for Stochastic Independence when the latter is characterized by high wealth inequality and fluctuation. Vice versa, in the intragenerational mobility scenario, it implies higher aversion to wealth inequality and fluctuation among periods when the mobility process is characterized by Stochastic Independence.

Although our questionnaire does not involve explicitly policy issues, our results point out some interesting insights in terms of public policy debate.

Firstly, the high social value of Stochastic Independence as mobility level pinpoints the importance of ex ante public policy. Specifically, the government should mitigate the role played by variables that are behind people's control in determining their wealth position such as parents' wealth class and family background. In this view a primary important social goal seems to be the redistribution of the wealth opportunities in the mobility process. However, contrary to Kruger (2012) observation, we can not forget about the ex post wealth distribution. Indeed, even if the wealth evolution among generations (periods) is characterized by Stochastic Independence, people seem to be still socially adverse to high wealth inequality and fluctuation among generations (periods). Accordingly, it seems that there is room for government intervention also considering the ex post wealth redistribution.

Finally, the questionnaire approach represents a valuable tool to empirically investigate fairness principles and ethical norms. Specifically, it defines an optimal setting to analyse people's social concern about wealth inequality and mobility. While the former has been largely investigated by the economic literature, the latter represents a more complicated issue because of its multifaceted nature.

The present work adds new pieces of evidence regarding the social relevance of the mobility process. However, it is important to further investigate other mobility dimensions such as people's mobility perception. Moreover, it may be interesting to extend the analysis to other countries in order to emphasize the possible role played by cultural dimensions in determining people's social preferences for mobility.

Chapter 3

An experimental questionnaire on people's perception about intergenerational mobility

Abstract

In this paper we investigate people's perception about two fundamental intergenerational mobility aspects, structural mobility and exchange mobility, through a questionnaire experiment. Furthermore, we provide several mobility scenarios that may affect people's mobility perception about both mobility aspects. We find that both exchange and structural mobility seem to outline subjects' perception about the income variations involved. However, some mobility processes involved by structural mobility seem to be strongly perceived than those involved by exchange mobility. Finally, we find that equality of opportunities may not be perceived as the highest intergenerational mobility level.

Keywords: Intergenerational Mobility, Experimental Questionnaire, Exchange Mobility, Structural Mobility.

JEL Classification: J62, C91

3.1 Introduction

Intergenerational mobility defines the way in which people move in a socio-economic system from the parents' generation to the children's generation. It represents a fundamental social topic that embodies different dimensions. As emphasized by Jantti and Jenkins (2015) in a recent survey: "there are several distinction reasons of why and how income mobility is said to be of interest. There are several distinct reasons, and this is because there are multiple concepts of mobility, each of which arguably has normative validity".

Scholars have provided several approaches to the mobility analysis. The theoretical literature has developed different mobility measures (Shorrocks, 1978; Fields & Ok, 1996; Fields & Ok 1999 for a review of this literature). Furthermore, several welfare models have been developed to evaluate the intergenerational mobility process (Atkinson & Bourdignon, 1982; Markandya, 1982; Gottschalk & Spolaore, 2002).

On the other hand, the empirical literature has analysed the level of intergenerational mobility considering different countries (Jarvis & Jenkins, 1998; Checchi & Peragine, 2010; Chetty et al., 2014; Chetty et al., 2017). Moreover, scholars from different fields have investigated people's beliefs about the chances of moving upward and downward in the mobility process (Krau & X.J.Tan, 2015; Davidai & Gilovich, 2015; Alesina et al., 2018; Cheng & Wen, 2019).

Despite the vast literature presented above, scholars do not seem to have developed a well-established approach to the analysis of intergenerational mobility. This result may be due to the gap between the fields of research. In fact, as pointed out by Fields and Ok (1999): "the income mobility literature is still distressingly from far from being unified on how to measure mobility and make mobility comparison. In part, this is because of lack of agreement on what the underlying concept is, but this is also due the wide gap between those who device measures of income mobility, and those who measure mobility empirically".

The aim of our work is to investigate people's perception about several mobility aspects through a questionnaire approach. The latter has been largely employed to analyse income inequality, both in terms of inequality measures (Amiel & Cowell, 1992; Harrison & Seidl, 1994; Amiel et al., 2001) and inequality social evaluation (Bernasconi, 2002; Bosman & Schokkaert, 2004; Traub et al., 2009). Conversely, few studies have used this approach for investigating people's concern about the intergenerational mobility process (Amiel et al., 2015).

The questionnaire approach can represent a valid empirical setting to analyse people's perceptions about mobility measures for several reasons. Firstly, because the way in which people move in a socio-economic system between generations represents an essential social issue that involves all citizens and affects significantly the public debate. Accordingly, as pointed out by Amiel and Cowell (1992) with respect to the income inequality: "it would be presumptuous to take for granted that only the views of prestigious but narrow specialists should be heeded". In fact, as pointed by the authors: "there is a risk of remaining hostages to convictions that accompany any academic specialism".

Moreover, as emphasized above, one of the main issue of the mobility literature seems to be the gap between the theoretical approach and the empirical one. Accordingly, questionnaire framework may provide a valuable tool to reconcile the theoretical mobility measures developed by the literature with people's actual perception about these measures.

Finally, unlike the analysis of other economic issues, such as expenditure choices, assets purchases and firms' costs, we can not infer people's judgements about mobility measures from their actual behaviour. In the same way, the experimental approach may not provide the optimal empirical setting. Indeed, people's judgements about theoretical measures do not involve monetary incentives for the subjects involved. Conversely, the monetary consequences of the individuals' decisions represent an essential feature of the experimental approach.

Most of the questionnaire studies presented above are based on choices expressed by students without financial incentives. There are several reasons to use university population. Firstly, they are easily recruited. Furthermore, they are used to reasoning about abstract questions. Nevertheless, students are not representative of the entire population. Moreover, as pointed out by Gaertner and Schokkaert (2012): "it may be true that, if the questions are too difficult, some of the respondents may not exert the necessary intellectual effort to answer carefully without monetary payments".

Hence, we run our questionnaire experiment using Amazon Mechanical Turk (Mturk). In the recent years an increased number of economic studies have used this on-line platform to conduct empirical analysis (Saez & Stancheva, 2013; Kuziemco et al., 2015; Nishi et al., 2015).

Considering the main objects of our research Mturk is a valuable tool for two reasons. First, it provides an optimal environment in terms of financial incentives. Indeed, using MTurk individuals' return for completing the questionnaire is a fixed monetary amount. The latter incentives the subjects to focus on the task during the course of the questionnaire. Nevertheless, individuals' final payoff does not depend on their choices in the questionnaire. Moreover, the sample provided by Mturk is more representative than the university population, especially considering the U.S. population (Paolacci et al., 2010).

The paper is divided as follow. Section 2 provides a formal representation of the intergenerational mobility process. Moreover, it points out two mobility aspects developed by the literature: exchange mobility and structural mobility. We also present several scenarios that may affect people's mobility perception about both aspects. Next, Section 3 describes the questionnaire and the main theoretical predictions, while Section 4 pinpoints sample characteristics. Section 5 provides questionnaire results and Section 6 concludes.

3.2 Mobility measures and mobility perception: an overview

Consider a society characterized by two generations: parents and kids. Let Z and Y represent parents' and kids' income distributions respectively. We can represent the intergenerational mobility of this society as the joint distribution of the random variables Z and Y.

Next, assume that within each generation the income status (class) can take only two values: z_l and z_h for parents and y_l and y_h for kids. The sub-script l stands for low income (the poor), while h stands for high income (the rich).

We can summarize the intergenerational mobility of this society by a mobility table (Table 3.1).

	y_l	y_h	Parents' m.d.
z_l	p_{ll}	p_{lh}	$p_{ll} + p_{lh} = p_{l.}$
z_h	p_{hl}	p_{hh}	$p_{ll} + p_{lh} = p_{h.}$
Kids' m.d.	$p_{ll} + p_{hl} = p_{.l}$	$p_{lh} + p_{hh} = p_{.h}$	

Table 3.1: 2 x 2 mobility table

In Table 3.1, p_{ij} represents the relative frequencies of families in the society with parents belonging to income status i and kids belonging to income status j, with $i, j = \{h, l\}$. Furthermore, given the low of large number, p_{ij} can also be view as an estimate of the chance of transition from income status i to j between the two generations.

The row sums, $p_{i.}$ points out parents' relative frequencies of income class i, while the column sums, $p_{.j}$ represents kids' relative frequencies of income class j. Moreover, $p_{i.}$ can be view as parents' chances to be in income class i, while $p_{.j}$ as kids' chance to be in income class j. Clearly, $\sum_i p_{i.} = \sum_j p_{.j} = 1$.

Finally, dividing the value of each cell (p_{ij}) by the row sum ($p_{i.}$) we obtain the relative frequencies of kids in income class j conditional to parents' income class i. Thereby, $p_{ij}/p_{i.}$ can be view as an estimate of the conditional probabilities of kids with parents in class i to move to class j.

Table 3.2 shows the income evolution among generations using a simple example. Firstly, in this society the income is equally distributed between the two generations. It means that $p_{i.} = p_{.j} = 0.5$ with $i, j = \{h, l\}$. Moreover, the income distribution consists of the same supports in both generations: $z_l = y_l = 200$ and $z_h = y_h = 600$. Finally, the probabilities of transition between the two income classes are: $p_{ll} = p_{hh} = 0.35$ and $p_{lh} = p_{hl} = 0.15$. It means that kids who belong to poor parents have 70% chance of remaining poor ($\frac{p_{ll}}{p_{l.}} = \frac{0.35}{0.5} = 0.7$) and 30% of becoming rich ($\frac{p_{lh}}{p_{h.}} = \frac{0.15}{0.5} = 0.3$). In the same way, kids who belong to rich parents have 70% chance of remain rich and 30% of becoming poor. Therefore, the intergenerational mobility process shown in Table 3.2 consists of a positive association between parents' and kids' income status.

	200	600	Parents' m.d.
200	0.35	0.15	0.5
600	0.15	0.35	0.5
Kids' m.d.	0.5	0.5	

Table 3.2

Many scholars have emphasized the relevance of two different aspects of the mobility process: structural mobility and exchange one (Markandya, 1982; Fields & Ok, 1999; Jantti & Jenkis, 2015).

Structural mobility deals with variations between parents' and kids' income marginal distributions $p_{i.}$ and $p_{j.}$. These variations include both changes of income supports between generations and changes of the relative frequencies in each support. In both cases, structural mobility determines variations of the entire economy such as economic growth or economic decline.

Table 3.3 shows two societies. Society A (Table 3.3a) is characterized by economic growth. In fact, kids' income distribution consists of higher supports than parents' one. That is, $y_j > z_i$ for all $i, j = \{h, l\}$. Vice versa, Society B (Table 3.3b) is characterized by economic decline. In fact, kids' income distribution consists of lower supports than parents' one. That is, $y_j < z_i$ for all $i, j = \{h, l\}$.

However, both in Society A and B the chances of transition between income classes as well as the relative frequencies in each income class are the same. Thus, the two societies differ only in terms of income supports between the two generations.

Table 3.4 shows two societies in which the income supports do not change between parents' and kids' generation. Indeed, in both cases $y_j = z_i$ for all $i, j = \{h, l\}$. Nevertheless, Society A (Table 3.4a) consists of economic growth. In fact,

	400	800	P.m.d.
200	0.35	0.15	0.5
600	0.15	0.35	0.5
K.m.d.	0.5	0.5	

(a) Society A: economic growth

	100	300	P.m.d.
200	0.35	0.15	0.5
600	0.15	0.35	0.5
K.m.d.	0.5	0.5	

(b) Society B: economic decline

Table 3.3: structural mobility as variations of the income supports between the two generations.

	200	600	P.m.d.
200	0.15	0.35	0.5
600	0.15	0.35	0.5
K.m.d.	0.3	0.7	

(a) Society A: economic growth

	200	600	P.m.d.
200	0.35	0.15	0.5
600	0.35	0.15	0.5
K.m.d.	0.7	0.3	

(b) Society B: economic decline

Table 3.4: structural mobility as changes of the relative frequencies in the income supports between generations.

the relative frequency of individuals in the high income status increases between parents' and kids' generations. That is, $p_{.h} = 0.5$ and $p_{h.} = 0.7$. Conversely, the intergenerational mobility process of Society B (Table 3.4b) involves economic decline. In fact, the relative frequency of individuals in the high income status decreases between parents' and kids' generations. That is, $p_{.h} = 0.5$ and $p_{h.} = 0.3$. Furthermore, the mobility processes shown in Tables 3.4(a) and 3.4(b) determine different probabilities of transition between income classes. Indeed, the values of p_{ij} are different for all $i, j = \{l, h\}$ in Societies A and B.

The second important mobility aspect is represented by the level of exchange mobility. The latter deals with families' chances of interchange their income status in the mobility process, fixed parents' and kids' income distributions.

Table 3.5 shows three societies characterized by different levels of exchange mobility. These societies consist of two common features. First, the income supports do not change between parents' and kids' generations ($z_l = y_l = 200$; $z_h = y_h = 600$). Moreover, the relative frequencies in each support are constant between the two generations ($p_{.i} = p_{j.} = 0.5$ for all $i, j = h, l$). Nevertheless, societies in Table 3.5 differ in terms of families' chances of interchange their income positions in the mobility process.

Table 3.5(a) shows a society in which kids who belong to rich families remain rich, while kids who belong to poor families remain poor. That is, $p_{lh} = p_{hl} = 0$ and $p_{ll} = p_{hh} = 0.5$. Therefore, Perfect Immobility determines a complete positive association between parents' and kids' income classes.

	200	600	P.m.d.
200	0.5	0	0.5
600	0	0.5	0.5
K.m.d.	0.5	0.5	

(a) Perfect Immobility

	200	600	P.m.d.
200	0.4	0.1	0.5
600	0.1	0.4	0.5
K.m.d.	0.5	0.5	

(b) Partial Immobility

	200	600	P.m.d.
200	0.25	0.25	0.5
600	0.25	0.25	0.5
K.m.d.	0.5	0.5	

(c) Stochastic Independence

Table 3.5: three societies characterized by three different exchange mobility levels and no structural mobility

Vice versa, Table 3.5(b) shows a society in which there is still a positive association between parents' and kids' generations, however the latter is lower than Perfect Immobility. Indeed, kids who belong to poor parents have 80% chance of remaining poor and 20% of becoming rich. Moreover, kids who belong to rich parents have 80% chance to remain rich and 20% of becoming poor. That is, p_{lh} $= p_{hl} = 0.1$ and $p_{ll} = p_{ll} = 0.4$.

Finally, Stochastic Independence (Table 3.5c) entails that each kid has the same chances of becoming rich or poor independently from their parents' income class. The latter condition implies $\frac{p_{ij}}{p_{i.}} = p_{.j}$ for all $i, j = \{h, l\}$. In fact, the chances of transition between income classes in Table 3.5(c) are: $\frac{p_{ll}}{p_{l.}} = \frac{p_{lh}}{p_{l.}} = \frac{p_{hl}}{p_{h.}} = \frac{p_{hh}}{p_{h.}} =$ 0.5.

