

# Explaining inequalities in vocational orientation choices among children from different social backgrounds ?\*

## Working Paper

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### Abstract

The causes of inequalities in educational outcomes between children from different social origins are the matter of a long-standing debate. Empirically, this situation appears to be due mainly to two phenomena : the difference in level at school between children from different social origins, and the difference in vocational orientation between children with the same level at school but from different social origins. The aim of this article is to offer a new way to explain the latter, thanks to the modelisation of human capital investment choice as a risky choice within the cumulative prospect theory (CPT) framework. This explanation is a rigorous reformulation of the reference point logic that has been put forward to explain this phenomenon since Merton and Kitt (1949).

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## 1 Introduction

Poverty, like wealth, is often transmitted intergenerationally. One of the main vectors of this transmission is the under investment in education of

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the children from lower class families. This fact is unambiguous and widely studied for developed countries (OECD 2001). Filmer and Pritchett (1999) show clearly that this phenomenon is the same in developing countries. The reasons of the under investment of lower class agents in human capital are numerous in theory. Piketty (2000) lists the possible explanations : credit imperfections, transmission of human capital, transmission of preferences, self-fulfilling beliefs. . .

A first explanation may be the credit constraint due to credit market imperfections (Loury 1981, Galor and Zeira 1993, Piketty 1997). The un-transferability of human capital and its impossibility to be sold prevent lower class agents from borrowing and investing in human capital since they can't find a collateral to insure their loan. This theory is widely used to explain the transmission of inequality in human capital. However, empirical studies supporting this theory are scarce (Flug, Spilimbergo, and Wachtenheim 1998, Checchi 1999). And some recent ones point out the low level of borrowing constraint (Carneiro and Heckman 2002) or even the absence of such constraint (Cameron and Taber 2002).

Another simple explanation is the possible transmission of human capital (Becker and Tomes 1979, Herrnstein and Murray 1994) : lower class families are less endowed with human capital than upper class ones, and these inequalities are transmitted to the children. Children from upper class families will, as a consequence, be able to go further in school than children from poorer families : be it because the difficulty of studies is greater for poorer children who will choose to stop before the others or because the selection of the educational system prevents weaker students from going further. Empirical studies seem to validate this theory by showing that children from richer families succeed more in logical tests such as IQ. According to Erikson and Jonsson (1996b), about one third of the association between class origin and education attainment is transmitted via IQ (swedish data). The results of empirical studies seem to show that these differences are not primarily "natural" (in the sense of innate abilities), but transmitted from the parents after birth. For instance, adopted children coming from lower families have seen their IQ scores significantly catching up with the level of the richer social background of their parents. A third possible factor is the geographical segregation. Suppose that there is some kind of peer effects to get human capital (it is easier to get human capital when people around are well endowed with it). The willingness to send one's children to schools where children are from wealthy social origins may entail urban segregation and educational inequalities (Benabou 1993). Another possibility is local financing of school implying more resources for schools from richer areas (Benabou 1996, Fernandez and Rogerson 1994). If the success of children increases with the resources dedi-

cated to their education, this may entail urban segregation and educational inequalities between children from different schools.

It is also possible to explain the inequalities by a transmission of preferences within the family: if families have significantly different preferences for education (Hyman 1953) and if there is an important correlation between the parents and the children's preferences, there will be mechanically a correlation between the level of education of the parents and the level of education of the children. Two major differences come to mind : differences in the utility or disutility of school and differences in utility of skilled jobs relatively to unskilled ones. If a family dislikes school and does not prefer skilled jobs to unskilled ones, it will invest less in education than a family who likes school and prefers skilled jobs. The questions raised by this theory are the credibility of the existence of such differences in preferences and their reasons.

How are those theories able to explain educational inequalities ? To answer this question, it is first necessary to notice the complex nature of educational inequalities. The multiplicity of theoretical answers to educational inequalities seems effectively to reflect the multiplicity of empirical causes.

