Introduction

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1 The object

What is justice in education? How can we evaluate whether observed distributions - which typically are unequal to a certain extent - of educational inputs or outcomes are fair or not? How should a society organize the redistribution of its educational resources in order to move its schooling system towards a fairer situation? What obstacles are likely to be found whenever redistributive policies are implemented in the educational sphere?

These were the main broad questions we wanted to investigate in this dissertation. What is the appropriate framework for an economist to answer them? When we started the research, it seemed to us that a promising strategy would consist of investigating, and then translating in a rigorous way, theories of distributive justice - which have been developed by political philosophers and normative economists - into normative criteria and objectives in the particular field of justice in education. These criteria and objectives should be as concrete, measurable, and comparable as possible, and they should respect desirable conceptual and mathematical properties. Such methodological strategy is in fact recommended by a prominent normative economist in a paper in the related field of justice in health, and justified in terms of recent "important advances in the systematization of the analysis of justice on the one hand", and "in the rather technical sub-field of the measures of unjust inequalities on the other hand" (Kolm, 2002).

We have then decided to develop our dissertation taking such methodological procedure as a guideline. The form the dissertation took in the end, as well as its precise contents, is described below, just after the following section, which is devoted to some aspects which motivated our research.

2 The intellectual motivation

2.1 'Normative economics of education': a research program in need of development

Some years ago, an "international encyclopedia on economics of education" was organized by the economist of education Martin Carnoy. Surprisingly, even in its second edition (1995), there is no entry exclusively devoted, neither to equity in education, nor to educational fairness or justice. There are some contributions focusing on the relationship between education, income distribution and discrimination, with emphasis on gender and race issues. There are even two parts devoted to the evaluation of educational investment and to educational finance, but it lacks a more detailed treatment of equity

issues, which is limited to three or four pages in two entries (out of almost 500 pages and 87 entries the volume contains).[1]

The case of the encyclopedia is not an exception at all. In fact it is not easy to find contributions in the economic literature whose focus is on justice in education in a broad sense, taking theories of distributive justice as their starting point.[2] Normative economics of education actually seems to lag behind related fields such as normative health economics. This impression was expressed, for example, by le Clainche (1999, p.78): "A great amount of work has been done by economists in what concerns equitable allocations of health care and relatively a small amount in what concerns education".

The treatment given to justice in education and to justice in health in a well-known handbooks series reflects the differences between the importance attributed to research on justice in these two fields. While the handbook of health economics (Cuyler and Newhouse, 2000) contains three chapters explicitly concerned with normative health economics, and partly based upon, or at least explicitly referring to, theories of distributive justice[3], the analogous handbook of economics of education, recently published (Hanushek and Welch, 2006), does not contain any chapter or part devoted exclusively, and generally, to 'equity and education', but again only three chapters devoted to specific aspects of the black-white performance gap.[4]

The shortness of contributions in normative economics of education was also noticed in the public-economic literature, an opinion expressed recently by Fleurbaey, Gary-Bobo, and Maguain (2002): "given the apparent importance of the subject, the economic theory of education in its relation with distributive justice and income redistribution is still under-developed". In their paper, they are concerned, in a broad sense, with the relationship between education and general justice, and not, in a specific sense, with justice in education. In order to address education policy issues, their model combines, at an abstract/theoretical level: theories of distributive justice, optimal taxation and principal-agent under adverse selection. They refer to few other papers treating some aspects of their research question, but they argue that none of them had gathered all these aspects together. The article

[1]These treatments of equity can be found in the following entries: "educational finance" by C.S. Benson (pp. 408-12), and "school finance" (pp. 412-9) by H.M. Levin. At the name index, there is only one reference to John Rawls and another one to Amartya Sen, which can be taken as an evidence of little concern for distributive justice theories.

[2]This subsection does not intend to be an extensive and comprehensive survey, but simply a 'random walk' around the literature on normative economics of education, serving as an introduction to that topic.

[3]The three chapters are: 2, 34 and 35. Two of them (34 and 35) compose, under the label "Equity", one of the nine parts in which the book is subdivided.