The mobility process shown in Table 3.5(c) is usually denoted as equality of opportunities. Indeed, mobility as Stochastic Independence does not predetermine the income evolution among generations.

The degree of exchange mobility between mobility tables can be analysed by the *odd ratio* (*or*). The latter, for a generic 2 x 2 mobility table, is defined as *or* $= \frac{p_{ll}/p_{lh}}{p_{hl}/p_{hh}}$.

The odd ratio is a measure of income association between generations. In fact, the *or* is a ratio between the chances of kids who belong to poor families to remain poor rather than become rich, with respect to the chances of kids who belong to rich families to become poor, rather than remain rich.

The value of the odd ratio increases with higher levels of positive income association between generations. Indeed, the *or* tends to ∞ in the case of Perfect Immobility (Table 3.5a), while Partial Immobility (Table 3.5b) and Stochastic Independence (Table 3.5c) are characterized by an *or* equals to 16 and 1, respectively.

	400	800	P.m.d.
200	0.5	0	0.5
600	0	0.5	0.5
K.m.d.	0.5	0.5	

(a) Society A

	400	800	P.m.d.
200	0.4	0.1	0.5
600	0.1	0.4	0.5
K.m.d.	0.5	0.5	

(b) Society B

Table 3.6

Following the above discussion, the mobility literature has emphasized two important aspects involved in the intergenerational mobility process: exchange mobility and structural mobility. Thus, a first important aim of our work is to test people's mobility perception about these mobility aspects.

Starting from exchange mobility, a relevant point is whether societies characterized by lower values of *or* are effectively perceived as more mobile. In fact, in terms of exchange mobility, societies characterized by lower (positive) association between parents' and kids' income status are usually defined as more mobile.

Focusing on the mobility representation in Table 3.1, it means that moving probabilities weight from the main diagonal (p_{ll} and p_{hh}) there is higher mobility. The latter condition implies that equality of opportunities (Table 3.5c) is more mobile than Partial Immobility (Table 3.5b), while the latter is more mobile than Perfect Immobility (Table 3.5a).

Accordingly, do people perceive mobility tables characterized by lower values of *or* as more mobile? That is, we investigate whether mobility tables in which families have higher chances of interchange their income classes in the mobility process are effectively perceived as more mobile.

The second mobility aspect, structural mobility, involves changes between parents' and kids' income distributions.

Table 3.6 shows two societies: Society A (Table 3.6a) and Society B (Table 3.6b). The former is characterized by Perfect Immobility as exchange mobility level ($or = \infty$), while the latter by Partial Immobility ($or = 16$). Moreover, in both societies kids' income distribution is composed by higher supports than parents' one.

In terms of mobility comparison, societies in Tables 3.5(a) and 3.6(a) are characterized by the same level of exchange mobility ($or = 16$). The same holds considering societies in Tables 3.5(b) and 3.6(b), $or = \infty$. However, societies in Tables 3.5(a) and 3.5(b) are characterized by no structural mobility, while societies in Tables 3.6(a) and 3.6(b) consist of economic growth as higher supports in kids' income distribution than parents' one.

A first important point is whether changes of the income supports between generations affect people's mobility perception. If this is the case, then people's

	200	600	P.m.d.
200	0.15	0.35	0.5
600	0.15	0.35	0.5
K.m.d.	0.3	0.7	

(a) Society C

	200	600	P.m.d.
200	0.3	0.2	0.5
600	0	0.5	0.5
K.m.d.	0.3	0.7	

(b) Society D

Table 3.7

mobility perception may change comparing societies in Tables 3.5(a) and 3.5(b) and societies in Tables 3.6(a) and 3.6(b).

Furthermore, does structural mobility modify people's perception about the exchange one? That is, we investigate whether mobility tables characterized by lower values of *or* are still perceived as more mobile when the mobility process involves also changes of the income supports between generations.

Variations between parents' and kids' income distributions may alter people's mobility perception in two ways. In one case, people's mobility perception may be mainly driven by the presence of higher income supports in kids' income distribution than parents' one (Table 3.6). In this perspective, when the intergenerational mobility process involves higher income status for all kids, people's mobility perception about families' chances of interchange their income status in the mobility process may be lower. If this is the case, Partial Immobility may be perceived as less mobile between societies in Tables 3.6(a) and 3.6(b) than between societies in Tables 3.5(a) and 3.5(b). Conversely, changes of the supports between parents' and kids' income distributions may not alter people's mobility perception about families' probabilities of interchange their income classes in the mobility process. If the latter condition holds, Partial Immobility may be perceived as more mobile both between societies in Tables 3.6(a) and 3.6(b) and between societies in Tables 3.5(a) and 3.5(b).

Structural mobility deals also with changes of the relative frequencies in the income supports between generations (Table 3.4). In this case, structural mobility involves variations of families' probabilities of interchange their income status in the mobility process. In case of economic growth, the intergenerational mobility process determines higher chances of becoming rich (Table 3.4a), while in case of economic decline higher probabilities of becoming poor (Table 3.4b).

Table 3.7 shows two societies. The latter are characterized by the same economic growth. In both societies kids' income distribution consists of higher frequencies in the high support than parents' one. However, they differ in terms of families' chances of interchange their income classes in the mobility process. Society C is characterized by $or = 1$, while Society D is characterized by $or = \infty$.

In terms of mobility comparison, societies in Tables 3.7(a) and 3.5(c) consist of the same value of $or = 1$, while societies in Tables 3.7(b) and 3.5(a) are both characterized by an $or = \infty$. Therefore, societies in Tables 3.7(a) and 3.5(c) consist of the same families' probabilities of interchange their income classes in the mobility process. The same holds considering societies in Tables 3.7(b) and 3.5(a). Nevertheless, all families have higher chances of becoming rich in societies of Table 3.7 than societies of Table 3.5.

Accordingly, we analyse whether changes of the frequencies in the income supports between generations affect people's mobility perception. If this is the case, then people's mobility perception may change comparing societies in Tables 3.5(a) and 3.5(c) and societies in Tables 3.7(a) and 3.7(b). Furthermore, we investigate whether changes of the relative frequencies in the income supports between generations affect people's perception about exchange mobility. Indeed, the higher chances of reach higher income classes may affect people's perception about families' probabilities of interchange their income status in the mobility process. If this is the case, Stochastic Independence may be perceived as less mobile between societies in Tables 3.7(a) and 3.7(b) than between societies in Tables 3.5(a) and 3.5(c). Vice versa, people's mobility perception may be still mainly driven by the degree of association of the income status between generations. If this is the case, then societies characterized by lower value of *or* may be still perceived as more mobile. If the latter condition holds, Stochastic Independence may be perceived as more mobile both between societies in Tables 3.7(a) and 3.7(b) and between societies in Tables 3.5(a) and 3.5(c).

Next, we investigate whether changes in the income supports between generations (Table 3.6) and changes of the relative frequencies in each support (Table 3.7) are perceived as equivalent in terms of intergenerational mobility. In fact, both variations deal with structural mobility. However, they may have a different impact on people's mobility perception. Indeed, in one case (Table 3.6) structural mobility does not involve changes of families' probabilities of interchange their income classes, while in the second case (Table 3.7), change of the income distribution between generations modifies the chances of transition between income status.

A further significant point concerning the mobility aspects presented above deals with negative associations between parents' and kids' income classes. The welfare literature has developed several models in which the rank reversal between parents' and kids' economic status has social value. Atkinson and Bourguignon (1982) have provided a model in which, under some conditions, the welfare function is maximized with Complete Reverse (Table 3.6). The latter mobility level implies that kids who belong to poor families become rich, while kids who belong to rich families become poor. Also the model proposed by Gottshalck and Spolaore (2002) pinpoints the social relevance of rank reversal of income classes between generations considering a different welfare framework. Furthermore, Shorrocks (1978) in his axiomatic approach to mobility measures highlights the conflict between mobility as Stochastic Independence and Complete Reverse .

Despite the literature presented above, few attempts have be made to analyse people's mobility perception about rank reversal of the economic status between generations (Bernasconi and Dardanoni, 2005). However, on theoretical ground, it is interesting to analyse people's perception about non-positive association between parents' and kids' income classes at least for two reasons.

Firstly, because mobility tables characterized by lower positive income associations between generations are usually defied as more mobile. In this perspective the highest exchange mobility level implies Stochastic Independence. The latter is characterized by an $or = 1$. However, societies characterized by non-positive association of income status between generations may be perceived as more mobile than equality of opportunities. That is, mobility tables characterized by an odd ratio lower than 1 may be perceived as more mobile than Stochastic Independence. In this perspective, the highest mobility level may imply $or = 0$. Conversely, Stochastic Independence may be perceived as the highest exchange mobility level not only considering positive associations of the income status between generations, but including also the negative one. Hence, the highest mobility level may imply $or = 1$ considering all possible income associations between generations.

Second, the empirical investigation of people's perception about rank reversal of income status may point out the theoretical affinity (or discrepancy) between two complementary aspects of the intergenerational mobility process: mobility measurement and mobility evaluation. That is, Complete Reverse may be relevant not only considering welfare models, but also mobility measures.

Table 3.8 shows a society characterized by Complete Reverse as exchange mobility level . Indeed, the intergenerational mobility process consists of complete negative association between parents' and kids' income status. That is, all kids who belong to rich families become poor, while all kids who belong to poor families become rich: $p_{lh} = p_{hl} = 0.5$ and $p_{ll} = p_{hh} = 0$. Moreover, Complete Reverse implies $or = 0$.

	200	600	Parents' m.d.
200	0	0.5	0.5
600	0.5	0	0.5
Kids' m.d.	0.5	0.5	

Table 3.8: Complete Reverse

Finally, an interesting issue not well investigated by the literature concerns mobility tables of an order greater than 2 x 2. Table 3.9 shows two societies in which the income distribution consists of three supports: the poor (200), the rich (600) and the very rich (800). Moreover, the income is equally distributed between the two generations in both societies. Vice versa, Societies E and F differ in terms of families' chances of interchange their income classes. In Society E kids from rich and very rich families have the same chances of interchange their relative position, while all kids from poor families remain poor. Conversely, in Society F kids who belong to poor and rich families have the same chances of becoming poor and rich, while they have no chances of becoming very rich. Indeed, all kids who belong to very rich families remain very rich.

	200	600	800	P.m.d.
200	0.33	0	0	0.33
600	0	0.151	0.151	0.33
800	0	0.151	0.151	0.33
K.m.d.	0.33	0.33	0.33	

(a) Society E

	200	600	800	P.m.d.
200	0.151	0.151	0	0.33
600	0.151	0.151	0	0.33
800	0	0	0.33	0.33
K.m.d.	0.33	0.33	0.33	

(b) Society F

Table 3.9: 3 x 3 mobility tables

In terms of exchange mobility comparison, Dardanoni and Forcina (2002) have extended the notion of odd ratio to mobility tables greater than 2 x 2. The related *generalised odd ratios* ($gors$) are composed by the or of all possible 2 x 2 mobility tables obtained by summing up families in adjacent income classes.

Therefore, a first relevant issue is whether mobility tables characterized by lower $gors$ are perceived as more mobile. That is, we investigate whether mobility processes in which families have higher chances of interchange their income position between three income status are perceived as more mobile.

A second important point is whether families' probabilities of interchange their income classes are perceived differently when the switch between income classes occur in different parts of the mobility tables.

The inequality literature has emphasized how the same transfer between lower incomes rather than higher one may have a different impact on the inequality measure. In fact, Kolm (1976b) extending the Pigou-Dalton principle, has proposed the so called "Principle of Diminishing Transfer". The latter implies that there is higher equality if one unit is transfer from one person who earn 500 to a person who earn 100, rather than between a person who earn 900 and another who earn 500.

Similarly, probabilities of interchange income classes in the mobility process may be perceived differently depending on the income supports involved. For example, in Table 3.9(a) the switch between income status occur in the lower part of the income distribution, while in Table 3.9(b) the switch occur between the higher income classes. Thereby, does this difference affect people's mobility perception?

More in general, we test whether the same chances of transition between income status are perceived differently when their occur in different parts of the income distribution.

To sum-up, the intergenerational mobility process embodies several income variations among generations. In this section we have focused on two of them: exchange mobility and structural mobility. Furthermore, we have emphasized several issues that may affect people's perception about these two important mobility aspects. The principal aim of our study is to analyse people's perception about these mobility aspects considering several scenarios through an experimental questionnaire.

3.3 The experimental questionnaire

Our experimental questionnaire consists of two treatments. Each treatment includes three sections: introduction, subjects' choices and a final survey.

The introduction outlines the mobility representation in the questionnaire and subjects' task.

Subjects' choices are composed by 12 questions; 7 out of 10 differ between the two treatments, while 5 out of 12 remain constant between the two. Each question consists of the comparison between a couple of hypothetical societies. Moreover, there are three control questions. Thus, in total there are 15 questions.

The final survey includes informations about gender, age, ethnicity and education. Furthermore, we collect informations about subjects' beliefs about their standard of living, income opportunities and mobility value.

Questionnaire introduction is exactly the same in the two treatments. Thereby, we firstly describe the introduction and then the features of each treatment.

The introduction consists of three parts. The first one explains to the participants the meaning of the intergenerational mobility process. The latter is defined as the process through which people move in a socio-economic system from the parents' generation to the children's generation.

The second part illustrates to the participants their task in questionnaire. The latter consists of a mobility comparison between two hypothetical societies as in Figure 3.1.

Figure 3.1 shows the intergenerational mobility process of two hypothetical societies: Society A and Society B. The latter consist of two generations: the parents and their children. Moreover, in both societies there is an identical number

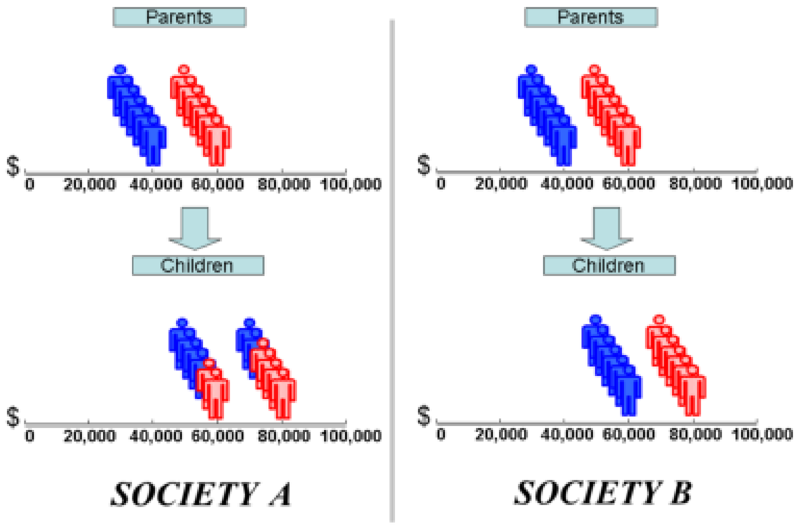


Figure 3.1

of parents and children. Finally, the colour identifies the families. Thus, a blue parent has a blue child and a red parent has a red child.