## 2 Some stylised facts

Micklewright (1989) remarks that usually two effects of the family social background are distinguished : First a higher investment “in human capital from infancy onwards, resulting in a more able child and a school type that is selective or private. Second, there may be a direct effect whereby parents from that class encourage or coerce a child to stay on irrespective of his or her ability or type of school. Sociologists have referred to these indirect and direct impacts as the “primary” and “secondary” effects, respectively, of social class stratification”<sup>1</sup>

The primary effect is clearly compatible with the human capital transmission hypothesis : upper class children tend to have a better ability at school thanks to their parents. The secondary effect is different : it tells that for a given ability at school, lower class children tend to choose shorter or vocational curricula, whereas upper class children tend to choose longer and

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<sup>1</sup>An another cause of educational inequality appears to be that children are unequally oriented according to the school they attend. Schools with more children from lower class families tend to orient children towards shorter and more vocational curricula. For Duru-Bellat (2002), this accounts for one third of all educational inequality in France. This effect is smaller for Erikson and Jonsson (1996b) according to whom the effect of schools accounts for only five per cent of the variation in transitions to upper secondary education in Sweden. This fact could be explained by the segregation hypothesis.

general curricula. The aim of this paper is to explain this component of the intergenerational transmission of educational inequality.

The fact that, for a given level of results at school, children from a wealthier social origin tend to choose longer curricula (and so better wages at the end) is a fact widely covered in studies from a wide range of countries : See Micklewright (1989), Wadsworth (1991) for UK, Sewell and Hauser (1976) for the USA, Sauvy and Girard (1965), Duru-Bellat and Mingat (1993) and Duru-Bellat, Jarousse, and Mingat (1993) for France, Erikson and Jonsson (2000) for Sweden, Gambetta (1987) for Italy.

For instance, take the choice to make general or vocational studies that French children have to make at 15. Table 1 shows the percentage of children choosing general education (longer) according to their grade (ranging from 0 to 20) and social origin. The difference in choice appears clearly between children from different social origins.

Micklewright (1989) computes the respective probabilities to leave school at the minimum compulsory age (that is 16). For parents who are manual workers or who do not work and who did not stay on at school, the predicted leaving probability of a boy with median level of ability is 0.777 while the same probability of a boy with the same ability but whose parents stayed at school and belong to the middle class, the predicted probability falls to 0.339. Those differences in leaving probabilities controlled for the children's academic ability and type of school account for half and two thirds of the global differences in leaving probabilities. The willingness to make general and long studies look almost like a lexicographic preference for children from upper class origin. This entails a kind of risk seeking attitude from those children. Gambetta (1987) remarks that the less advantaged part of the middle class hang on to the general high school orientation with, as a consequence, a high risk of failure.

The data available show that differences in choice according to social origin depend on the school results of children :

Table 1:

Difference in orientation according to social origins				
Grades	<9	9 - 10.3	10.3 - 12	12<
Farmer	28.1	63.6	81.3	100
Worker	28.1	36.7	64.8	94.2
Professional	60.9	95.5	97.1	100

Source : Duru-Bellat, Jarousse, and Mingat (1993).

Choices are clearly characterized by an unequal self-selection according to social origins... When the student is very good or very weak, the wishes of families are equally ambitious or conversely modest. But a great diversity characterizes more middle level students. (Duru-Bellat 2002)

What are the reasons for those differences in orientation choices for a given school result between children from different social origins ? Credit market imperfections could explain such a situation : for each school result, lower class children are more often constrained than upper class ones. But in developed countries, high schools and often even colleges (as in Europe) are mostly free. And the wealth of low-income families enables them to bear the cost of the education of their children. This may be the reason why credit constraints do not appear empirically to be the cause of educational inequalities (Carneiro and Heckman 2002, Cameron and Taber 2002). Another hypothesis could be the different preferences hypothesis. If lower class families like school less than upper class ones, it is not surprising that for a given level of ability, children from poorer families make less ambitious choices in orientation. But the problem of this explanation is that it seems *ad hoc* : why should preferences be different ?