[4]Chapters 3, 9 and 17.

is extremely interesting and it gives some insight on important trade-offs.[5] However, it does not provide clear-cut answers to the questions we raise in section 1.

A paper from an educationist (Brighouse, 2002) tries to shed some light on the relationship between a particular, but important, theory of justice (egalitarian liberalism), and justice in education. Before trying to accomplish this endeavor, the author says he is puzzled by the fact that, although highly influential in other normative disciplines over the last thirty years, Rawlsian theories of distributive justice have been ignored by education scholars. One of the reasons for that could be, in his opinion, the neglect of education issues by philosophers themselves. He adds that by neglect, or misunderstanding, of egalitarian liberalism, egalitarian scholars "have missed out on a rich tool for critique of current practices and policies, and for the guidance of future reforms". Thus, it seems to be the case that normative analyses of education have also been rare in other disciplines, even in those which place education at the core of their research preoccupations.

Going back to economics, it should be said that a flourishing literature regarding normative issues in education is found in studies on equity in education financing. The empirically oriented papers belonging to this stream of the literature employ simple and intuitive normative concepts such as horizontal and vertical equity, and now and then refer to more complex ones such as equality of opportunity (although usually a rigorous definition of the concept is absent). Examples of this are: Murray, Evans, and Schwab (1998); Iatarola and Stiefel (2003). Another stream of this literature, in articles such as Hoxby (1999); Fernandez and Rogerson (1999), provides more formalized analysis (i.e., standard economic models). A feature of almost all the contributions in this line of research, and particularly the empirical ones, is that equity is usually assessed at the input level. The main variables at stake - typically, the dependent variables in econometric studies - are the monetary resources allocated to pupils, such as per-pupil expenditures, teacher's wages or school resources.

The problem with the latter approach is that monetary resources are only

[5]They model education planning in an economy composed of individuals (agents) whose costs of acquiring education (called "talent") are different and not observable. The principal is endowed with money and can transfer it to the agents either in cash or in-kind (in the form of "help", understood as schooling expenditures), having as an objective to maximize a SWF which is specified as a CES index of utility levels. They calibrate their model by assuming different levels of inequality aversion and then derive results which are qualitatively similar assuming both a finite set of types and a continuum of types. In a dynamic environment, they obtain the optimal levels of education effort, schooling expenditures (help) and cash, taking into account budget constraints, and finally they add self-selection constraints in order to address adverse selection issues.

part of the inputs required to produce education, as an abundant literature in the economics of education has taught us.[6] Put differently, even if monetary inputs (school resources) were uniformly distributed to all students of a given population, the outcomes of these students would certainly still be quite unequal - and unjust, depending on the theory of distributive justice one relies on. To appropriately measure equity in education, it might be necessary to go beyond this monetary input approach and to take into account other inputs (e.g. non-monetary resources) and not to ignore outcome equity.[7]

2.2 Getting closer to the 'normative economics of education'

A few studies lead us closer to the 'normative economics of education'. The work by le Clainche (1999), already mentioned above, begins with a brief comparison of some characteristics of health and education. She rejects a simple utilitarian approach to education, which by assuming that less talented individuals were less able to derive utility from education, would lead to ethically objectionable policies. The work of Rawls, and his followers, allowed equity theories to switch their focus from subjective (such as utility) to objective notions of socio-economic normative criteria. She is interested in such theories which she labels "post-welfarist" approaches. She suggests a classification in three groups: (i) equality of resources (Rawls, Dworkin, Van Parijs, ...), (ii) equality of opportunities (Arneson, Cohen, Roemer, Sen, ...), (iii) equality of "fundamental outcomes or realizations" (Fleurbaey, Scanlon, Trannoy, Sen, ...). While the two first groups of theories are "easily contestable" according to the author, the third one is presented as a "solution". Throughout the paper, she exposes (slightly formally) and discusses concepts such as internal resources, external resources, responsibility, compensation and natural reward (some of which we will refer to in this dissertation). However, being originally a researcher in the field of health economics, le Clainche (1999) does not attempt to provide a deeper scrutiny of educational fairness.