In Figure 3.1, parents' incomes are shown in the upper part of the display, while children's income are shown in the lower part of the display. For example, in Society A, there are 6 parents depicted in blue with income \$ 40,000, and 6 parents depicted in red with income \$ 60,000. Children's income distribution consists of 6 children with income \$ 60,000 and 6 children with income \$ 80,000. Their colours show the following: 2 children depicted in red with income \$ 60,000 come from parents with income \$ 60,000; and 4 children depicted in blue with income \$ 60,000 come from parents with income \$ 40,000. 4 children depicted in red with income \$ 80,000 come from parents with income \$ 60,000; and 2 children depicted in blue with income \$ 80,000 come from parents with income \$ 40,000.

Figure 3.1 illustrates to the participant how the income is distributed within each generation as well as how it evolves between the two. Accordingly, our mobility representation allows to disentangle the income variations between parents and kids due to exchange mobility (the number of kids that interchange their income classes in the mobility process) from the structural one (variations of the income supports between generations as well as changes of the frequencies in each support).

Finally, the third part of the introduction highlights to the participants informations about the source of income distribution. Specifically, the introduction points out that only different life chances determined parents' income classes in both societies of Figure 3.1. That is, parents' income status do not depend on their own natural ability such as aptitude, talent and skills. Moreover, we specify that this natural ability is randomly distributed among both parents' and children's generations. The introduction ends emphasizing that the incomes in Figure 3.1 are net income after taxes and social transfers.

3.3.1 Treatment 1

As emphasized above, the questionnaire is composed by 12 pairwise comparisons between two hypothetical societies. The latter are shown in three different tables. Questions 1, 2, 3 and 4 in Table 3.10; questions 5, 6 and 7 in Table 3.11; questions 8, 9, 10, 11 and 12 in Table 3.12. Furthermore, questions from 1 to 7 change between the two treatments, while the reaming five are constant between the two.

For each question we provide the associated societies pairwise comparison and the main theoretical implications in terms of mobility measures and perception.

In all questions subjects have to state which society is more mobile between Society A and Society B. The choice is explained to the participants by the following question:"which society do you think is more mobile between Society A and Society B ?".

Starting from questions 1, 2 and 3, societies' pairwise comparisons are between the same levels of exchange mobility and different levels of structural one.

In all three questions, Society A is characterized by Stochastic Independence ($or = 1$), while Society B is characterized by a higher positive income association between generations. Accordingly, the odd ratio of Society B is $or = 4$. Vice versa, question 1 is characterized by no structural mobility, question 2 by economic decline and question 3 by economic growth. Specifically, in question 1 parents' and kids' income distributions consist of the same supports. Conversely, in question 2 kids' income supports are lower than parents' one, while in question 3 the former are higher than the latter.

The aim of the first three pairwise comparisons is twofold. First, we investigate whether people recognize societies characterized by lower values of or as more mobile. That is, we test whether societies in which families have higher chances of interchange their income status in the mobility process are perceived as more mobile. If this is the case, then subjects may choose Society A in question 1.

Second, we test whether changes of supports between parents' and kids' income distribution affect subjects' mobility perception. Furthermore, we analyse whether economic growth and economic decline determine the same mobility perception.

Starting from question 2, the introduction of lower supports in kids' income distribution than parents' one may reinforce people's perception about the level

Treatment 1: questions 1, 2, 3 and 4

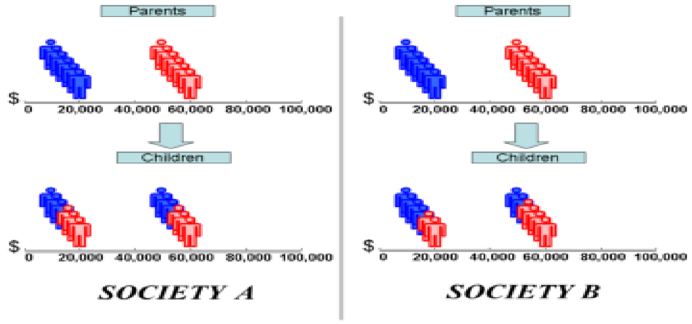
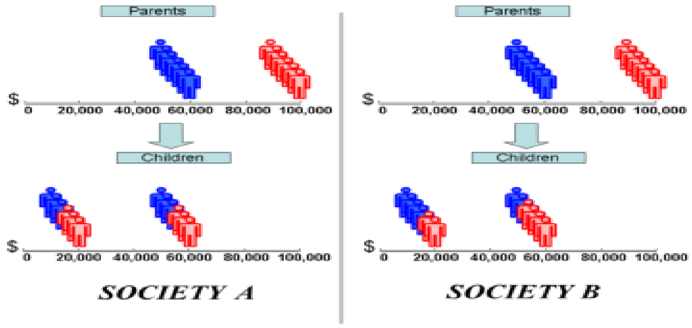
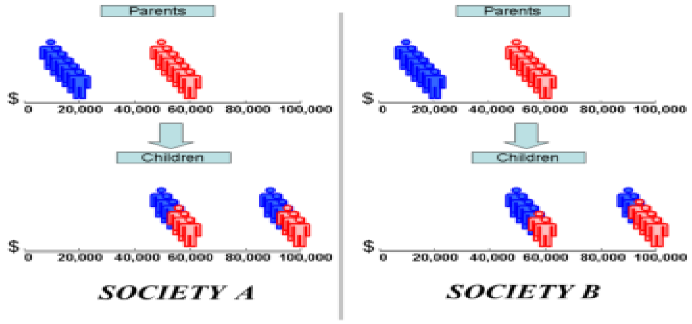
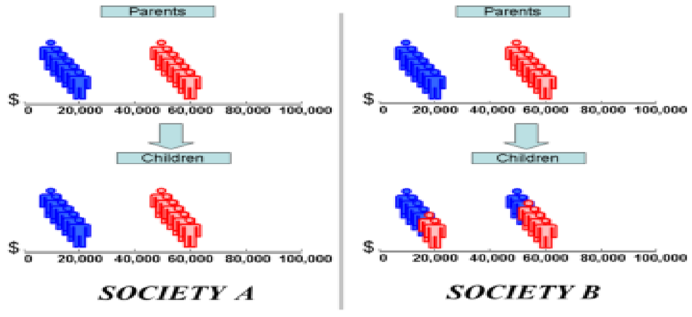
Choices	
	**Question 1**: higher exchange mobility in A than B; *or* = 1 in A; *or* = 4 in B; no structural mobility in A and B.
	**Question 2**: higher exchange mobility in A than B; *or* = 1 in A; *or* = 4 in B; same structural mobility (economic decline) in A and B.
	**Question 3**: higher exchange mobility in A than B; *or* = 1 in A; *or* = 4 in B; same structural mobility (economic growth) in A and B.
	**Question 4**: higher exchange mobility in B than A; *or* = ∞ in A; *or* = 4 in B; no structural mobility in A and B.

Table 3.10

of exchange mobility. That is, when the mobility process involves lower income classes for all kids, families chances of interchange their relative positions in the mobility process may be strongly perceived. If this is the case, then subjects may still choose society with the lower value of *or* as more mobile, Society A.

Conversely, subjects' mobility perception may be mainly driven by changes of income supports between the two generations. That is, families' probabilities of interchange their income status may be weakly perceived. Accordingly, societies characterized by lower values of *or* may no longer be perceived as more mobile. If this is the case, then subjects' choices for Society A may decrease between questions 1 and 2.

Question 3 involves higher income supports for kids' generations than parents' one. If people's mobility perception is mainly driven by the presence of higher income supports in kids generations than parents' one, then families' chances of interchange their income status in the mobility process may be weakly perceived. Hence, subjects' choices for Stochastic Independence (Society A) may decrease between questions 1 and 3. Moreover, if structural mobility as economic growth and economic decline affects subjects' mobility perception in the same way, then subjects' choices in questions 2 and 3 may not change significantly. Vice versa, if the presence of higher income supports in kids' generations than parents' one do not alter people's mobility perception, then subjects' choices may not change substantially between questions 1 and 3.

Question 4 investigates whether the same mobility level is perceived differently when compared with other one. Indeed, in Society B of questions 1 and 4, families have the same chances of interchange their income status ($or = 4$). Vice versa, Society A is characterized by Stochastic Independence in question 1 ($or = 1$) and Perfect Immobility in question 4 ($or = \infty$).

Therefore, if subjects always recognize societies characterized by lower values of *or* as more mobile, then they may choose Society A in question 1 and Society B in question 4. Vice versa, subjects may perceive differently the same chance of interchange income status depending on the the mobility comparison. In fact, the theory of probability overweighting (Kahneman and Tversky, 1979) may suggest that people perceive as very strong a mobility process that moves society away from rigidity, while the same mobility level may be perceived as weaker when it is compared with a society which is already very mobile.

Accordingly, subjects' choices for Society B ($or = 4$) may be higher in questions 4 than choices for Society A ($or = 4$) in question 1. In fact, the same mobility level is compared with Stochastic Independence (Society A) in question 1 and Perfect Immobility (Society A) in question 4.

Next, Table 3.11 shows questions 5, 6 and 7. These questions consist of societies in which kids' and parents' income distributions consist of three supports.

Moreover, in each question families interchange their income classes in different parts of the income distribution. In question 5 kids interchange their income status between the higher income supports, in question 6 between the lower and in question 7 between all income classes.

Moreover, in Societies A of questions 5, 6 and 7, families have higher chances of interchange their income classes than Societies B. Indeed, the latter are characterized by higher values of *gor* than Society A .

The aim of questions 5, 6 and 7 is twofold. First, we test whether subjects' mobility perception is sensitive to the presence of an additional income support. That is, we investigate whether societies characterized by lower values of *gor* are perceived as more mobile. If this the case, then subject may choose Society A in questions 5, 6 and 7.

Second, we test whether subjects' mobility perception change when families interchange their income classes in different parts of the income distribution. As emphasized in Section 2, the "Diminishing Transfer Principle" proposed by Kolm (1979b) may hold also considering the mobility scenario. In this perspective, people's mobility perception may be stronger when the income switch occur between lower income supports than higher ones. If this is the case, then subjects' choices in questions 5 and 6 may changes.

Table 3.12 shows the last five questionnaire choices: questions 8, 9, 10, 11 and 12.

Questions 8 investigates how are perceived mobility processes in which the change of income distribution between generations involves variations of the relative frequencies in each support. In fact, in both societies the relative frequency of kids in the high income class is larger than parents one. That is, all families have higher chances of becoming rich. However, the value of the *or* is lower in Society A ($or = 2$) than Society B ($or = 8$).

The presence of higher probabilities of reach the highest income status may affect people's mobility perception. Specifically, families' chances of interchange their income classes may be weakly perceived. Thus, subjects' choices for Society A and Society B in question 8 may be equally distributed. Vice versa, higher families' chances of becoming rich may not affect people's mobility perception. Hence, subjects may recognize society characterized by lower value of *or* as more mobile (Society A).

In question 9 the variation of income distribution between parents' and kids' generations involves both changes of supports between the two generations and variations of the relative frequencies in each support. However, the value of *or* is still lower for Society A ($or = 2$) than Society B ($or = 8$).

Thereby, question 9 investigates whether changes of the income supports among

Treatment 1: questions 5, 6 and 7

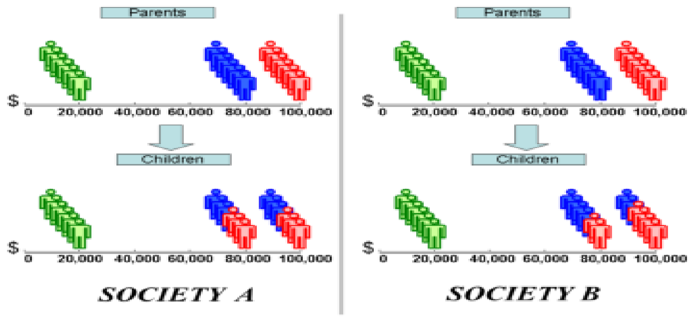
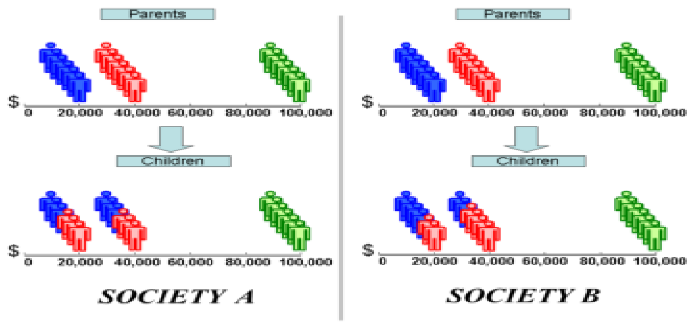
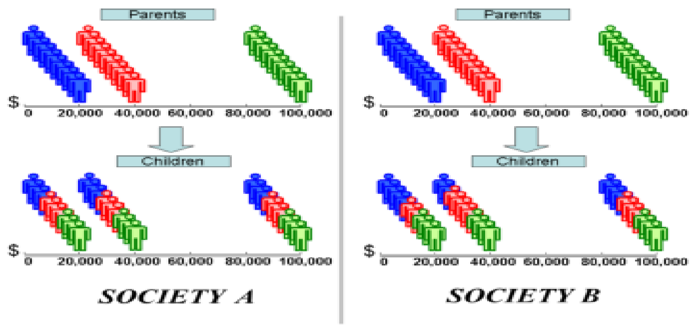
<table>
<tr><th>Choices</th><th></th></tr>
<tr><td>
</td><td>Question 5: higher exchange mobility in A than B; lower values of gor in A than B; families interchange income classes in the higher part of the income distribution in A and B.</td></tr>
<tr><td>
</td><td>Question 6: higher exchange mobility in A than B; lower values of gor in A than B; families interchange income classes in the lower part of the income distribution in A and B.</td></tr>
<tr><td>
</td><td>Question 7: higher exchange mobility in A than B; lower values of gor in A than B; all income classes involved in the mobility process in A and B.</td></tr>
</table>

Table 3.11

generations and changes of the relative frequencies in each support are perceived as equivalent in terms of mobility. Both variations are measured by structural mobility. However, they may have a different impact on people's mobility perception.

If subjects' mobility perception is mainly driven by changes of the income supports among generations, then societies characterized by lower values of *or* may no longer be perceived as more mobile. If this is the case, then subjects' choices for Society A may decrease between questions 8 and 9. Conversely, both variations of income distribution among generations may be perceived as equivalent in terms of mobility. Hence, subjects' choices in questions 8 and 9 may not change substantially.

Next, questions 10, 11 and 12 investigate people's perception about mobility processes that include negative association between parents' and kids' economic classes. Furthermore, choices in questions 10, 11 and 12 involve three extreme exchange mobility levels: Stochastic Independence ($or = 1$), Perfect Immobility ($or = \infty$) and Complete Reverse ($or = 0$).

Specifically, the choice is between Stochastic Independence (Society A) and Perfect Immobility (Society B) in question 10, between Stochastic Independence (Society A) and Complete Reverse (Society B) in question 11, while question 12 adds to the pairwise comparison of question 11 also economic growth as change of income supports between the two generations.

Questions 10 and 11 have two main goals. First, we analyse whether Stochastic Independence is perceived as the highest mobility level considering both positive and negative income associations among generations. If this is the case, subjects may choose Society A in questions 10 and 11.