Moreover, another simple question arises : if social origin has an impact, why is it a function of the child's school results ? That is, social origin has a high impact for low and middle students, but a lower impact for very good and very low students. Current theoretical answers of educational inequalities do not seem to be able to explain convincingly the impact of social origin for a given level of school results, but this latter fact seems even more difficult to explain. For instance, credit market imperfections could explain this phenomenon if credit constraints were weaker on the good students who come from poorer social backgrounds. But if this is effectively the case concerning famous private colleges whose those students get grants given their school ability. This explanation can't account for the major part of inequalities which arise in post compulsory schooling.

To explain this puzzle and, consequently, the pattern of difference in choices between children from different social origins, we model the human capital investment choice as a risky choice : there is a risk of failure in education, and, consequently, the choice of children depends on the probability to succeed (which is linked to their ability) <sup>2</sup>.

Then, we show that developments in risk theory enable, through Cumulative

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<sup>2</sup>This idea is reasonable, (Gambetta 1987) finds that independently of social class and of economic constraints, orientation choices are largely function of past school achievements.

Prospect Theory (CPT), to explain this pattern of inequalities.

### 3 The model

The framework of the CPT is very similar to the Expected Utility Theory (EUT) one (Tversky and Kahneman 1992, Wakker and Tversky 1993) : it is the reformulation of prospect theory (Kahneman and Tversky 1979) with the theoretical foundations of rank dependant expected utility, RDEU (Quiggin 1982). Three differences have to be pointed out : The independence axiom of expected utility theory is replaced by the axiom of the comonotone sure thing (Chateauneuf, 1999), as in RDEU. This authorizes the two following differences.

First, similarly to EUT, the utility function  $V$  is the sum of each outcome times a decision weight. However, contrary to EUT, and as in RDEU, the decision weight is not the probability itself, but a non-linear function of this probability.

Second, contrary to EUT (and RDEU), CPT do not consider as outcomes the final wealth, but the gains and losses (0 being the status quo). So, the set  $X$  of outcomes considered consists of gains and losses computed relatively to a reference point.

Thus, let  $X$  be the set of riskless alternatives,  $X$  being a nonempty compact topological space. A lottery is a probability measure with finite support on  $X$  denoted by  $P = (p_1, x_1; \dots; p_i, x_i; \dots; p_n, x_n)$  where  $x_1, \dots, x_n \in X$ ,  $x_1 \geq \dots \geq x_k \geq 0 \geq x_{k+1} \geq \dots \geq x_n$ , and  $\sum_{i=1}^n p_i = 1$ . The set of all lotteries is  $L(X)$ . A riskless alternative  $x \in X$  is identified with the lottery  $(1, x) \in L(X)$ . A preference relation  $\succeq$  is assumed over lotteries. Let  $V$  be a representing function of this relation : if  $(P, Q) \in L(X)^2$ ,  $P \succeq Q \Leftrightarrow V(P) \geq V(Q)$ .

$$(1) \quad V = \sum_{j=1}^n \varphi_j u(x_j)$$

$\varphi_j$  is a decision weight generated by two weighting probability functions  $\pi^+$  and  $\pi^-$  defined respectively over gains and loss such that :

$$(2) \quad \varphi_j = \begin{cases} \pi^+ \left( \sum_{i=1}^j p_i \right) - \pi^+ \left( \sum_{i=1}^{j-1} p_i \right) & \text{when } j \leq k \\ \pi^- \left( \sum_{i=j}^n p_i \right) - \pi^- \left( \sum_{i=j+1}^n p_i \right) & \text{when } j > k \end{cases}$$

Let's suppose an individual choosing to invest or not in human capital so as to improve her human capital, and consequently her future stream of income (on an infinite horizon). In the first period, the individual can choose to invest in education or to work for an unskilled wage  $\omega_u$ . Let's suppose now that the result of this year of investement is not sure. Suppose there is an exam to pass in order to get the diploma, and suppose there is only a probability  $p$  ( $p < 1$ ) to pass this exam<sup>3</sup>. We assume too that this diploma is necessary to get the benefits of the invesment in human capital (we can think of it as an ability signal that firms require of those who apply for skilled jobs). For simplicity, we assume that if she fails at this exam, she gets only an unskilled wage  $\omega_u$  and the skilled wage  $\omega_s$  otherwise. The problem of differences in choices we presented above may be very simply expressed in the CPT framework.