[6] Cf. among others: Coleman et al. (1966); Hanushek (1986, 1997, 2002); Card and Krueger (1992); Figlio (1999); Woessman (2000, 2001).

[7] An exception is Iatarola and Stiefel (2003), who, apart from estimating input equity measures, also estimate output equity measures. They try to find out what factors influence pupil performances in standardized tests. In this case, the dependent variable is the educational outcome, and not inputs anymore. They claim that their paper "is one of the first to measure output equity, using levels and changes in test scores to do so". Some chapters in Berne and Picus (1994) had also tried to go beyond the input equity approach, exploring output equity issues.

Another interesting contribution is that of Zachary, Dupriez, and Vandenberghe (2000), who are interested in studying the effect of the organization of an educational system on efficiency and equity. The authors begin by introducing what they call "four principles of justice" related to educational systems: (i) efficiency, understood as maximization of global performance; the correspondent policy consists of devoting more educational effort to the most talented students, (ii) equality, understood as an equal treatment to all students, (iii) proportionality, in terms of contributions, needs, merit; and (iv) equity, which they claim can be defined in many ways, but having as a common feature that a particular attention is given to the worse-off pupils. In their empirical estimations, equity is defined as the extent to which a pupil's performance is influenced by his characteristics (socio-economic status), which is a widespread conception of equity in econometric studies.[8] The drawback is that it lacks a deeper analysis of conceptual issues concerning the educational sector, and no explicit reference to theories of distributive justice is made.

In a more recent paper, Dupriez and Vandenberghe (2003) say they do not want to discuss in depth different conceptions of justice that underlie different visions of an equitable school. More modestly, they just intend to consider three conceptions of equality at school and to provide measures of these (in)equalities. They admit the conceptions of justice with which they work emphasize the analysis of *results* of the educational process, instead of giving priority to equality of *access* or of *treatment*. They justify their choice by claiming that equality of access has already been more or less achieved in the developed world, and that equality of treatment reflects a conception of equality which requires an extremely centralized decision-making[9], and as such, it can be criticized on many grounds. Then they introduce the conceptions of justice they employ: (i) equality of results, which is a very ambitious objective and may be taken simply as a useful benchmark (ii) equality of access to a minimal level of attainments[10], which takes into account only a subset of the results, and (iii) equality of chances, which, being multi-fold, lacks a unique definition - they choose to work with equality of expected results. Using PISA 2000 (an international test scores database), they estimate educational inequalities at the international level. Finally, they present measures of social segregation, which are often used in the US to estimate the level of racial segregation in cities or states, and cross them with some inequality indicators, leading them to find a high correlation between segrega-

[8]Examples of articles which employ this conception of equity studying the Brazilian context are: Albernaz, Ferreira, and Franco (2002); Waltenberg (2005).

[9]They use the French expression "conception très républicaine de l'égalité".

[10]In French: "égalité des acquis".

tion measures and inequality measures. Once again, while insightful in many senses, the paper does not try to undertake a systematization of normative concepts.

Levin (1994) is a relatively older, but extremely interesting, contribution, since it is exclusively devoted to the topic of equity in education. The author defines an equitable educational situation as one in which "representatives of different racial, gender, and socio-economic origins have about the same probabilities of reaching different educational outcomes". He reasons in terms of expected outcome equity. He first criticizes approaches of equity as equality of access or equality of funding (resources), claiming that they are not sufficient conditions for achieving educational equity. In order to achieve educational equity in Levin's sense, compensatory education funding efforts are needed. But defining how much should be spent for compensatory purposes is a difficult task, because it involves three complex issues: time horizon, potential trade-off between education equity policies and other policies, potential trade-off between education equity policies and economic growth. The path he favors for compensatory policies is the establishment of "accelerated schools", aimed at increasing the schooling performance of at-risk students. It would consist of an *ex ante* policy (i.e., a preventive strategy or, as he calls it, an "enrichment strategy") and not an *ex post* one (i.e., a remediation strategy). While working with the intuitive notion of outcome equity stated above, this contribution comes very close to the more systematic notion of equity conceptualized by John Roemer. However, this article has the usual drawback of not being fully based on theories of distributive justice. Probably for this reason, a more detailed and empirically applicable definition of justice in education is missing, and no solution is given on how to effectively address the "three complex issues" it raises.