Vice versa, positive and negative income associations may not be perceived as equivalent in terms of mobility. Specifically, higher negative income associations between generations may be perceived as more mobile than equality of opportunities. Accordingly, subjects' choices for Society A may be lower in question 10 than question 11. The latter result implies that $or = 1$ does not correspond to the highest mobility level.

Second, we analyse how Complete Reverse is perceived with respect to Perfect Immobility. In fact, there is a relevant difference between these two mobility levels in questions 10 and 11. Both mobility levels imply that parents' income position determine the fortune of their offspring. However, Perfect Immobility implies that each family is composed by people who belong to the same income class, while Complete Reverse implies income losses for people who move downward and income gains for people who move upward. Accordingly, loss aversion may affect people's mobility perception. If this is the case, then subjects' choices for Society A may increase between questions 10 and 11.

Finally, question 12 adds changes of income distribution between the two generations to the mobility comparison of question 11. Specifically, kids' income distribution consists of higher supports than parents' one. Thus, in question 12 Complete Reverse does not determine income losses for people who move downward. If loss aversion plays some role in determining subjects' mobility perception, then choices for Society B may be higher in question 12 than question 11. Vice versa, if loss aversion does not affect subjects' mobility perception, then answers to questions 11 and 12 may not change substantially.

3.3.2 Treatment 2

Our experimental questionnaire involves seven different societies pairwise comparison between Treatments 1 and 2. Namely, questions from 1 to 7 change between the two treatments, while questions from 8 to 12 remain constant between the two. Moreover, questionnaire introduction as well as final demographic survey do not change between the two treatments.

Starting from questions 1, 2, 3 and 4, the only difference between the two treatments is the mobility process of Societies B. In fact, in all questions, Societies A are exactly the same between Treatments 1 and 2. Vice versa, the intergenerational mobility process of Societies B changes between the two treatments. Specifically, Societies B of Treatment 2 are characterized by two kids that interchange their income classes in the mobility process. That is, there is one kid that switch from low to high income class and another kid that switch from high to low income class. Conversely, Societies B of Treatment 1 consist of four kids that interchange their income status in the mobility process (Table 3.10).

In the same way, Societies A of questions 5, 6 and 7 do not change between Treatments 1 and 2. Vice versa, the mobility process of Societies B changes between the two. Specifically, Societies B of Treatment 2 consist of two kids that interchange their income status in questions 5 and 6, while in Treatment 1 there are four kids that interchange their income classes in questions 5 and 6 (Table 3.11). However, in both treatments the switch occur in the higher part of the income distribution in question 5 and in the lower one in question 6. Finally, in question 7 there is only one kid that switch from rich to poor families in Treatment 2, while in Treatment 1 there are two kids that switch from rich to poor families in question 7 (Table 3.11).

The principal aim of the between treatments analysis is to test whether the size of the switch between income status affects people's mobility perception. Indeed, as emphasized in the previous section, the theory of probability overweighting (Kahneman and Tversky, 1979) may suggest that people perceive as very strong a mobility process that moves away society from rigidity, while the same mobility level may be perceived as weaker when it is compared with a society which is already mobile. Considering questions 1, 2 and 3, it means that Societies A may

Treatments 1 and 2: questions 8, 9, 10, 11 and 12

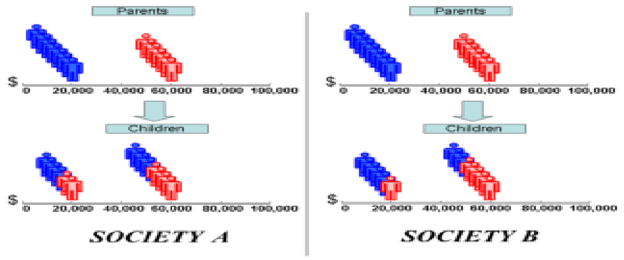
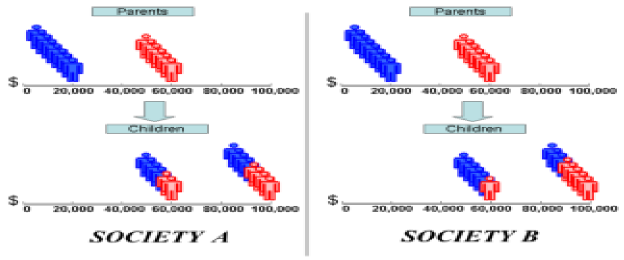
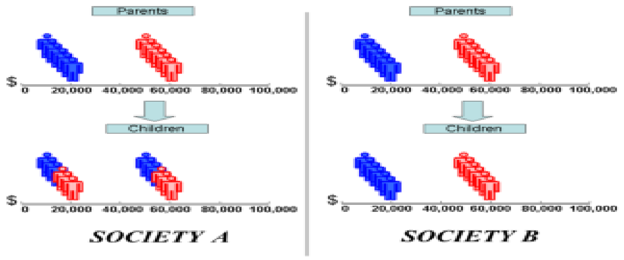
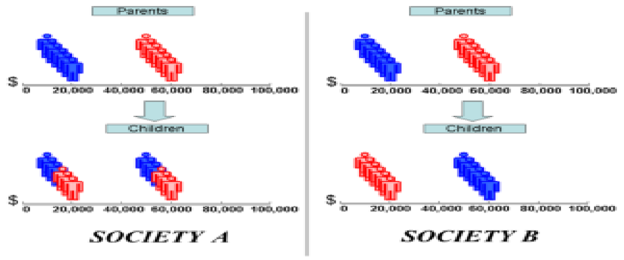
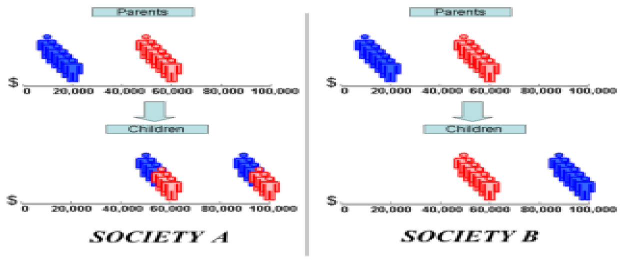
Choices	
	**Question 8**: higher exchange mobility in A than B; same increase of frequencies in the high income status (structural mobility) in A and B.
	**Question 9**: higher exchange mobility in A than B; same increase of frequencies in high income status and higher income supports in kids' distribution in A and B.
	**Question 10**: Stochastic Independence in A; Perfect Immobility in B; no structural mobility in A and B.
	**Question 11**: Stochastic Independence in A; Complete Reverse in B; no structural mobility in A and B.
	**Question 12**: Stochastic Independence in A; Complete Reverse in B; same structural mobility (economic growth) in A and B.

Table 3.12

be perceived as more mobile in Treatment 2 than Treatment 1. Indeed, in the first treatment Stochastic Independence (Societies A) is compared with a more rigid society than Treatment 2. The odd ratio of Societies B in Treatment 1 is $or = 4$, while in Treatment 2 is $or = 27$.

In the same way, Society B in question 4 may be perceived as more mobile in Treatment 2 than Treatment 1. In fact, subjects may be perceive as stronger the mobility process associated to two kids that interchange their income status (Treatment 1), rather than four four kids that interchange their income classes (Treatment 2) when both mobility processes are compared with Perfect Immobility (Society A).

Conversely, subjects mobility perception may not be affected by the size of the switch between income classes. Accordingly, subjects' choices in questions 1, 2, 3 and 4 between Treatments 1 and 2 may not change substantially.

Finally, questions 5, 6 and 7 investigate whether the size of the switch between income classes affects subjects' mobility perception considering mobility processes in which parents' and kids' income distributions consist of three supports.

3.4 The final survey: demographic variables and subjects' beliefs

Treatment	*Number of Subjects*
Treatment 1	127
Treatment 2	115

Table 3.13: number of subjects that correctly completed Treatments 1 and 2

The questionnaire was completed in July 2019 by 258 subjects. The latter were recruited by Amazon Mechanical Turk. They were from U.S. population.

The questionnaire includes three control questions. The latter were not correctly completed by 16 subjects. Thus, the final sample is composed by 242 subjects.

Participants were randomly assigned to the two treatments. Table 3.13 shows the number of subjects that correctly completed each one.

Subjects take on average 11 minutes to complete the questionnaire. The individuals' payment for completing the questionnaire was 1$. The latter corresponds to the minimum U.S. wage for hour. Furthermore, it represents the standard monetary reward in Amazon Mechanical Turk.

Variable	*Percentage*	*Mean*	*s.d.*
Age		35.29	10.62
Gender			
Female	38%		
Ethnicity			
African American	11%		
Asian	8%		
Hispanic	9%		
White	72%		
Education			
High School Diploma	39%		
Bachelor's Degree	50%		
Master's Degree	11%		
Marital Status			
Divorced	8%		
Married or Domestic Partnership	42%		
Single	50%		

Table 3.14: Sample characteristics

Table 3.14 shows the characteristics of our sample. The latter is composed by young people. Moreover, the female gender is slightly under represented, while the level of education is significantly high. In fact, more than 60% of the subjects own at least a bachelor's degree.

Vice versa, our sample seems to be representative about the principal ethnic groups of the U.S. population. Finally, there is a good balance between married (or domestic partner) and single subjects, while there is a low proportion of divorced individuals.

All in all, our sample replicates the main demographic characteristics of MTurk U.S. population. The latter consists of younger subjects' than the U.S. one, with a higher level of education as emphasized by Paolacci et al. (2010).

In addition to the demographic variables shown in Table 3.14, the final survey includes informations about subjects' beliefs regarding their standard of living and income opportunities (Table 3.15). Furthermore, we collect subjects' views about two different intergenerational mobility definitions (Table 3.16).

Table 3.15 shows the aggregate proportion of subjects' answers about three different issues. The first one (S1) investigates subjects' perceptions about their standard of living compared to the average standard in the U.S. The second one (S2) analyses subjects' beliefs about their standard of living compared to their parents, while S3 explores subjects' perception about their income opportunities compared to their parents.

Many scholars have emphasized how individuals' beliefs about intergenerational mobility may affect people's inequality perception and their preferences for redistribution (Piketty, 1995; Benabou & Ok, 2001; Alesina & Angeletos, 2005). Accordingly, questions S1, S2 and S3 investigate whether subjects' beliefs about their standard of living and income opportunities affect their perception about mobility measures.

Answers to first question (S1) emphasize a significant subjects' proportion (37%) who believe to have a lower income status (as standard of living) than the U.S. average, while 51% of subjects believes to have the same one. Moreover, only 15% of the sample thinks to own a higher standard of living than the U.S. average. Vice versa, subjects' beliefs about their standard of living are higher when compared with their parents. In fact, answers to S2 pinpoint that 28% of subjects thinks to own higher standard of living than they parents, while the 37% thinks to have the same level. Subjects' perception about their income opportunities is even better. Indeed, 36% of the sample believes to have higher income opportunities than their parents, while only 31% believes to have the same one.

Next, S4 and S5 (Table 3.16) provide two verbal statements concerning mobility measure and mobility evaluation. As pointed out by Amiel and Cowell (1999), the introduction of verbal statements in the questionnaire may be useful to verify the coherence of subjects' choices in numerical or graphical tasks. In this case, S5 (S4) analyses whether higher chances of interchanges income status in the mobility process are effectively perceived (evaluated) as more mobile (preferred).

Specifically, S4 analyses the desirability of the mobility process as it determines lower association between parents' and children's economic positions. Subjects' answers pinpoint that 69% of the sample agrees that a society characterized by more independence between parents' and children's economic status is socially preferable. S5 investigates subjects' opinions about the relation between equality of opportunities and lower association between parents' and children's income status. 65% of the sample agrees that more independent are parents' and children's economic positions in a society, the more equality of opportunities there is in the society.

	Much Lower	*Lower*	*The same*	*Higher*	*Much Higher*
S1	5%	32%	51%	12%	0%
S2	8%	27%	37%	26%	2%
S3	8%	25%	31%	31%	5%

Table 3.15: aggregate proportion of subjects' answers expressed in questions S1, S2 and S3; where question S1 is: "How would you rank your standard of living with respect to the average standard in U.S ?"; S2 is: "Do you think that your standard of living is higher, lower or equal respect to your parents at your age?"; S3 is "Do you think that your income opportunities are higher, lower or equal respect to your parents at your age?"

	S.Disagree	*Disagree*	*N. Agree or Disagree*	*Agree*	*S.Agree*
S4	0%	4%	27%	56%	13%
S5	0%	6%	29%	48%	17%

Table 3.16: subjects' answers expressed in questions S5 and S6; *S.Disagree* and *S.Agree* stand for strongly disagree and strongly agree respectively; question S4 is: "indicate how much you agree or disagree with the following statement: the more independent are children's and parents' economic position in a society, the more preferable is the society"; question S5 is: "indicate how much you agree or disagree with the following statement: the more independent are children's and parents' economic position in a society, the more equality of opportunity there is in the society".

3.5 Questionnaire results

We summarize subjects' choices in two tables. Table 3.17 shows subjects' answers in Treatment 1, while Table 3.18 shows subjects' choices in Treatment 2.

In both tables the first column identifies the question, while the second and the third one point out the aggregate proportions of choices for "Society A" and "Society B" in each question, respectively. Moreover, the fourth column shows the proportion of answers for "Equally Mobile" between the previous two choices. Finally, the fifth and sixth columns provide the values of two difference-of-proportion test: d and r. The d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, while the r test is for the null hypothesis of aggregate random answers.

	Soc. A	**Soc. B**	**Eq. Mob.**	d	r
Question 1	55%	23%	22%	16.27***	27.13***
Question 2	39%	36%	25%	0.094	3.88
Question 3	42%	38%	20%	0.24	9.74***
Question 4	12.5%	75%	12.5%	56.22***	98.28***
Question 5	50%	30%	20%	6.62***	18.62***
Question 6	52%	27%	21%	10.24***	20.42***
Question 7	43%	26%	31%	5.55**	10.05***
Question 8	59%	30%	11%	12.11***	44.61***
Question 9	37%	45%	18%	0.96	14.42***
Question 10	68%	20%	12%	34.32***	71.87***
Question 11	46%	42%	12%	0.32	26.89***
Question 12	44%	43%	13%	0.009	24.58***

Table 3.17: subject' choices in Treatment 1; *,**,***, denote rejection at 10, 5, 1% significance levels; "Soc. A." and "Soc. B." stand for Society A and Society B respectively, while "Eq. Mob." stands for equally mobile; the d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, that is $H_0 : p(A) = p(B) = \frac{1}{2}$; the r test is for the null hypothesis of aggregate random answers, that is H_0: $p(A) = p(B) = p(E) = \frac{1}{3}$.

Starting from Treatment 1 (Table 3.17), subjects' choices in question 1 seem to pinpoint that societies in which families' have higher chances of interchange their income classes in the mobility process are perceived as more mobile. That is, societies characterized by lower values of *or* seem to be recognize as more mobile. Indeed, 55% of the subjects consider Society A ($or = 1$) more mobile than Society B ($or = 4$).