The first question is the determination of the reference point. Usually, the reference point is the current situation of the individual. In this first case, it is logical to associate the reference point (in terms of wealth) of the child to the situation of her parent. However, more generally, reference point may depart from the current situation of the individual and correspond to a situation the individual may expect. For simplicity, we will suppose here that the reference point of the child is the situation of her parent. So, when anticipating her future stream of income, we will suppose that she takes as a reference point the stream of income her parent got<sup>4</sup>. However, it would be possible to think of slightly different reference points : for instance a higher reference point in a situation of generalisation of education.

The difference with the simple use of CPT framework is that the outcomes of the lottery are here intertemporal streams of gains and losses. The streams of gains or losses relatively to a reference point are easily deduced from the possible streams of income. Let  $\Omega_{ne}$  be a list corresponding to the stream of income for not having invested in education,  $\Omega_{es}$  for having invested successfully and  $\Omega_{ef}$  for having invested unsuccessfully. We have :

$$\begin{aligned}\Omega_{ne} &= \{\omega_u, \omega_u, \omega_u, \dots\} \\ \Omega_{es} &= \{0, \omega_s, \omega_s, \dots\} \\ \Omega_{ef} &= \{0, \omega_u, \omega_u, \dots\}\end{aligned}$$

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<sup>3</sup>For analytical convenience, and in order to stay in a situation of risk, we assume that this probability is known by the individual

<sup>4</sup>If you suppose that the parent chooses for their child, it is so logical to put the reference point at their own profile of intertemporal stream of income. If it is the child who chooses, we suppose that she does not take as a reference point the current income of her parent, but taking into account the initial invesment which may have been necessary to get this income, she takes in account the whole stream of income.

So, if you call respectively  $\Delta\Omega_{ne}^p$ ,  $\Delta\Omega_{es}^p$  and  $\Delta\Omega_{ef}^p$  the streams of gains and losses relatively to the reference point of the lower class individual and  $\Delta\Omega_{ne}^r$ ,  $\Delta\Omega_{es}^r$  and  $\Delta\Omega_{ef}^r$  the streams of gains and losses relatively to the reference point of the upper class individual. You get<sup>5</sup> :

$$\begin{aligned}\Delta\Omega_{ne}^p &= \{0, 0, 0, \dots\} \\ \Delta\Omega_{es}^p &= \{-\omega_u, \omega_s - \omega_u, \omega_s - \omega_u, \dots\} \\ \Delta\Omega_{ef}^p &= \{-\omega_u, 0, 0, \dots\} \\ \\ \Delta\Omega_{ne}^r &= \{\omega_u, \omega_u - \omega_s, \omega_u - \omega_s, \dots\} \\ \Delta\Omega_{es}^r &= \{0, 0, 0, \dots\} \\ \Delta\Omega_{ef}^r &= \{0, \omega_u - \omega_s, \omega_u - \omega_s, \dots\}\end{aligned}$$

So, letting  $P_j^i$  be the general term of prospects (that is lotteries) with  $i \in \{r, p\}$ , and  $j \in \{e, ne\}$  (we keep the same logic for subscripts and superscripts) :

$$\begin{aligned}P_{ne}^p &= (1, \Delta\Omega_{ne}^p) \\ P_e^p &= (p, \Delta\Omega_{es}^p; 1 - p, \Delta\Omega_{ef}^p) \\ P_{ne}^r &= (1, \Delta\Omega_{ne}^r) \\ P_e^r &= (p, \Delta\Omega_{es}^r; 1 - p, \Delta\Omega_{ef}^r)\end{aligned}$$