The closer we get to the normative economics of education approach is found in a recent book chapter, Meuret (2001), who provides an overview of the way the main theories of distributive justice can shed light on educational inequalities, accompanied by suggestions of possible inequity indicators. The text is organized around Rawls's theory of justice. Firstly, the author presents the theories criticized by Rawls, which are, according to him, utilitarianism, meritocracy, and the principle of redress. He says the former is the main "adversary" of Rawls's construction, while the two latter ones are local theories, that is, theories that do not take into account their effects in spheres other than the educational one. Secondly, he describes Rawls' theory. Finally, those who criticized or extended Rawls's work are discussed: the theory of independence or communitarianism (Walzer), libertarianism and egalitarianism. While it is a quite rich descriptive piece of work, Meuret's analysis does not try to address the lack of careful attention of those sets of theories

discussed there with regards to the educational sector. As a consequence, the intellectual challenge we have noticed and described in this section still remains unanswered.

2.3 Concluding remarks

Although we do not claim this section contains an extensive and systematic survey, we conclude from what we have reported here that there is still a limited number of contributions in normative economics of education which are explicitly based on contemporary theories of distributive justice, which properly state and address challenging trade-offs, and, finally, which provide a solid basis for empirical applications. Whilst some fragmented contributions do exist, as far as we know no systematic and detailed treatment of the topic of educational justice, combined with an empirical preoccupation has been done. More concretely, in our understanding, the questions we raised in the first lines of this dissertation can not be appropriately answered by relying only on the available literature.

So we have set as the intellectual goal of this dissertation to contribute to filling the gap we diagnosed. In order to do so, we have searched on quite different literatures, such as the ones already mentioned above in this section, and which include: health economics, political philosophy, welfare and normative economics, measurement of inequality and of inequality of opportunity, economics of education, and applied microeconometrics.

3 The empirical motivation

3.1 Large and diverse social inequalities in Brazil

Together with the challenging intellectual questions motivating us to study our research topic, there was also a more concrete underlying motivation: the empirical observation, in an important developing country (Brazil) of substantial inequalities, of different natures, many of them related in some sense to education, and many of them likely to be considered unfair.

Inequalities are so widespread a phenomenon in Brazil that an informed Brazilian reader would probably dispense of a section which tried to provide a motivation for the study of inequalities. By consulting any important Brazilian social-scientific journal, one immediately realizes that articles devoted to the study of inequality and related topics (poverty, education, health status, social exclusion, transfer schemes, taxation etc.) are very frequent. Even outside academia, such topics are evoked very often. Based on a survey

conducted in 1993 and 1994, for example, Reis (2000) reports that a sample of rich and well-instructed Brazilians identified the following objectives as the country's main priorities for the following years: (i) to improve the educational level (23.0%); (ii) to decrease the size of the State (18.2%); (iii) to erradicate poverty (17.6%). An objective such as "to sustain economic growth" occupied only a modest 6th place in such list.

Available socio-economic indicators indeed reveal a situation of substantial multi-dimensional inequality in Brazil. The UN International Poverty Centre chose to post in the cover of a recent publication (IPC, 2005) a picture taken from a helicopter in Rio de Janeiro, which showed, side by side, the upper-class neighborhood, "Gávea", and "Rocinha", the largest *favela* (slum) in the city, where more than 100,000 people live in unappropriate conditions. Some indicators regarding 2001 were shown in each side of the picture and they are reproduced here:

Gávea — INDICATOR[11] **— Rocinha**
0.97 — Human Development Index — 0.73
80.5 — Life Expectancy at Birth (years)— 67.3
98.1 — Adult Literacy Rate (% of population)— 87.9
1,174.4 — Income Per Capita (US$ of year 2000)— 120.7
100.0 — School Attendance (% of population)— 69.5

The editor of IPC (2005) emphasizes that Gávea's HDI in 2001 was higher than that of Norway, the country which ranked first in the international HDI ranking. Rocinha's HDI, in turn, was similar to that of Georgia, a country which ranked 100th in that same year.