Considering the answers to questions 2 and 3, changes of supports between parents' and kids' income distributions seem to affect subjects' mobility perception. In fact, in both questions there is a significantly decrease of choices for Societies A and simultaneously higher choices for Societies B. Accordingly, the value of the d test does not rejects the hypothesis of equal proportion of answers for Societies A and B in questions 2 and 3. Furthermore, the introduction of higher income supports in kids' generations seems to affect subjects' perception about families' chances of interchange their income status in the mobility process. In fact, societies characterized by lower value of *or* (Societies A) are no longer perceived as more mobile in questions 2 and 3. The latter result seems to emphasize that subjects' mobility perception may be mainly driven by variations of supports between parents' and kids' income distributions (structural mobility) rather than families' chances of interchange their income status in the mobility process (exchange mobility). Finally, economic decline and economic growth seem to affect in the same way subjects' mobility perception. Indeed, answers to questions 2 and 3 do not change substantially.

Subjects' choices in questions 4 pinpoint two interesting results. First, when the mobility process does not involves changes of income supports between generations, societies characterized by lower values of *or* seem to be perceived as more mobile. In fact, 75% of the sample consider Society B ($or = 4$) more mobile than Society A ($or = \infty$). Moreover, subjects seem to overweight mobility processes that move away society from rigidity, rather than increase mobility between societies already mobile. Indeed, subjects' choices for Society A increase by 20% between questions 1 and 4. Societies B of questions 1 and 4 consist of $or = 4$, while Societies A are characterized by Stochastic Independence in question 1 ($or = 1$) and Perfect Immobility in question 4 ($or = \infty$). Accordingly, Society B in question 4 moves away the society from Perfect Immobility, while in question 1 Society A increases mobility between societies already mobile.

Next, the societies pairwise comparisons in questions 5, 6 and 7 deal with mobility processes in which parents' and kids' income distributions consist of three supports. Moreover, in each question families interchange their income classes in different parts of the income distribution. In question 5 the income switch occur between the higher income classes, in question 6 between the lower, while in question 7 between all income status.

The introduction of a third income support does not seem to affect significantly subjects' mobility perception. In fact, subjects seem to perceive as more mobile societies in which families have higher chances of interchange their income position between three income status. In questions 5 and 6 at least 50% of subjects considers Society A as more mobile than Society B, while in question 7, 43% of the sample considers Society A more mobile than Society B. In all three questions, Societies A consists of lower values of *gor* than Societies B.

Moreover, the position of the income switch in the income distribution does not seem to affect subjects' mobility perception. In fact, subjects' choices in questions 5 and 6 do not change fundamentally. The latter result seems to reject the "Principle of Diminishing Transfer" applied to the mobility scenario. Indeed, the same chances of transition between income classes are not perceived differently when they involve higher income supports rather than lower one.

Questions 8 and 9 investigate subjects' mobility perception when the mobility process involves changes of the frequencies in each support between parents' and kids' income distributions.

Answers to question 8 (Table 3.17) emphasize that 59% of subjects recognises Society A (or = 2) as more mobile than Society B (or = 8). Thereby, the introduction of higher chances of becoming rich for all families does not seem to affect subjects' perception about families' chances of interchange their income positions in the mobility process. That is, the society characterized by lower values of *or* (Society A) is still perceived as more mobile.

Conversely, the introduction of higher income supports in kids' generation than parents' one affects subjects' mobility perception. In fact, choices for Society A (or = 2) decrease by 23% between questions 8 and 9, while choices for Society B (or = 8) increase by 15%. Furthermore, the value of the d test does not reject the hypothesis of equal proportion of answers for Societies A and B in question 9. Accordingly, the society with the lower value of *or* (Society A) is no longer recognizes as more mobile in question 9. The latter result points out two interesting pieces of evidence. First, societies characterized by the same variation of income supports between generations and different chances of interchange income position in the mobility process seem to be perceived as equally mobile. It means that people's mobility perception may be mainly driven by changes of income supports between generations. Moreover, changes of the relative frequencies in each support between generations and changes of income supports between generations seem to be perceived differently in terms of mobility. It means that despite both income movement are measured by structural mobility they may have a different impact on people's mobility perception.

	Soc. A	**Soc. B**	**Eq. Mob.**	d	r
Question 1	62%	22%	16%	20.87***	42.59***
Question 2	40%	41%	19%	0.01	10.45***
Question 3	43%	38%	19%	0.26	10.76***
Question 4	16%	68%	16%	37.5***	61.58***
Question 5	61%	23%	17%	20.16***	39.87***
Question 6	66%	18%	16%	31.18***	55.63***
Question 7	48%	27%	25%	6.69***	10.92***
Question 8	62%	23%	15%	19.75***	43.06***
Question 9	41%	38%	21%	0.09	8.15**
Question 10	70%	20%	10%	32.34***	73.11***
Question 11	40%	38%	22%	0.04	7.00**
Question 12	47%	35%	18%	2.08	14.31***

Table 3.18: subjects' choices in Treatment 2; *,**,***, denote rejection at 10, 5, 1% significance levels; "Soc. A." and "Soc. B." stand for Society A and Society B respectively, while "Eq. Mob." stands for equally mobile; the d test is for the null hypothesis that preferences for Society A and Society B are equally distributed, that is $H_0 : p(A) = p(B) = \frac{1}{2}$; the r test is for the null hypothesis of aggregate random answers, that is H_0: $p(A) = p(B) = p(E) = \frac{1}{3}$.

Questions 10, 11 and 12 investigate subjects' mobility perception when the mobility process consists of three extreme mobility scenarios: Perfect Immobility, Stochastic Independence and Complete Reverse. Question 10 compares Perfect Immobility (Society B) with Stochastic Independence (Society A), questions 11 Perfect Immobility (Society B) with Complete Reverse (Society A), while question 12 adds to societies comparison of question 11 also economic growth as changes of income supports between generations.

Starting from question 10, subjects' choices highlight the high mobility perception associated to Stochastic Independence when the latter is compared with Perfect Immobility. In fact, 68% of the sample believes that Society A is more mobile than Society B. This result seems to confirm that societies characterized by higher positive association between parents' and kids' income status (higher *or*) are perceived as less mobile. Vice versa, subjects' mobility perception about higher negative association between parents' and kids' income classes seems to go in the opposite direction. In fact, answers to question 11 seem to point out that Stochastic Independence and Complete Reverse are perceived as equally mobile. Specifically, the proportion of choices for Stochastic Independence (Society A) and Complete Reverse (Society B) are 46% and 42%, respectively. Accordingly, the value of d test does not reject the hypothesis of equal proportion of choices for Societies A and B in question 11.

Thereby, subjects' answers in question 11 pinpoint that societies characterized by perfect negative association between parents' and kids' income status seem to be perceived as equally mobile than societies in which kids' income status do not depend on parents' ones. Accordingly, when negative income associations are included in the mobility analysis, or = 1 may not be perceived as the highest mobility level.

Finally, subjects' choices in questions 11 and 12 do not change substantially. Indeed, the proportion of choices for Stochastic Independence (Society A) and Complete Reverse (Society B) are 44% and 43%, respectively in question 12. Accordingly, the presence of higher income supports in kids' income distribution than parents' one does not seem to affect subjects' mobility perception about Stochastic Independence and Complete Reverse. This result seems to go in the opposite direction of subjects' answers in questions 2, 3 and 9. Moreover, subject' choices in questions 11 and 12 seem to suggest that loss aversion does not affect subjects' mobility perception. Indeed, the proportion of answers for Society B (Complete Reverse) does not change between questions 11 and 12. However, in question 11 Complete Reverse determines income losses for families who move downward, while in question 12 Complete Reverse does not involve income losses.

Moving from Treatment 1 to Treatment 2, Table 3.18 shows the aggregate proportion of choices for each question from 1 to 12 in the second treatment.

Starting from questions 1, 2 and 3, subjects seem to consider societies in which families have higher chances of interchange their income status in the mobility process (Society A) as more mobile in question 1. Furthermore, variations of income supports between generations seems to affect subjects' mobility perception in questions 2 and 3. Indeed, societies in which families have higher chances of interchange their income classes in the mobility process (Societies A) are no longer perceived as more mobile in both questions.

Answers to question 4 seem to confirm that societies characterized by lower value of *or* are perceived as more mobile when the mobility process does not involve variations of the income supports among generations. In fact, 68% of the sample believes that Society B (or = 25) is more mobile than Society A (or = ∞). However, subjects' answers in question 4 seem to reject the hypothesis of overweight probability in the mobility process. Indeed, subjects' choices for Society A do not change significantly between questions 1 and 4.

Accordingly, the size of the switch between income status does not seem to affect significantly subjects' mobility perception in questions 1, 2, 3 and 4. This result is confirmed by results in Table 3.19. The latter shows the values of a χ^2 test of homogeneity for the null hypothesis that answers in Treatments 1 and 2 can be viewed as if draw from the same population. The values of χ^2 do not reject the hypothesis of homogeneity of the population considering subjects' choices in questions 1, 2, 3 and 4.

Considering answers to questions 5 and 6 in Treatments 2, the size of the switch between income classes seems to affect subjects' mobility perception. In fact, the choices for Society A increase by 11% in question 5 between the two treatments and by 14% in question 6. At the same time, choices for Society B decrease by 7% and 9% between the two treatments in question 5 and 6, respectively. Moreover, the value of the χ^2 test rejects (at 90%) the hypothesis of homogeneity of the population considering subjects' choices in question 6. Vice versa, answers to question 7 do not change substantially between Treatments 1 and 2.

Next, answers to questions 8 seem to confirm that variations of frequency in each income support between generations do not affect subjects' mobility perception about families' chances of interchange their income classes in the mobility process. In fact, 62% of the sample considers Society A ($or = 2$) more mobile than Society B ($or = 8$). Furthermore, subjects' choices in question 9 seem to confirm that variations of income supports between generations are strongly perceived in terms of mobility. Indeed, Society A ($or = 2$) is no longer perceived as more mobile than Society B ($or = 8$). The value of the d seems to confirm that this difference is significant.

Subjects' choices in questions 10, 11 and 12, seem to confirm answers of Treatment 1. Starting from question 10, Stochastic Independence (Society A) is perceived as more mobile when compared with Perfect Immobility (Society B). Vice versa, Stochastic Independence (Society A) and Complete Reverse (Society B) seem to be perceived as equally mobile in questions 11 and 12.

Therefore, variations of income supports between parents' and kids' income distributions do not seem to affect subjects' mobility perception about Stochastic Independence and Complete Reverse. Accordingly, subjects' choices in question 10, 11 and 12 seem to confirm that positive and negative income associations between generations may be perceived in the opposite way in terms of mobility. The latter result seems to confirm that equality of opportunities may not be perceived as the highest mobility level. Finally, loss aversion does not seem to affect subjects' mobility perception. In fact, also in Treatment 2, answers to questions 11 and 12 do not change substantially.

	Soc. A	**Soc. B**	**Eq. Mob.**	χ^2
Question 1				1.75
Treatment 1	55%	23%	22%	
Treatment 2	62%	22%	16%	
Question 2				1.36
Treatment 1	39%	36%	25%	
Treatment 2	40%	41%	19%	
Question 3				0.06
Treatment 1	42%	38%	20%	
Treatment 2	43%	38%	19%	
Question 4				1.45
Treatment 1	12.5%	75%	12.5%	
Treatment 2	16%	68%	16%	
Question 5				2.74
Treatment 1	50%	30%	20%	
Treatment 2	61%	23%	17%	
Question 6				4.99*
Treatment 1	52%	27%	21%	
Treatment 2	66%	18%	16%	
Question 7				0.94
Treatment 1	43%	26%	31%	
Treatment 2	48%	27%	25%	

Table 3.19: *,**,***, denote rejection at 10, 5, 1% significance levels; the χ^2 test of homogeneity is for the null hypothesis that answers in Treatments 1 and 2 can be viewed as if draw from the same population.

3.6 Final remarks

In this paper we have investigated people's mobility perception about two fundamental mobility aspects, structural mobility and exchange mobility, considering several mobility scenarios.

Subjects' choices pinpoint several interesting results. Firstly, exchange mobility seems to outline people's mobility perception about the income variations involved. That is, mobility tables characterized by higher families' chances of interchange their income positions in the mobility process seem to be perceived as more mobile. This result seems to be confirmed also from the analysis of subjects' answers about mobility verbal statements shown in Table 3.16. Moreover, 3 x 3 mobility tables in which families have higher chances of interchange their positions between three income classes are still perceived as more mobile. We find also that income switch in different parts of the income distribution do not seem to affect people's mobility perception. Accordingly, both the odd ratio (or) and the generalized odd ratios (gor) seem to be relevant mobility indexes.

Also structural mobility seems to outline people's mobility perception about the income changes involved. In fact, changes of income distribution between generations seem to affect subjects' mobility perception. However, variations between parents' and kids' income distributions seem to affect in different ways people's mobility perception. Variations of income supports between generations seem to affect people's perception about families' chances of interchange their income position in the mobility process. Vice versa, changes of frequencies in each income support do not seem to affect subjects' perception about families' probabilities of interchange their income classes in the mobility process.

Finally, mobility tables characterized by complete negative association between parents' and kids' income status and mobility tables characterized by equality of opportunities seem to be perceived as equally mobile. Thus, mobility tables in which $or = 1$ may not be perceived as the most mobile when all possible income associations between generations are considered.

The present work has tried to reduce the gap between theoretical and empirical approaches to mobility analysis pointing out how people actual perceive two important mobility aspects emphasized by the literature. However, we believe that it is important to deeply investigate people's perception about intergenerational mobility processes including further mobility measures and dimensions.

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Appendix

A Chapter 1

A1 Dynastically symmetric quadratic social welfare function and transition matrices

In this appendix we formally derive the predictions of the dynastically symmetric quadratic social welfare function (1.6). We recall that our general set-up is for the set of social states lotteries $P = (p_1, ..., p_M)$ of a society with H dynasties, defined on the set $X = \left\{x^1, ..., x^M\right\}$ of certain social state x^m and with $M \geq 2$. A typical social state $x \in X$ is given by $x = [z, y]$, where z and y are vectors for certain income positions of wellsprings and offsprings, respectively. There are $N \leq H$ income levels in both generations denoted with subscript letters in increasing order, so that $z_1 < z_2 < ... < z_N$ and $y_1 < y_2 < ... < y_N$.

In this analysis we assume that the conditional probabilities induced by lottery P that a wellspring h_w in income class z_i has offspring h_o in income class y_j are independent across individuals, so that such conditional probabilities are univocally identified by the entries of the $(N \times N)$ income transition matrix generated by P and denoted as $\Pi^P = \left|\pi_{ij}^P\right|$ with $\pi_{ij}^P \geq 0$ and $\sum_{i=1}^n \pi_{ij}^P = 1$. In particular, this means that any row s of a transition matrix directly gives the lottery $\pi_{i.} = \pi_{i1}, ..., \pi_{in}$ (where $\sum_j \pi_{ij} = 1$), with each π_{ij} providing the probability that an offspring with wellspring in income class z_i obtains income y_j.