Assuming that the utility function on outcomes is timely additively separable, we have :

$$\begin{aligned}V(P_{ne}^p) &= 0 \\ V(P_e^p) &= u(-\omega_u) + \pi^+(p) \frac{u(\omega_s - \omega_u)}{\rho} \\ V(P_{ne}^r) &= u(\omega_u) + \frac{u(\omega_u - \omega_s)}{\rho} \\ V(P_e^r) &= (1 - \pi^-(p)) \frac{u(\omega_u - \omega_s)}{\rho}\end{aligned}$$

The conditions to invest in education for the two kinds of individuals are

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<sup>5</sup>For simplicity, we suppose that lower class parents did not invest unsuccessfully in education but choose not to invest.



consequently :

$$V_e^p \geq V_{ne}^p \Leftrightarrow u(-\omega_u) + \pi^+(p) \frac{u(\omega_s - \omega_u)}{\rho} \geq 0$$

$$V_e^r \geq V_{ne}^r \Leftrightarrow (1 - \pi^-(p)) \frac{u(\omega_u - \omega_s)}{\rho} \geq u(\omega_u) + \frac{u(\omega_u - \omega_s)}{\rho}$$

Let  $p_p^*$  and  $p_r^*$  be the respective critical probabilities of success under which children choose not to invest in education. We have :

$$\pi^+(p_p^*) = -\rho \frac{u(-\omega_u)}{u(\omega_s - \omega_u)}$$

$$\pi^-(p_r^*) = -\rho \frac{u(\omega_u)}{u(\omega_u - \omega_s)}$$

So :

$$\frac{\pi^+(p_p^*)}{\pi^-(p_r^*)} = \frac{u(-\omega_u)}{u(\omega_u)} \cdot \frac{u(\omega_u - \omega_s)}{u(\omega_s - \omega_u)}$$

Suppose, that the utility function  $u$  on outcomes is symmetric for losses and gains but a multiplicative constant. That is :  $u(-x) = -\lambda u(x)$ . We get :

$$\frac{\pi^+(p_p^*)}{\pi^-(p_r^*)} = \lambda^2$$

This latter choice is made to enable a simple characterisation of *loss aversion* which is an important concept appeared with CPT : the asymmetrical evaluation of gains and losses. Formally, following Wakker and Tversky (1993), loss aversion is the fact that :  $-u(-x) > u(x)$ ,  $\forall x > 0$ .

Loss aversion has received a clear support from empirical studies (Kahneman and Tversky 1979, Hershey, Kunreuther, and Schoemaker 1982, Samuelson and Zeckhauser 1988, Kahneman, Knetsch, and Thaler 1991, Benartzi and Thaler 1995, Schmidt and Traub 2000, for instance).

Our specification implies loss aversion as soon as  $\lambda > 1$ . It's straightforward that, if  $\pi^+ = \pi^-$ , this implies :  $p_p^* > p_r^*$  if  $\lambda \geq 1$ . We get the situation of Figure 1 : having different levels of critical probabilities, children will not made the same choices for the same level of ability. With lower critical probabilities, children from upper social class will choose to invest in human capital even for low abilities levels. This result fits clearly with the observed pattern of choice make by children.



and Wu we made the assumption  $\pi^+ = \pi^-$ . Tversky and Kahneman used a one parameter weighting probability function, which has also been used by Camerer and Ho (1994) and in particular Wu and Gonzalez (1996) and Abdellaoui (2000) :

$$\pi(p) = \frac{p^\gamma}{(p^\gamma + (1-p)^\gamma)^{\frac{1}{\gamma}}}$$

Gonzalez and Wu (1999) and Abdellaoui (2000) used an another functional form they call “linear in log odds” which has been used by Goldstein and Einhorn (1987), Tversky and Fox (1995), Birnbaum and McIntosh (1996), Kilka and Weber (1998) :