3.2 Income inequality and education in Brazil

Brazil's income inequality is one of the largest among countries for which reliable income data is available. According to Ferreira (2000), in the 1980s and the 1990s, the average Gini coefficient has oscillated around: 0.25 and 0.29 in Eastern European countries; 0.33-0.34 in OECD countries and Cuba; 0.32-0.35 in Southern Asia; 0.38-0.41 in the Middle-East; 0.43-0.47 in Sub-Saharian Africa; and 0.49-0.50 in Latin America. In Brazil, it consistently remained around 0.59-0.60, that is, well above even its highly unequal Latin American neighbors. A consensus is emerging among Brazilian researchers in that income inequality has decreased in the current decade, going down to around 0.56 in 2004, which is the lowest Gini since 1976 (Various, 2006).

[11] Different sources compiled by IPC (2005).

Despite such recent decline, income inequality in Brazil is still very high, and places itself among the top 5% in the worldwide ranking.

Although educational inequality is not of course the only source of income inequality, it does play an important role, both for current and for subsequent generations. For example, static decompositions of usual inequality indices show that individuals' education accounted for 1/4 to 1/3 of wage inequality in Brazil along the 1980s and 1990s (Ramos and Vieira, 2000). Studying the years 1981, 1990 and 1995, Ferreira and Litchfield (2001) find that educational attainment of the household head was the most important determinant of overall inequality, accounting for a share of 37 to 42%, at least three times as substantial as any other factor taken into account in their study.

The structure of private monetary returns to education plays an important role in shaping income inequality.[12] Average monetary returns to education in developing countries are typically higher than those in developed countries (Psacharopoulos and Patrinos, 2004), and Brazil is not an exception to such rule: returns there are high, as reveals a series of papers published between 1983 and 2006, recently surveyed by Resende and Wyllie (2006). Using 1996/97 data, and taking into account selection bias and a rough measure of educational quality[13], those authors themselves find returns of 0.126 for women and 0.159 for men, results which do not differ much from those obtained in the studies they reviewed.

A drop in average returns could attenuate the role of years of schooling as a source of income inequality. If we examine the available findings on a long run perspective, there is evidence that the returns to schooling have been decreasing, going from an average of 0.17 for male workers in 1976-77 to 0.14 in 1996-97, according to Menezes-Filho, Fernandes, and Picchetti (2006). Simulations reported by them indeed predict such a development over the following decades.[14]

A drawback of the studies mentioned in this subsection is that all of them employ as a measure of education simply the years of schooling of the indi-

[12]Ferreira and Litchfield (2001) conclude their paper as follows: "The overall lesson, to the extent that there is one, is that the main cause of Brazil's unenviable record inequality levels remains its combination of *inequality in educational achievements* and *high returns to education in the labour market*." (Our italics.)

[13]Their measure of educational quality is self-reported educational quality.

[14]The decrease in average returns to schooling has not yet led to a substantial drop in income inequality in Brazil, among other reasons, because returns have been reported to be convex in the period covered by such studies (mid-1970s to mid-1990s), according to Ferreira and Litchfield (2001); Menezes-Filho, Fernandes, and Picchetti (2006), ensuring large returns to the highly skilled individuals and precluding income inequality from falling as fast as it would have fallen otherwise.

viduals, without a proper adjustment for *quality of education*.[15] Plausibly, returns to quality of education are not unimportant as a source of income inequality, since such returns to quality could have an impact particularly on inequality within educational groups. Of course, it is not by lack of interest that such topic has not been explored, but to empirical obstacles; to lack of data in particular.[16]

One thing we are able do with the data available right now in Brazil is to analyse the distribution of quality of education by using test scores databases. Provided that such scores appropriately reflect quality of education, expressing individuals' skills and anticipating future productivity and wages, they have a potential link with income distribution in subsequent years. There is indeed evidence suggesting such link between test scores and future productivity holds, such as Currie and Thomas (2001) and the references therein.