The formal relationships between transition matrices and lotteries are specified as follows. For any certain social state $x^m \in X$, denote with: $n_{i.}^m$ the number of wellsprings having income z_i; $n_{.j}^m$ the number of offspring having income y_j; and n_{ij}^m the number of dynasties in which wellsprings have income z_i and offsprings income y_j. Since there are H dynasties, the corresponding relative frequencies are, respectively, $v_{i.}^m = \frac{n_{i.}^m}{H}$, $v_{.j}^m = \frac{n_{.j}^m}{H}$ and $v_{ij}^m = \frac{n_{ij}^m}{H}$. Form these obtain the income transition matrix $\Pi^m = \left|\pi_{ij}^m\right|$ for any certain state x^m where $\pi_{ij}^m = v_{ij}^m / v_{i.}^m$ (or $\pi_{ij}^m = n_{ij}^m / n_{i.}^m$). Given the transition matrices $\Pi^m = \left|\pi_{ij}^m\right|$ and the vectors $v_w^m = \left|v_{i.}^m\right|$ and $v_o^m = \left|v_{.j}^m\right|$ for all certain social states $x^m \in X$, the transition matrix associated to any social state lottery $P = (p_1, ..., p_M)$ is given by $\Pi^P = \left|\sum_1^M p_m \Pi^m\right|$ and the vectors of marginal income distributions by $v_w^P = \left|\sum_1^M p_m v_w^m\right|$ and $v_o^P = \left|\sum_1^M p_m v_o^m\right|$. Under the low of large number it is $v_o^P = v_w^P \Pi^P = \left|\sum_1^M p_m v_o^m\right|$. We also denote with $n_{i.}^P = v_{i.}^P H$ the number of dynasties with wellsprings in income class z_i under social state lottery P.

The above notation is useful to write the dynastically symmetric quadratic social welfare function (1.6) in terms of the incomes and lotteries received by the individuals of either generation in any social state lottery P. The welfare function (1.6) is rewritten here, for any $P \in L$ where $\mathbf{u} = (u_{1_w}, u_{1_o}, ..., u_{H_w}, u_{H_o})$ such that $U_{h_g}(P) = u_{h_g}$ for all $h = 1, ..., H$ and $g = w, o$:

$$\begin{aligned} \hat{W}_Q(\mathbf{u}) &= a\left[\sum_h u_{h_w}^2 + \sum_h u_{h_o}^2\right] + \sum_{h \neq k} u_{h_w} u_{k_w} + \sum_{h \neq k} u_{h_o} u_{k_o} + \\ & 2\left[c_W \sum_h u_{h_w} u_{h_o} + c_B \sum_{h \neq k} u_{h_w} u_{k_o}\right] \end{aligned} \tag{3.1}$$

We focus on social state lotteries $P = (z, P_o)$, similar to those discussed in simplex $\{e^I, e^R, e^O\}$ of the text, in which wellsprings' income class is certain, while the social state for the members of the offsprings' generation has yet to be determined. To this end, we also denote with $n_{i.}^P = v_{i.}^P H$ the number of dynasties with wellsprings in income class z_i under social state lottery $P = (z, P_o)$.

The utilities of wellsprings and offsprings for lottery $P = (z, P_o)$, determined consistently with expected utility, are as follows: 1) $u_{h_w} = u(z_i)$ for all wellspring h_w receiving income z_i in lottery $P = (z, P_o)$; 2) $u_{h_o} = U_{h_o}(P) = \sum_j \pi_{ij} u(y_j)$, for all offsprings h_o with wellsprings in income class i since they receive lottery $\pi_{i.}$ in $P = (z, P_o)$. In the following we denote $V(\pi_i) = \sum_j \pi_{ij} u(y_j)$ (also omitting the superscript P to simply notation).

Substituting the above utilities in (3.1), it is:

$$\begin{aligned} \hat{W}_Q(\mathbf{u}) &= a\left[\sum_i n_{i.} u(z_i)^2 + \sum_i n_{i.} V(\pi_i)^2\right] + \\ & \sum_i (n_{i.} - 1) n_{i.} u(z_i)^2 + \sum_i (n_{i.} - 1) n_{i.} V(\pi_i)^2 + \\ & \sum_{i \neq l} n_{i.} n_{l.} u(z_i) u(z_l) + \sum_{i \neq l} n_{i.} n_{l.} V(\pi_i) V(\pi_l) + \\ & 2c_W \sum_i n_{i.} u(z_i) V(\pi_i) + \\ & 2c_B \left[\sum_i (n_{i.} - 1) n_{i.} u(z_i) V(\pi_i) + \sum_{i \neq l} n_{i.} n_{l.} u(z_i) V(\pi_l)\right] \end{aligned} \tag{3.2}$$

Equation (3.2) can be used to analyze how the dynastically symmetric quadratic social welfare function (1.6) respond to diagonalizing switches (**?**). Diagonalizing switches are operations conducted on bistochastic transition matrix to analyze social preference for mobility. A bistochastic transition matrix is any transition matrix in which both $\sum_{i=1}^{n} \pi_{ij} = 1$ and $\sum_{j=1}^{n} \pi_{ij} = 1$. A bistochastic transition matrix is obtained from any social state lottery in which a fixed number $n(= \frac{H}{N})$ of wellsprings and offsprings is assigned to each income class. A transformation of a bistochastic transition matrix $\Pi = |\pi_{ij}|$ into another bistochastic transition matrix $\Pi' = |\pi'_{ij}|$, written as $\Pi \overset{ds}{\rightarrow} \Pi'$, represents a *diagonalizing switch* when $\pi_{ij} = \pi'_{ij}$ for all $i \neq r, r+1$, $j \neq s, s+1$, and

$$\begin{aligned} \pi'_{rs} &= \pi_{rs} + \delta \qquad & \pi'_{r,s+1} &= \pi_{r,s+1} - \delta \\ \pi'_{r+1,s} &= \pi_{r+1,s} - \delta \qquad & \pi'_{r+1,s+1} &= \pi_{r+1,s+1} + \delta \end{aligned}$$

with $\delta > 0$ (**?**).

In simplex $\{e^I, e^R, e^O\}$, diagonalizing switches corresponds movements from e^R to e^I on the lower edge of the simplex. Thus diagonalizing switches directly inform about the preference implied by the social quadratic welfare function along lower edge of the simplex. Moreover, given the parallelism property implied by the quadratic form, namely that all indifference curves in the simplex can be obtained as parallel displacements of one another along expansions paths which go through the midpoints of the chords joining any two points on the indifference curves (**?**), diagonalizing switches also inform about the preferences in the whole the simplex.

More in general, the effect of diagonalizing switches on the quadratic form (3.1), is measured by the difference between the social welfare function (3.2) computed at two social state lotteries $P = (z, P_o)$ and $P' = (z, P'_o)$ with corresponding bistochastic transition matrices Π and Π', where $\Pi \overset{ds}{\rightarrow} \Pi'$. Let $\hat{W}(\mathbf{u})$ and $\hat{W}(\mathbf{u}')$ the values of (3.2) computed $P = (z, P_o)$ and $P' = (z, P'_o)$, respectively. Then, the effect of diagonalizing switches (after some algebra) is given by:

$$\Delta \hat{W}_Q = 2n\delta \Delta u_s \left[(a-1) \left(V(\pi_{r+1}) - V(\pi_r) - \delta \Delta u_s \right) - (c_W - c_B) \Delta u_r \right] \qquad (3.3)$$

where $\Delta \hat{W}_Q = \hat{W}_Q(\mathbf{u}) - \hat{W}_Q(\mathbf{u}')$, $\Delta u_s = u(y_s) - u(y_{s+1})$ and $\Delta u_r = u(y_r) - u(y_{r+1})$.

When $a = 1$ and $c_W = c_B$, expression (3.3) equals zero and diagonalizing switches have no impact on welfare (utilitarianism). Otherwise we have distinguished three cases:

A2 Preference for origin independence ($a < 1$ and $c_W = c_B$)

When $c_W = c_B$, equation (3.3) reduces to :

$$\Delta \hat{W}_Q = 2n\delta \Delta u_s \left[(a-1) \left(V(\pi_{r+1}) - V(\pi_r) - \delta \Delta u_s \right) \right]$$

Since $\Delta u_s < 0$ (for $y_{s+1} > y_s$) and $a - 1 < 0$ (for quasi-concavity) diagonalizing switches ($\delta > 0$) increase welfare ($W_s(\mathbf{u}) - W_w(\mathbf{u}') < 0$) when $(V(\pi_{r+1}) - V(\pi_r) -$

$\delta\Delta u_s) < 0$ and the opposite of diagonalizing switches ($\delta < 0$) increase welfare when $(V(\pi_{r+1}) - V(\pi_r) - \delta\Delta u_s) > 0$. When $V(\pi_{r+1}) = V(\pi_r)$ any $\delta \neq 0$ harm welfare. Thus welfare is maximum when $V(\pi_{r+1}) = V(\pi_r)$ and $\delta = 0$.

A3 Preference for reversal/immobility (Atkinson's ordering) ($a = 1$ and $c_W \neq c_B$).

When $a = 1$, expression (3.3) is given by:

$$\Delta\hat{W}_Q \quad = \quad -2n\delta\Delta u_s\left(c_W - c_B\right)\Delta u_r$$

Since both $\Delta u_s < 0$ and $\Delta u_r < 0$, it follows that

$$\Delta\hat{W}_Q \overset{>}{\underset{<}{-}} 0 \Longleftrightarrow c_W \overset{<}{\underset{>}{-}} c_B$$

that is, diagonalizing switches always increase welfare (preference for immobility) if $c_W > c_B$ (within-dynasty weights greater than between-dynasty weights); whereas diagonalizing switches reduce welfare (preference for reversal) if $c_B > c_W$ (between-dynasty weights greater than within-dynasty weights).

A4 Preference for equality of opportunity when talent is genetically transmitted ($a < 1$, and $1 \leq c_w \neq c_b \geq 1$).

When $a < 1$ and $c_W \neq c_B$, the sign of (3.3) depends on all parameters in the expression. Nevertheless, one can consider some hypothetical situations in order to determine the values that the weights should be assigned in order to satisfy given normative principles. This is for example the approach followed by **?** to determine asymmetric individual weights in a stationary society with identical steady-states income distributions for wellsprings and offsprings, namely $v_o = v_w$. Consider now a similar stationary society where in addition to the N income classes in each generation there are N levels of talent; and suppose that in principle the society would like that higher income classes are assigned to people with higher talent. Suppose also that talent is genetically transmitted from wellspring to offspring with probability p, whereas with probability $1 - p$ it is equally likely that an offspring receives any other level of talent different from that of her wellspring. In such a case it seems natural that the equilibrium optimal income mobility matrix should match the matrix of genetic talent transmission denoted by Π^G, namely:

$$\Pi^G = \begin{bmatrix} p & \frac{1-p}{N-1} & \cdots & \cdots & \frac{1-p}{N-1} \\ \frac{1-p}{N-1} & p & \cdots & \cdots & \frac{1-p}{N-1} \\ \cdots & \cdots & p & \cdots & \cdots \\ \cdots & \cdots & \cdots & p & \frac{1-p}{N-1} \\ \frac{1-p}{N-1} & \cdots & \cdots & \frac{1-p}{N-1} & p \end{bmatrix}$$

Using equation (3.3) it is then possible to compute the ethical weights to select such a matrix or the corresponding social choice lottery G satisfying such restriction. Let in particular $\hat{W}(\mathbf{u}^G)$ be the social utility (3.2) computed at G. Applying equation (3.3), after some manipulations it is:

$$\begin{aligned}\hat{W_Q}(\mathbf{u^G}) - \hat{W_Q}(\mathbf{u}') &= 2n\delta\Delta u_s \left[(a-1)\left(\frac{1-pN}{N-1}\left(u(y_r)-u(y_{r+1})\right)-\delta\Delta u_s\right)\right. \\ &\quad \left. -\left(c_W-c_B\right)\Delta u_r\right] \qquad (3.4)\end{aligned}$$

Since the marginal income distributions of wellsprings and offsprings are equal, $u(z_r) = u(y_r)$ for all r, expression (3.4) is equal to:

$$\hat{W_Q}(\mathbf{u^G}) - \hat{W_Q}(\mathbf{u}') = 2n\delta\Delta u_s\left([a-1](-\delta\Delta u_s) + \Delta u_r\left([a-1]\left[\frac{1-pN}{N-1}\right]-[c_W-c_B]\right)\right)$$

which implies that diagonalizing switches or their opposite ($\delta \neq 0$) always harm welfare when the term in the last circle bracket is equal zero, namely:

$$\left([a-1]\left[\frac{1-pN}{N-1}\right]-[c_W-c_B]\right) = 0 \qquad (3.5)$$

So, when condition (3.5) holds, welfare is maximized at $\delta = 0$. In this sense, condition (3.5) can be interpreted as implementing a situation with equality of opportunities when talent is genetically transmitted. For example, when $N = 2$, if the society wishes to give maximum social value to a society in which offspring maintain their wellspring's income position according to the genetic probability p of receiving their wellspring's talent then the ethical weights must satisfy:

$$0.5\left[1-\frac{c_W-c_B}{a-1}\right] = p$$

(in addition of course to the other conditions to satisfy quasi-concavity, including $a < 1$).