$$\pi(p) = \frac{\delta p^\gamma}{\delta p^\gamma + (1-p)^\gamma}$$

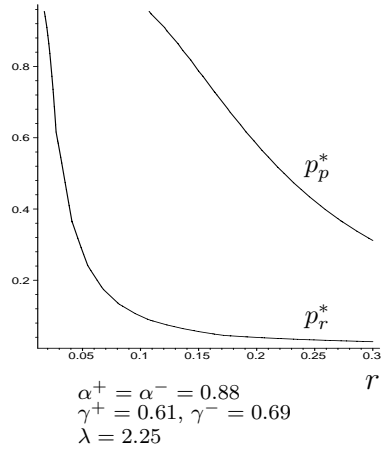
For Abdellaoui (2000), the curve resulting from a simulation with a weighting function “linear in log odds” is closely similar to the curve drawn with the function of Kahneman and Tversky, we graph only the latter. Identically, Wu and Gonzalez (1996) have also estimated the parameter of the function proposed by Prelec (1996), and the curve being very similar to the curve with a “linear in log odds” weighting function, we graph only the latter. The Prelec function is :

$$\pi(p) = e^{-(\ln p)^\gamma}$$

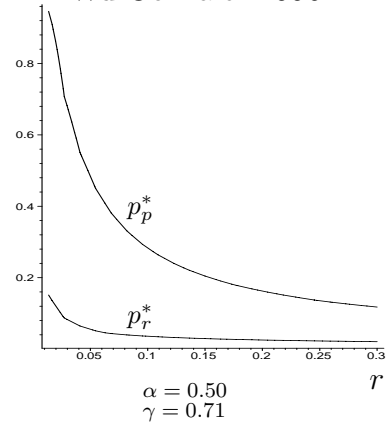
As none of these studies concerned intertemporal stream of income, no discount rate was empirically estimated. We use as a discount rate  $\rho = 0.05$ .

The very low critical probabilities of children from uper class origin is similar to a lexicographic preference for education as Gambetta (1987) said. This implies too a risk seeking attitude : children from wealthier origin are willing to take more risky choices, being unwilling to accept a loss relatively to their reference point.

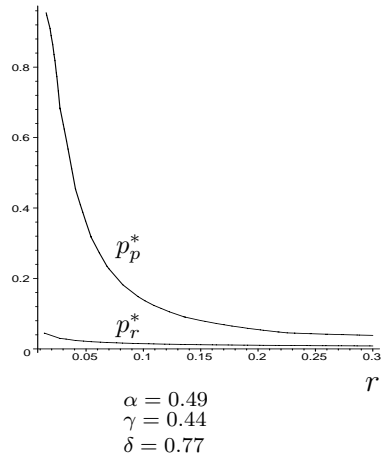
Tversky and Kahneman 1992



Wu Gonzalez 1996



Gonzalez and Wu 1999



Abdellaoui 2000

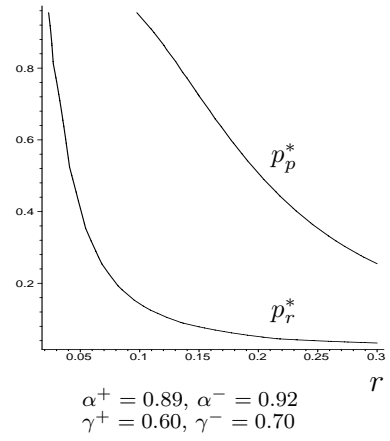


Figure 2: Critical probabilities in CPT

## 5 Comparison with previous works

The explanation of differences in choices has not been widely studied yet, in economics. Inequalities in education are widely seen as the results of constraints on lower class agents : those constraints are possibly the differences in ability (transmission of human capital), and the unequal access to the credit market (credit market imperfections). Our study shows that, the origin of the differences in choices may come from individual choices and not only from constraints.