The more specific evidence on the relationship between *distributions of scores* and *distributions of income* is scarcer. Bedard and Ferrall (2003) report that distributions of test scores measured at age thirteen in 1964 and 1982 for eleven countries are significantly related to future wage dispersion.[17] Even if more data were available, another problem related to the pattern of the two sets of data would show up, as Card and Krueger (1996) have warned: "compared to test scores outcomes, the variance in earnings is large, making it more difficult to detect modest effects of school quality".[18]

So while it is plausible to expect a relationship between distributions of test scores and future income distributions to hold, we cannot (yet) be sure it does. Such statement does not imply there is no interest whatsoever in studying test scores, for at least two reasons. Firstly, because even if the distribution of education quality did not matter for shaping income distribution, a person's test scores at some point in time could still be positively correlated with the quantity of education, that is, with the probability of her staying longer in the schooling system. And the distribution of quantity

[15] As mentioned in a previous footnote, Resende and Wyllie (2006) try to take educational quality into account. However, the variable they use (self-reported quality) is not very reliable, as the authors themselves acknowledge. In a previous study, Behrman and Birdsall (1983) had controlled for quality using average years of schooling of teachers living in the same area where individuals of a specific age range had studied.

[16] The need for taking quality into account is often raised in the debate on returns to schooling in Brazil, and also in studies on related topics, such as Bourguignon, Ferreira, and Menéndez (2006).

[17] Bedard and Ferrall (2003) use data from the First and Second International Mathematics Examinations (IME), conducted in the years mentioned above by the International Association for the Evaluation of Educational Achievement (IEEA).

[18] This finding is confirmed if we compare the income-Gini already mentioned in this chapter, with the score-Gini reported in section 3.4.

of education (schooling years) has been shown to have impacts on income inequality distribution. Secondly, education and education quality in particular - possibly expressed by test scores - are important for other reasons, a topic we turn to now.

3.3 A digression on the value of education

At least since the seminal works of the 1960s (Schultz, 1963; Becker, 1964), economists explicitly and formally recognize that education has an important economic value. However, educational outcomes are *important means* for achieving a wide array of personal goals, not only because of the strictly monetary returns it provides. Indeed, educational achievements can be good predictors not only of an individuals' future earnings capacity, but also of her access to college, of the social position she holds, and so on.

Furthermore, education is likely to be positively correlated to outcome variables or "advantages" valued by *various theories of justice* (referred to in chapters 1 and 2), and not only within the specific normative framework usually adopted by economists. Being more educated enhances the likeliness for an individual of being "happier", at least up to a certain level of education (Hartog and Oosterbeek, 1998; Corbi and Menezes-Filho, 2006). But more educated individuals might also score higher in the distribution of primary goods defined by Rawls (1999), of functionings and capabilities defined by Sen (1985), and also of other "mesojustice" attributes, such as health status and civic engagement, for example (Hartog and Oosterbeek, 1998; Dee, 2004; Grossman, 2005).

Education is also an end or an achievement, since it is an attribute of a "good life". In other words, being educated arguably has an *intrinsic value*, regardless of the effect education might have on other, contemporaneous or future, goals. Being more educated widens the capacity of processing information and understanding the world one lives in - in other words, it opens peoples' horizons. To Amartya Sen, for example, a minimal level of education is a requirement for people to live decently. United Nations' Human Development Index (HDI), inspired by the work of Sen, ranks countries according, not only to their income per capita, but also to (rough) measures of health status and education.[19] Finally, and along the same line, education is defined by Fleurbaey (1995) as one of the core individuals' achievements

[19] Although there is a correlation between countries' GDP per capita (evaluated at PPP exchange rates) and their HDI, the rankings based on the two measures do not necessarily coincide. For example, in 2003, Sweden ranked 22nd in GDP per capita, while it was 6th in the HDI ranking. South Africa, in turn, was 52nd in GDP per capita, but only 120th in terms of HDI.

society should care about.