A5 Algebra for equation (3.3)

$$
\begin{aligned}
\Delta W &= n(a+n-1)[V^2(\pi_r)+V^2(\pi_{r+1})-V^2(\pi_r^{'})-V^2(\pi_{r+1}^{'})] \\
&+2n^2[V(\pi_r)V(\pi_{r+1})-V(\pi_r^{'})V(\pi_{r+1}^{'})] \\
&+2nc_w\{u(z_r)[V(\pi_r)-V(\pi_r^{'})]+u(z_{r+1})[V(\pi_{r+1})-V(\pi_{r+1}^{'})]\} \\
&+2nc_b\{(n-1)u(z_r)[V(\pi_r)-V(\pi_r^{'})]+(n-1)u(z_{r+1})[V(\pi_{r+1})-V(\pi_{r+1}^{'})] \\
&+nu(z_r)[V(\pi_{r+1})-V(\pi_{r+1}^{'})]+nu(z_{r+1})[V(\pi_r)-V(\pi_r^{'})]\} \\
&= n(a+n-1)[V^2(\pi_r)+V^2(\pi_{r+1})-V^2(\pi_r^{'})+V^2(\pi_{r+1}^{'})] \\
&+2n^2[V(\pi_r)V(\pi_{r+1})-V(\pi_r^{'})V(\pi_{r+1}^{'})] \\
&+2nc_w\{u(z_r)[V(\pi_r)-V(\pi_r^{'})]+u(z_{r+1})[V(\pi_{r+1})-V(\pi_{r+1}^{'})]\} \\
&+2nc_b\{[(n-1)u(z_r)+nu(z_{r+1})][V(\pi_r)-V(\pi_r^{'})] \\
&+[(n-1)u(z_{r+1})+nu(z_r)][V(\pi_{r+1})-V(\pi_{r+1}^{'})]\}
\end{aligned}
$$

Notice that:

1. $V(\pi_r') = V(\pi_r) + \delta\,[u(y_s) - u(y_{s+1})]$
2. $V(\pi_{r+1}') = V(\pi_{r+1}) - \delta\,[u(y_s) - u(y_{s+1})]$

Also denote with $\Delta u_s = u(y_s) - u(y_{s+1})$ and $\Delta u_r = u(y_r) - u(y_{r+1})$
Then:

$$
\begin{aligned}
\Delta W &= n(a+n-1)\{[V^2(\pi_r)+V^2(\pi_{r+1})-[V(\pi_r)+\delta\Delta u_s]^2-[V(\pi_{r+1})-\delta\Delta u_s]^2\} \\
&+2n^2\{[V(\pi_r)V(\pi_{r+1})]-[V(\pi_r)+\delta\Delta u_s][V(\pi_{r+1})-\delta\Delta u_s]\} \\
&+2nc_w\{u(z_r)[V(\pi_r)-V(\pi_r)+\delta\Delta u_s]+u(z_{r+1})[V(\pi_{r+1})-V(\pi_{r+1})-\delta\Delta u_s]\} \\
&+2nc_b\{[(n-1)u(z_r)+nu(z_{r+1})][V(\pi_r)-V(\pi_r)-\delta\Delta u_s] \\
&+[(n-1)u(z_{r+1})+nu(z_r)][V(\pi_{r+1})-V(\pi_{r+1})+\delta\Delta u_s]\} \\
&= 2\delta\Delta u_s n(a+n-1)[V(\pi_{r+1})-V(\pi_r)-\delta\Delta u_s] \\
&+2\delta\Delta u_s n^2[V(\pi_r)-V(\pi_{r+1})+\delta\Delta u_s] \\
&+2\delta\Delta u_s\Delta u_r nc_w \\
&-2\delta\Delta u_s\Delta u_r nc_b \\
&= 2\delta\Delta u_s n\{(a-1)[V(\pi_r)-V(\pi_{r+1})+\delta\Delta u_s]+\Delta u_r(c_w-c_b)\}
\end{aligned}
$$

B Chapter 2

B1 χ^2 test of homogeneity: all treatments

	Treat.1-2 χ^2	Treat.1-3 χ^2	Treat.3-4 χ^2	Treat.2-4 χ^2	Treat.1-4 χ^2
Part 1					
Question 1	0.8	1.19	1.51	3.75	5.00*
Question 2	0.11	1.00	1.41	4.23	4.93*
Question 3	1.9	0.08	0.32	2.65	0.096
Part 2					
Question 1	2.19	0.33	0.42	6.8**	1.53
Question 2	2.93	2.94	0.29	0.49	4.69*
Question 3	2.72	6.04**	1.02	2.80	6.44**
Part 3					
Question 1	0.19	1.59	0.91	0.27	0.86
Question 2	5.7*	0.43	2.69	2.62	5.63*
Question 3	1.08	1.81	0.95	2.7	3.37
Part 4					
Question 1	0.60	0.02	5.20*	4.16	4.76*
Question 2	1.74	1.30	3.02	1.22	5.33*
Question 3	1.13	3.40	6.13**	0.72	3.53
Part 5					
Question 1	5.97**	1.21	0.60	3.98	0.25
Question 2	8.38**	4.73*	0.53	1.88	3.78
Question 3	2.7	2.04	1.94	0.28	4.42

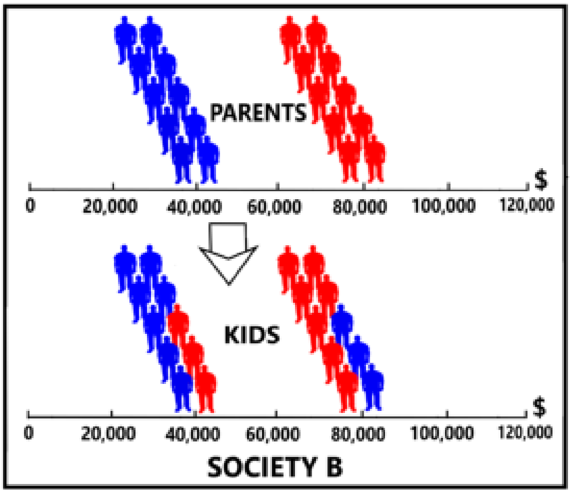
Table 3.20: *,**,***, denote rejection at 10, 5, 1% significance levels; Treat.1-2 χ^2 is for the null hypothesis that answers in Treatments 1 and 2 can be viewed as if draw from the same population; Treat.1-3 χ^2 is for the null hypothesis between Treatments 1 and 3; Treat.3-4 χ^2 is for the null hypothesis between Treatments 3 and 4; Treat.2-4 χ^2 is for the null hypothesis between Treatments 2 and 4

B2 Instruction Treatment 1

A questionnaire on Social Preferences

This questionnaire concerns people's social preferences. Social preferences are defined as the preferences expressed by a neutral observer towards societies characterized by different wealth distributions. To be a "neutral observer" means to express preferences on the wealth distribution among people of a society without being directly involved in the wealth distribution of that society.

Several features stand out as relevant when the wealth distribution of a society is considered from a neutral perspective. One of these features is the way in which the wealth is distributed among generations. In this questionnaire, we present you societies in which the entire population consists of two generations: the parents and their kids. We represent kids' and parents' wealth distribution as in Figure 1.

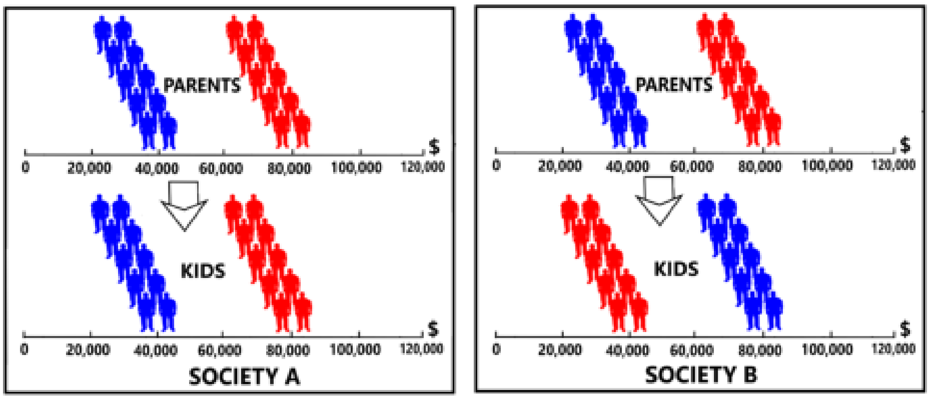


In Figure 1, as well as in all the societies of the questionnaire, the number of parents and kids is identical and equal to 20. This means that each parent has one descendant only. Parents and kids who belong to the same family are depicted in the same colour. Parents depicted in blue have kids depicted in blue while parents depicted in red have kids depicted in red.

In Figure 1, as well as in all the societies of the questionnaire, the top line shows the parents' wealth distribution, while the bottom line shows the kids' wealth distribution. Moreover, in both generations, the wealth distribution is characterized by two groups: the rich and the poor. Finally, the wealth distance between the rich and the poor increases between parents' and kids' generation.

Figure 1 reports society A. This society consists of 10 parents in red with a wealth of 80,000$ and 10 parents in blue with a wealth of 40,000$. Kids' wealth distribution

shows that the 10 kids who belong to red families have a wealth of 100,000$, while the 10 kids who belong to blue families have a wealth of 20,000$. A further relevant feature, when considering the wealth distribution of a society is the way in which parents' wealth position transfers to their own offspring.
For example, Figure 2 depicts Society B. This society consists of 10 parents in red with a wealth of 80,000$ and 10 parents in blue with a wealth of 40,000$. Differently from their parents', the kids' wealth distribution is composed as follow: 7 out of 10 kids who belong to blue families own a wealth of 40,000$, while the remaining 3 kids own a wealth of 80,000$. Conversely, 7 out of 10 kids who belong to red families own a wealth of 80,000$, while the remaining 3 kids own a wealth of 40,000$.

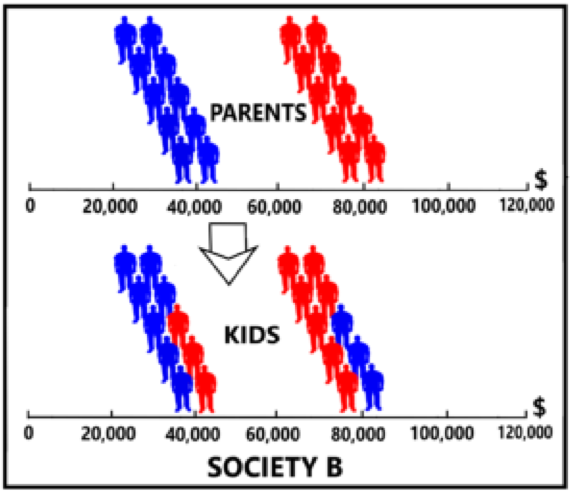


This questionnaire consists of 5 blocks of questions. Each block includes 3 pairs of societies as represented in Figure 1 and 2. Moreover, in the first block there is an additional comprehensive question. For each question, you will be asked to state which society you consider more socially preferable from your position as a neutral observer.
When giving your answers you have to consider that only different life chances determined parents' wealth distribution: rich parents in red and poor in blue. This means that parents' wealth groups (rich or poor) do not depend on their own natural abilities such as aptitude, talent, and skills. Indeed, in the societies that you are comparing people's natural abilities are randomly distributed among both parents' and kids' generations.
Finally, people's wealth points out the net wealth after taxes and social transfers.

B3 Instruction Treatment 2

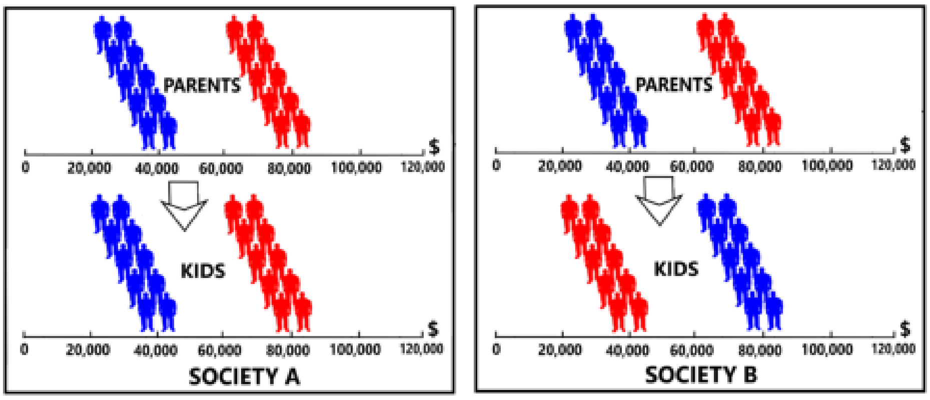
A questionnaire on Social Preferences

This questionnaire concerns people's social preferences. Social preferences are defined as the preferences expressed by a "neutral observer" towards societies characterized by different wealth distributions. To be a neutral observer" means to express preferences on the wealth distribution among people of a society without being directly involved in the wealth distribution of that society.
Several features stand out as relevant when the wealth distribution of a society is considered from a neutral perspective. One of these features is the way in which the wealth is distributed among generations. In this questionnaire, we present you societies in which the entire population consists of two generations: the parents and their kids. We represent kids' and parents' wealth distribution as in Figure 1.



In Figure 1, as well as in all the societies of the questionnaire, the number of parents and kids is identical and equal to 20. This means that each parent has one descendant only. Parents and kids who belong to the same family are depicted in the same colour. Parents depicted in blue have kids depicted in blue while parents depicted in red have kids depicted in red.
In Figure 1, as well as in all the societies of the questionnaire, the top line shows the parents' wealth distribution, while the bottom line shows the kids' wealth distribution. Moreover, in both generations, the wealth distribution is characterized by two groups: the rich and the poor. Finally, the wealth distance between the rich and the poor increases between parents' and kids' generation.
Figure 1 reports society A. This society consists of 10 parents in red with a wealth of 80,000$ and 10 parents in blue with a wealth of 40,000$. Kids' wealth distribution

shows that the 10 kids who belong to red families have a wealth of 100,000$, while the 10 kids who belong to blue families have a wealth of 20,000$. A further relevant feature, when considering the wealth distribution of a society is the way in which parents' wealth position transfers to their own offspring.
For example, Figure 2 depicts Society B. This society consists of 10 parents in red with a wealth of 80,000$ and 10 parents in blue with a wealth of 40,000$. Differently from their parents', the kids' wealth distribution is composed as follow: 7 out of 10 kids who belong to blue families own a wealth of 40,000$, while the remaining 3 kids own a wealth of 80,000$. Conversely, 7 out of 10 kids who belong to red families own a wealth of 80,000$, while the remaining 3 kids own a wealth of 40,000$.

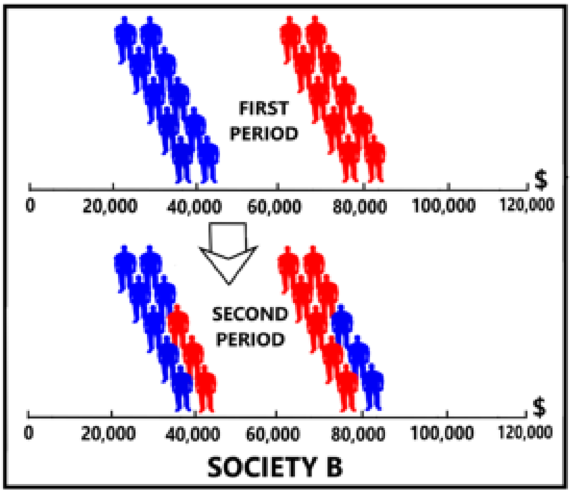


This questionnaire consists of 5 blocks of questions. Each block includes 3 pairs of societies as represented in Figure 1 and 2. Moreover, in the first block there is an additional comprehensive question. For each question, you will be asked to state which society you consider more socially preferable from your position as a neutral observer.
When giving your answers you have to consider that parents' natural abilities such as aptitude, talent, and skills determined their own wealth groups: rich parents in red and poor in blue. Indeed, parents in red are characterized by a high level of natural abilities, while parents in blue are characterized by a low level of aptitude, talent and skills. Furthermore, these natural abilities are transmitted genetically. Thus, kids who belong to red families are characterized by high aptitude, talent and skills. Conversely, kids who belongs to blue families are characterized by a low level of natural abilities.
Finally, people's wealth points out the net wealth after taxes and social transfers.