This mechanism of choice implying a reference point has already been put forward in sociology and psycho-sociology. Hyman (1942) and later Merton and Kitt (1949) proposed the notion of reference group : according to this theory, people assess their situation by comparing it to the situation of the members of a given group (the reference group). This statement is interesting, however it raises the question of the determination of the reference group which is not determined. Moreover, those authors considered that different groups have different sets of values guiding the actions of their members. The explication of the differences in ambition was so explained by a difference in preferences among different groups by Hyman (1953). This is unpleasant for an economist who feels that the problem has been solved thanks to an *ad hoc* hypothesis concerning preferences<sup>6</sup>.

Criticising this hypothesis of social differences in preferences, an another sociologist, Boudon (1973), sought to explain the difference in ambition of children by a reference point logic : he supposed that each individual has a social position which is her reference point (Keller and Zavalloni, 1964). The idea is that, as the reference point of children from richer social origin is higher than the reference point of children from lower social origin, they will have more ambition. This being true without supposing social differences in preferences. This way has been followed by others sociologists to study education (Goldthorpe 1996, Erikson and Jonsson 1996a).

However, the Boudon's answer lays two problems. First, it equally implies a difference in preferences (at least in the economical sense), and that is one of the advantages of the modelisation under CPT to make this point clearer. As EUT, CPT is based upon a preference relation over lotteries represented by a utility function  $V$ . And in CPT, the preference relation is composed of a valuation function  $u$ , a decision weight function  $\varphi$ , and a reference point that determines the outcomes to be valued (gains and losses). The advantage of CPT is to show the smallest hypothesis about differences in preference

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<sup>6</sup>Moreover, Erikson and Jonsson (1996b) remark that the hypothesis of difference in social preferences toward education cannot easily explain the enormous increase of secondary and tertiary education among children from lower classes during the twentieth century

necessary to explain the phenomenon. That is to say, it's no use postulating differences in "cultures" between groups.<sup>7</sup>

Second, Boudon's approach has a major shortcoming : as our study shows, the reference point logic is not sufficient in itself to entail a difference in choices between children from different origins. The principle necessary to produce this difference is *loss aversion*. Without it, different reference points may be linked with the same critical probabilities. A closer look at Boudon's argumentation shows that in his book of 1973, he introduced a specific cost for poorer individuals : the social distance from their parents threatens the solidarity system underlying the family. This entails automatically the expected difference in educational choices, but thanks to an *ad hoc* hypothesis.

## 6 Implications

The implications of our explanation for policies aiming at reducing inequalities in educational outcomes may seem rather pessimistic. If our model depicts accurately reality, the roots of an important part of educational inequalities lie in psychological mechanisms that can't be changed. Consequently even if affirmative action policies may prove to be successful to some extent, there are good reasons to believe that they can't be enough to reduce educational inequalities. However, by enabling one to better understand the mechanism of the intergenerational transmission of inequalities in education, this may enable us to find better policies to promote equity in educational systems.

Three main conclusions can be made at this point. First, the CPT model matches with the common empirical statement that the more income and educational inequalities there are in a country's population, the more educational outcome inequalities there are bound to be. Nordic countries are for this issue a paradigm. First their low level of inequality goes hand in hand with the lowest educational outcome inequalities from OECD (OECD 2001). Second, studies on educational inequalities in Sweden show that the reduction of this kind of inequality has taken place while global economic inequalities were decreasing (Erikson and Jonsson 1996a). Naturally, this may not be seen as the proof of a causal link, but for sure this is compatible with the logic of reference dependent preferences about education (Goldthorpe 1996). So one way to reduce educational inequality seems to be to reduce globally

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<sup>7</sup>Consequently, the reference point logic rely upon the hypothesis of a difference in preferences. But here, the hypothesis of differences in preferences is not any more a black box made on purpose to explain a given puzzle. Here, it is a very clear assumption lying on empirical findings and theoretical axiomatisation.

economic inequalities...