While correlated, *income and educational outcomes are not perfect substitutes*. When the "currency of justice"[20] is income, for a given society to achieve social justice as defined by John Roemer (1998), this society could opt, either to massively change the allocation of school resources (as suggested by Betts and Roemer (2004)), or to redistribute income substantially (as suggested by Roemer et al. (2003)). However, while important for many reasons, massive income redistribution is, in a sense, a second-best solution for the problem of social justice, since it is a *curative* or *remedial* approach. The first-best situation would consist of educating people as well as possible, as Betts and Roemer (2004) suggest, such that they can earn a substantial fraction of their income on their own - a *preventive* or *empowering* perspective.

Rawls (1999, p. xiv) defends a property-owning democracy, which for a number of reasons, while relying on competitive markets, tries to disperse the ownership of wealth and capital. He specifies this should be done:

> "(...) not by redistributing income to those with less at the end of each period (...) but rather by ensuring the widespread ownership of productive assets and human capital (...) at the beginning of each period."

Commenting on Rawls' ideal society and relating it to educational justice, Van Parijs (2004) says:

> "From this perspective, an educational system that equips all citizens with all they need not only to find a decently paid job, but also to get along in the other aspects of their lives, such as choosing a doctor, renting a flat or selecting an internet provider, is of paramount importance."

According to such views, which we share, income redistribution should be employed to complement peoples' income and to insure them, but not as a permanent and sustained substitute for peoples' use of their own personal skills. Among the reasons for adopting such views, we could mention the warnings made by Roemer (1998), that redistribution mechanisms are not a panacea, for at least three reasons: (i) tax-and-transfer mechanisms create its own inefficiencies, (ii) individuals may derive self-esteem from occupying skilled jobs, (iii) income taxation distributes money not only from advantaged to disadvantaged types of individuals, but also from high-effort to low-effort individuals (of similar types), which is ethically contentious.

[20] That is, the relevant normative attribute.

The (factual) partial non-substitutability of income and educational outcomes suggests two interrelated implications. First, from an ethical viewpoint, we cannot be sure that transferring money to disadvantaged people will be as good as raising their skills, both for themselves and for their descendants (given that parental education is an important determinant of pupils' educational performance). Second, from an efficiency viewpoint, it may be wiser to make people less dependent upon transfers, which is all the more important in the context of increasingly constrained welfare states and of an aging population in rich Western countries, but also for developing countries facing challenging trade-offs in the allocation of their restricted budget.[21]

3.4 Concluding remarks

Summing up, the educational level of a person - possibly expressed by test scores - is a valuable asset, not only because of the benefits in terms of future income stream it entails, but also because it paves the way for other life opportunities, and finally, because it may be viewed as having an intrinsic importance. It seems to us that investigating different aspects of educational inequality is a relevant research topic, certainly related to the study of income inequality - for reasons indicated above -, but which is important for its own sake.

We already reported here some socio-economic indicators documenting Brazil's inequalities. But how does Brazil compare with other countries in terms of test scores distribution? In 2000, the OECD organized a series of international student assessment exams, the so-called "PISA 2000". Thirty-two countries took part in these exams, 28 of which being OECD members, plus four invited countries including Brazil. In terms of average scores, Brazil ranked last both in reading, with 383 points (while the average for all countries was 499), and in math, with 320 (while the average for all countries was 498), as reported in our previous research (Waltenberg, 2005). In terms of inequality of scores, Brazil also ranked last (i.e., it was the more unequal country) in both exams. In math, for example, the score-Gini coefficient was 0.18. Finland was the less unequal one, with 0.08; Mexico, a country that is more similar to Brazil in many respects[22], presented a math score-Gini

[21]There is a recent, prolific, stream of literature, offered by James Heckman and his co-authors (e.g., Masterov and Heckman (2007)), advocating substantial investments in educating children - and very young children (pre-school) in particular - because of the high potential returns of such investments. Thus an argument based on efficiency considerations.

[22]Due to decisions of Brazilian and Mexican educational authorities, pupils who were not enrolled within an appropriate grade range at school were excluded from the PISA

of 0.12; Greece, which comes right above Brazil in the ranking, presented a score-Gini of 0.14.[23]

These results suggest Brazil is one of the most unequal countries in terms of education quality (proxied by test scores), motivating us even further to investigate some characteristics of that country's distributions of test scores.