B4 Instruction Treatment 3

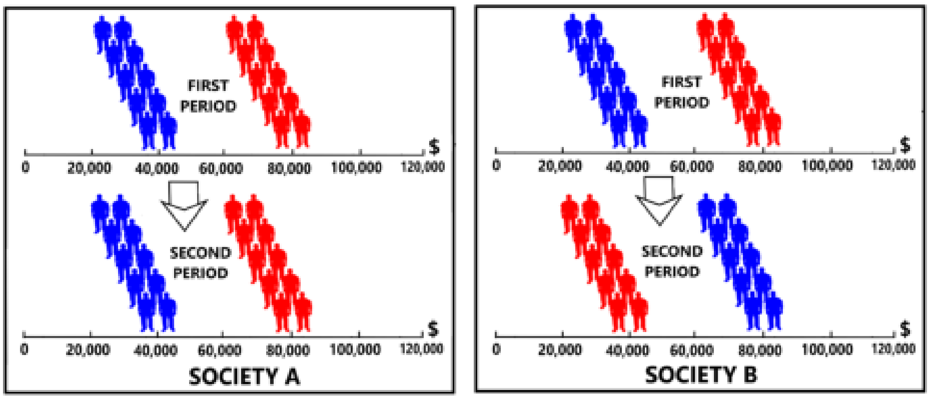
A questionnaire on Social Preferences

This questionnaire concerns people's social preferences. Social preferences are defined as the preferences expressed by a neutral observer towards societies characterized by different wealth distributions. To be a "neutral observer" means to express preferences on the wealth distribution among people of a society without being directly involved in the wealth distribution of that society.
Several features stand out as relevant when considering the wealth distribution of a society from a neutral perspective. One of these features is the way in which the people's wealth evolves over the lifetime. In this questionnaire we present you alternative societies in which people's lifetime consist of two periods: the first period and the second one. We represent people's wealth distribution as in Figure 1.



In Figure 1, as well as in all the societies of the questionnaire, there are 20 people. The colours identify the people's wealth evolution over the two periods.
In Figure 1, as well as in all the societies of the questionnaire, the top line shows the people's wealth distribution in the first period, while the bottom line shows the people's wealth distribution in the second period. Moreover, people's wealth distribution in both periods is characterized by two groups: the rich and the poor. Finally, the distance between the rich and the poor increases between the two lifetime periods.
For example, Figure 1 reports a Society A. In this society, the 10 people depicted in red own a wealth of 80,000$ in the first period and 100,000$ in the second one.

Conversely, the 10 people depicted in blue own a wealth of 40,000$ in the first period and 20,000$ in the second one.
A further relevant feature, when considering the wealth distribution of a society is the way in which people's position in the wealth distribution transfers from one period to another over their lifetime.
For example, Figure 2 reports a Society B. In this society, the 10 people depicted in red own a wealth of 80,000$ in the first period, while in the second period 7 out of 10 own a wealth of 80,000$ and the remaining 3 own a wealth of 40,000$. Conversely, the 10 people depicted in blue own a wealth of 40,000$ in the first period, while in the second period 7 out of 10 own a wealth of 40,000$ and the remaining 3 own a wealth 80,000$.

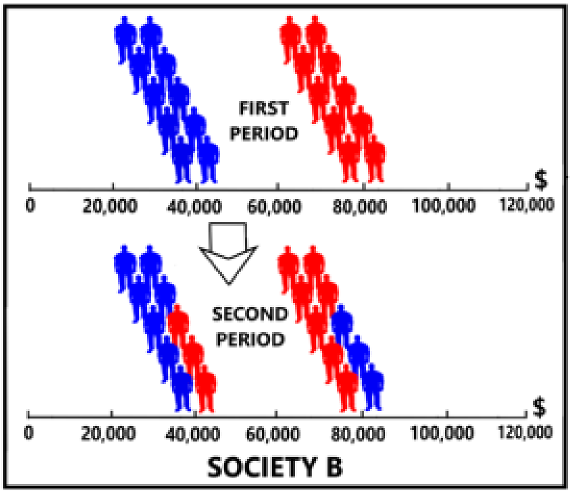


This questionnaire consists of 5 blocks of questions. Each block includes 3 pairs of societies as represented in Figure 1 and 2. Moreover, in the first block there is an additional comprehensive question. For each question, you will be asked to state which society you consider more socially preferable from your position as a neutral observer.
When giving your answers you have to consider that only different life chances determined people's wealth groups in the first period: rich people in red and poor in blue. It means that people's wealth groups in the first period (rich or poor) do not depend on their natural abilities such as aptitude, talents and skills. Indeed, in the societies that you are comparing people's natural abilities are randomly distributed among the 20 people.
Finally, people's wealth points out the net wealth after taxes and social transfers.

B5 Instruction Treatment 4

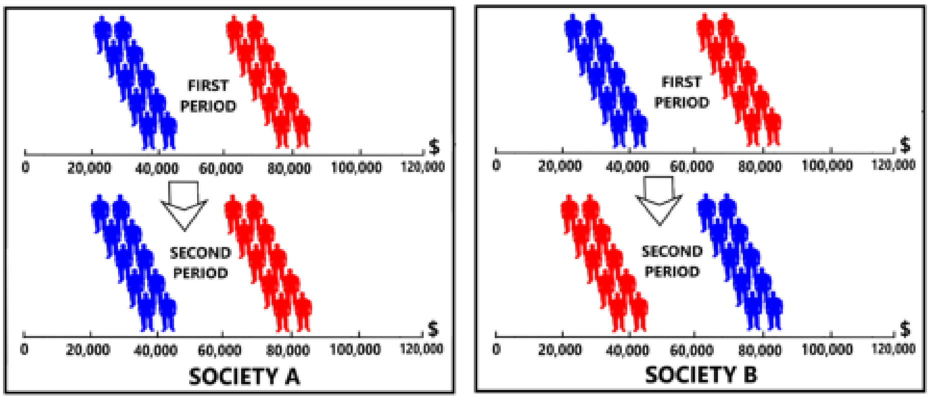
A questionnaire on Social Preferences

This questionnaire concerns people's social preferences. Social preferences are defined as the preferences expressed by a neutral observer towards societies characterized by different wealth distributions. To be a "neutral observer" means to express preferences on the wealth distribution among people of a society without being directly involved in the wealth distribution of that society.
Several features stand out as relevant when considering the wealth distribution of a society from a neutral perspective. One of these features is the way in which the people's wealth evolves over the lifetime. In this questionnaire we present you alternative societies in which people's lifetime consist of two periods: the first period and the second one. We represent people's wealth distribution as in Figure 1.



In Figure 1, as well as in all the societies of the questionnaire, there are 20 people. The colours identify the people's wealth evolution over the two periods.
In Figure 1, as well as in all the societies of the questionnaire, the top line shows the people's wealth distribution in the first period, while the bottom line shows the people's wealth distribution in the second period. Moreover, people's wealth distribution in both periods is characterized by two groups: the rich and the poor. Finally, the distance between the rich and the poor increases between the two lifetime periods.
For example, Figure 1 reports a Society A. In this society, the 10 people depicted in red own a wealth of 80,000$ in the first period and 100,000$ in the second one.

Conversely, the 10 people depicted in blue own a wealth of 40,000$ in the first period and 20,000$ in the second one.
A further relevant feature, when considering the wealth distribution of a society is the way in which people's position in the wealth distribution transfers from one period to another over their lifetime.
For example, Figure 2 reports a Society B. In this society, the 10 people depicted in red own a wealth of 80,000$ in the first period, while in the second period 7 out of 10 own a wealth of 80,000$ and the remaining 3 own a wealth of 40,000$. Conversely, the 10 people depicted in blue own a wealth of 40,000$ in the first period, while in the second period 7 out of 10 own a wealth of 40,000$ and the remaining 3 own a wealth 80,000$.



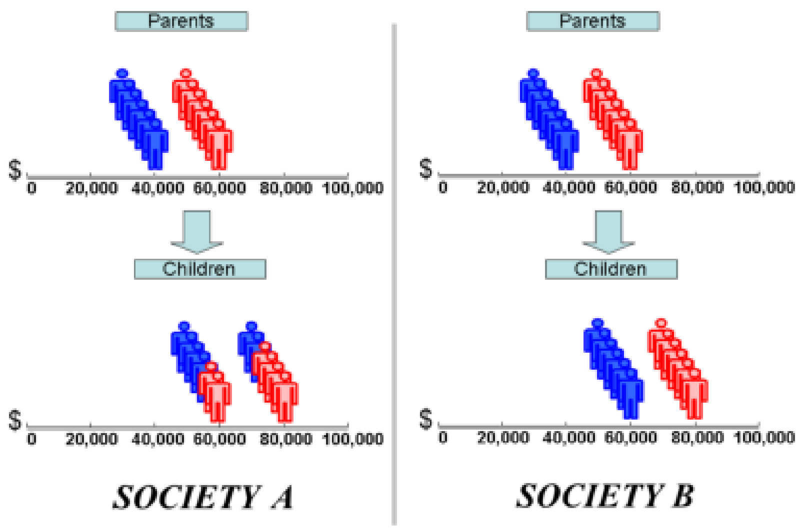
This questionnaire consists of 5 blocks of questions. Each block includes 3 pairs of societies as represented in Figure 1 and 2. Moreover, in the first block there is an additional comprehensive question. For each question, you will be asked to state which society you consider more socially preferable from your position as a neutral observer.
When giving your answers you have to consider that people' natural abilities such as aptitude, talent and skills determined their wealth groups in the first period: rich people in red and poor in blue. Indeed, people in red are characterized by a high level of natural abilities while people in blue are characterized by a low level of aptitude, talent and skills.
Finally, people's wealth points out the net wealth after taxes and social transfers.

C Chapter 3

C1 Instruction Treatments 1,2

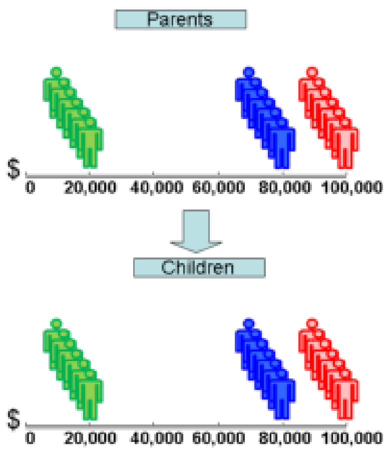
A Questionnaire on Mobility

The questionnaire is about mobility. Mobility is defined as the process through which people move in a socio-economic system from the parents generation to the children's generation.
The questionnaire involves 12 questions in which we ask you to compare the mobility of two hypothetical societies. Figure 1 shows the format of a typical question. The figure shows mobility in two hypothetical societies: SOCIETY A and SOCIETY B. In each society there are two generations: the parents and their children. Parents' incomes are shown in the upper part of the display. For example, in SOCIETY A (on the left of the Figure), there are 6 parents depicted in blue with income \$ 40,000, and 6 parents depicted in red with income \$ 60,000. The same is true for SOCIETY B, shown on the right of the display.
Each parent in each society gives birth to a child. Children's incomes are shown in the lower part of the display. The colour of children is the same as their parents. Thus, a blue parent will have a blue child and a red parent will have a red child. Children's income may however be different from their parents', both in absolute terms and in the ranks of the income parade.



For example, in SOCIETY A there are 6 children with income \$ 60,000 and 6 children with income \$ 80,000. Their colours show the following: 2 children depic-

ted in red with income $ 60,000 come from parents with income $ 60,000; and 4 children depicted in blue with income $ 60,000 come from parents with income $ 40,000. 4 children depicted in red with income $ 80,000 come from parents with income $ 60,000; and 2 children depicted in blue with income $ 80,000 come from parents with income $ 40,000.
In SOCIETY B there are also 6 children with income $ 60,000 and 6 children with income $ 80,000. The red colour of the children with income $ 80,000 shows that they all come from parents with income $ 60,000; while the blue colour of the children with income $ 60,000 shows that they all come from parents with income $ 40,000.
Moreover, in some questions the income distributions of the two generations may be composed by three income groups. For example, the display in Figure 2 shows a SOCIETY A in which there are 6 parents depicted in green with income $ 20,000, 6 parents depicted in blue with income $ 80,000, and 6 parents depicted in red with income $ 100,000; the income distribution of children shows that the 6 children from the green parents receive an income of $ 20,000, the 6 children from the blue parents receive an income of $ 80,000, and the 6 children from the red parents receive an income of $ 100,000.



SOCIETY A

In the questionnaire you will face 12 comparisons of pairs of hypothetical societies shown in displays similar to those of Figure 1. In each pairwise comparison you are asked to state which society, according your view, has to be considered more mobile. If you think that the two societies are equally mobile, you can give such answer at the bottom of each question. At the end of the comparisons you will

also find some further questions, asking some personal information.
When giving your answers you have to consider that only different life chances determined parents' income groups. This means that parents' income groups do not depend on their own natural abilities such as aptitude, talent, and skills. Indeed, in the societies that you are comparing people's natural abilities are randomly distributed among both parents' and children's generations.
Finally, people's income points out the net income after taxes and social transfers.

Estratto per riassunto della tesi di dottorato

Studente: Giulio Cinquanta matricola: 956271 _

Dottorato: Economics

Ciclo: 32°

Titolo della tesi: Three essays on social mobility: mobility dimensions, welfare analysis and questionnaires evidence.

Abstract: The thesis concerns social mobility. Social mobility defines the way in which people's socio-economic positions evolve over time or among generations. The thesis is composed of three chapters. Chapter 1 discusses the relevance of quadratic social welfare function provided by Epstein and Segal (1992) in a dynastic society. As a result, the chapter extends the social choice approach provided by Harsanyi (1953, 1955, 1977) to dynastic society. Moreover, the chapter discusses how in the dynastic setting, appropriate parametrization allows the quadratic welfare function to embed the principal contributions provided by the welfare literature on intergenerational mobility, including utilitarianism, origin independence, reversal and randomization. Chapter 2 provides an experimental questionnaire about people's value of social mobility, considering both the intergenerational mobility scenario and the intragenerational one. This chapter investigates people's value about different mobility dimensions proposed by the welfare literature. Furthermore, the questionnaire aims at capturing whether mobility evaluations differ based on the source of inequality: life chances randomly distributed versus natural ability genetically transmitted. The questionnaire is implemented in Amazon MTurk platform. Chapter 3 provides a further experimental questionnaire aimed at capturing people's perception about two fundamental mobility aspects: structural mobility and exchange mobility, focusing on the intergenerational mobility scenario. Furthermore, the chapter provides several mobility dimensions that may affect people's mobility perception about these features. The questionnaire is implemented in Amazon MTurk platform.

Abstract: Tema centrale della tesi è la mobilità sociale. La mobilità sociale definisce i meccanismi che governano l'evoluzione dello status socio-economico degli individui nel tempo o tra le generazioni. La tesi è composta da tre capitoli. Il capitolo 1 discute la pertinenza della funzione di welfare quadratica sviluppata da Epstein and Segal (1992) in un framework dinastico. Inoltre questo capitolo analizza come una appropriata parametrizzazione della funzione di welfare quadratica integra i principali contributi della letteratura riguardante l'analisi sociale della mobilità intergenerazionale. Il capitolo 2 analizza le preferenze sociali degli individui riguardo la mobilità intergenerazionale e intragenerazionale attraverso un questionario sperimentale. Inoltre, questo capitolo analizza in che misura differenti fonti di disuguaglianza tra le generazioni (periodi) influiscono sulle preferenze sociali degli individui riguardo la mobilità intergenerazionale (intergenerazionale). Il capitolo 3 analizza le percezioni degli individui riguardo due aspetti essenziali della mobilità intergenerazionale: la "exchange mobility" e la "strucutral mobility" attraverso un questionario sperimentale. Inoltre il capitolo 3 analizza differenti aspetti del processo di mobilità che potrebbero influenzare la percezione degli individui rispetto alla mobilità intergenerazionale.

Firma dello studente