Second, as we said at the beginning, the reference point is not necessarily the current situation of the individual. Concerning school ambition, it is reasonable for instance to think that, in a context of lengthening of studies, the reference points of children should be above their parents' attainment. Consequently, one way to curb inequalities in educational orientation choices would be to limit the correlation between the reference point of the child and the level of education and income of the parents. It is surely rather unlikely (and even maybe not to be hoped for) to think of trying to act directly on the reference point of children, by talking to them for instance. But the child's reference point seems to depend on the child's peers in school : children from lower class families make more ambitious choices if they are in a school with more children from upper class families. This fact has been established since the Coleman report (Coleman 1966) which talks of an equalising effect of non segregated schools within which children from poor minorities get the level of aspiration of the children from the rich white majority. As said Duru-Bellat (2002, p.103-104) : "the choices of orientation of children are all the more ambitious when, everything being equal, the mean level of choices is high in ambition". In the CPT framework, this implies that a child from a lower class family surrounded by peers from upper class families will have a higher reference point than if she were surrounded by children from its own social class. Consequently, this means clearly that social segregation in school should be excluded as much as possible. Social heterogeneity in school is bound to decrease the correlation between the income and educational attainment of parents and the choice of orientation in education of the children. The creation of classes with the same levels is for instance full of perverse effects on this single point of view (and maybe on others).

And finally, the more children will face situations of choice concerning their orientation, the more there will be inequality. Our model implies that only few things may be done against it. However, the "cost" in inequality of each point of divergence in orientation should incite one to reduce their number to a minimum. For instance, the high dropouts rates and the high inequalities characterising the dropouts in developing countries imply that a major reform of educational systems in developing countries is to increase the age of compulsory schooling. In developed countries, the dropouts rates are lower, and inequality is more characterised by inequality in choices of educational orientation : lower class children are more likely to choose technical or vocational education with lower wages in the end<sup>8</sup>. To promote equity in education im-

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<sup>8</sup>This is not only due to a shorter period of education but to lower rates of return to the investment in education too (Dearden, McIntosh, Myck, and Vignoles 2002)

plies to postpone the first choice of orientation to the latest possible moment. This is even more justified if we take into account the fact that the weight of parental preferences in the child's choice are bound to be all the more important that the child is younger. The Pisa (OECD 2001) study shows clearly that the earlier the first choice of orientation is, the higher inequalities in educational outcomes are. Erikson and Jonsson (1996b) reach the same conclusion about Sweden :

We believe that the crucial factor behind the equalization following the Swedish comprehensive school reform was the postponement of the earliest branching-points in school, that is, of the first consequential educational decision that a child is faced with.

The case of Germany, where the first orientation takes place around 10 is enlightening : it is the country with the earliest stage of orientation, and with the most educational outcome inequalities within OECD. Beyond, we may wonder if this situation of "children sorted for life" is fair : "Few children change track after the initial sorting that follows primary school. Hence the decisions made at age ten are of enormous importance." (UNICEF 2002). This is not without implication for a country such as France, where the unified primary school is intended to be changed so as to enable technical orientation from 14.

## 7 Conclusion

Our article tackles an issue which has been widely studied and debated since the 70s in sociology : the differences in educational choices between children from different social origins. Those differences in choices do not seem to be reduced to a human capital or a credit market imperfection explanation. First, it appears that children with the same ability do not make the same choices, and these differences at a given level account for between a third and one half of the global inequality in educational outcomes. Second, empirical studies show that, at least for developed countries, credit constraint does not seem to be a major phenomenon useful to explain educational inequalities. To explain this phenomenon, we model the human capital investment choice as a risky choice. Then, using a CPT model, we show that this phenomenon may be explained by a reference point logic with loss aversion. The reference point logic has often been put forward to explain inequalities in educational choices since Boudon (1973). The formalisation of this question with CPT shows, however, that the mere reference point logic is not in itself sufficient to



produce the expected result. An additional hypothesis, that CPT provides, is necessary : the aversion to losses relatively to the reference point.

Concerning the policy implications of our study, without denying usefulness in current policies aiming at reducing educational outcomes inequalities, the fact that inequalities stem significantly from individual choices implies to promote some solutions : the social heterogeneity in class, the increase of compulsory schooling in developing countries and the postponing of the first situation of orientation choice for children are likely to be the best answers to the gloomy mechanism exposed here.

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