4 The structure: semi-independent chapters

While each of the chapters is readable independently from one another, this dissertation is not supposed to be a 'collection of papers', roughly connected. We intend to provide a reasonably unified and coherent piece of work, in which all the composing blocks are related, sharing the common goal of scrutinizing (and applying) existing conceptual and empirical tools in order to analyze educational inequalities with both normative and quantitative concerns.

After this introductory pages, the dissertation is composed of six chapters, divided into three symmetric parts. The first chapter in each part is always more descriptive (or introductory, or in line with previous contributions in each sub-field), while the second chapter in each part is intended to be more analytic and possibly more innovative.

Brazil possesses good federal, regional, and local systems of collection and treatment of data, which leads to an almost unique condition: we are dealing here with a developing country, facing typical developing country problems, but for which 'developed country datasets' are available - in some cases, datasets which are more detailed and of better quality even as compared to those of some developed countries. For this reason, this dissertation can be of interest even for researchers who do not share with us our personal and affective link with Brazil, but would like to know more about the educational situation and the educational challenges faced by a developing country. Throughout the empirical chapters of the dissertation (chapters 3 to 6), we use Brazilian data, especially educational data which have been collected, treated and made available by INEP, a research bureau subordinated to Brazil's Ministry of Education.

Let us now present a brief description of the content of the three parts:

2000 sample in Brazil and Mexico. For this reason, the final samples represent only 69% and 52%, respectively, of the pupils' population in each country. Had these pupils not been excluded from the sample, the score-Gini of both countries would probably be higher, and their average scores would be lower.

[23]All results reported here come from our own calculations. If, instead of Gini, we employed other indices such as Atkinson or GE-class, with usual parameters, the position Brazil occupies in the ranking would not change at all: invariably the last one.

- **Part I: Normative and conceptual, devoted to defining educational justice**. Our aim is to provide a conceptual discussion regarding an appropriate definition of justice in education, taking into account the literature on normative economics, political philosophy, and economics of education. We have the ambition of providing a definition of educational justice that is sound in *normative* terms, but also useful in *concrete* terms, that is, applicable in empirical studies using existing datasets.

- **Part II: Descriptive and technical, devoted to measuring educational inequalities and inequities**. In the light of a reasonable conception of educational justice (cf. Part I), we are able to proceed and investigate ways of assessing the degree of fairness of particular distributions of educational outcomes. We start providing an institutional outline of the Brazilian educational system and a mapping of educational inequalities in Brazil. Then, using recently-developed indices of inequality of opportunity we assess the overall fairness of that country's schooling system, as well as of its regions'.

- **Part III: Descriptive and econometric, devoted to determining fair allocations of educational resources**. In the light of a reasonable definition of justice in education, and knowing the intensity of the educational unfairness in Brazil, we proceed to a stage in which we investigate if and how the allocation, or the reallocation, of certain educational resources can contribute to moving an educational system towards a fairer situation. Education production functions are specified and estimated in order to express as accurately as possible the relationship between educational resources and outcomes, and to unveil some policy alternatives.

5 Conventions

Before moving on to chapter 1, let us introduce some simple conventions which are used throughout the thesis:

1. Equity $\neq$ equality. While equality is just a situation in which all individuals have the same amount of a given attribute, equity is a situation in which justice, or fairness, is verified. 'Equity', 'fairness' and 'justice' are used as synonymous in this dissertation (as well as 'equitable', fair' and 'just'.).

2. As a consequence, inequity $\neq$ inequality. Inequity expresses a situation in which some kind of unfair inequality (or unfair equality) is verified.

3. '...' express the emphasis we are giving (or, more rarely, a quotation inside a quotation); while "..." express either a quotation, or an expression coined by another person, or, finally, a usual expression. Here is an example taken from chapter 1: *The term 'educationist' is adapted from Schneider-Bunner (1997) who uses "healthist" to refer to health-based normative approaches.*

4. 'He' or 'She'?. Most often I use 'she', sometimes I use 'he', and sometimes 'he or she'.

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