Equality of Opportunity:
A progress report

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Abstract: The purpose of this article is to offer a non-technical selective survey for a general audience about how economists have progressively handled the concept of equality of opportunity. The key idea is that equality of opportunity not only deals with ex-ante inequalities, something that the name already suggests, but also with ex-post inequalities which makes the analysis quite different from that of the capability approach. The article is structured in three parts. First, we review the main theoretical issues about inequality of opportunity. We then follow by looking at the measurement issues and by presenting some empirical results. We finally provide an overview about the challenges faced by policies aiming at enhancing equality of opportunity.

Egalité des chances: un rapport d'étape

Résumé: L'objet de cet article est d'offrir un tour d'horizon pour non-spécialistes sur la façon dont les économistes ont progressivement appréhendé le concept d'égalité des chances. L'idée clé est que l'égalité des chances ne se préoccupe pas seulement d'égalité ex-ante, quelque chose que le nom même de l'égalité des chances suggère, mais aussi d'égalité ex-post, ce qui rend l'analyse vraiment différente de celle des capabilités. L'article est structuré en trois parties. La première partie s'intéresse aux principaux débats théoriques concernant l'égalité des chances. Nous enchaînons sur des questions touchant aux problèmes de mesure de l'inégalité des chances avant de présenter quelques résultats empiriques. Enfin nous terminons par les défis auxquels sont confrontés les politiques visant à promouvoir l'égalité des chances.

Introduction.

No society across time and space has achieved full equality of outcomes. It may be because it is too costly from an efficiency view point or because it is not desirable per se. Many ideas revolve around both the positive and normative side of this issue. For example, the theory of incentive provides a framework for a positive explanation. The theory of social justice which belongs to the intersection of political philosophy and social sciences, and among them prominently economics, may offer foundations for the normative statement. This long term tradition of discussing social justice at the interface of economics and political philosophy traces back to the origin of economics with its founding father, Adam Smith, and then Jeremy Bentham and John Stuart Mill in the 19th century, and more recently Amartya Sen. Not all economists agree that social justice also belongs to their realm and Lionel Robbins (1932) is famous for having put forward the idea that in the distinction between ends and means economists should exclusively focus on means as vindicated by this excerpt: "*I have eschewed philosophical refinements as falling outside the province in which I have any claim to professional competence*". However many economists are asked to say something or to write a report about inequalities. It is difficult to articulate a consistent discourse about inequalities without understanding in depth how some inequalities are viewed as more or less legitimate[2]. It is the normative aspect of economics (Fleurbaey (1996)), the fact that economists are continuously asked to say something on what should be done, that pulls them toward political philosophy to discuss social justice topics. In doing so, normative economists argue in a different way than philosophers do. The former foresee a universal domain for their concepts whereas the latter frame the discussion within a model aiming at describing some important features of an economy. Gilles Deleuze defines

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[2] The recent books of Thomas Piketty (2014) and Anthony Atkinson (2015) — for excellent they are – resort to the statement (not formulated by the former author) that the reduction of inequality, whatever it recovers as social phenomena, is good per se.
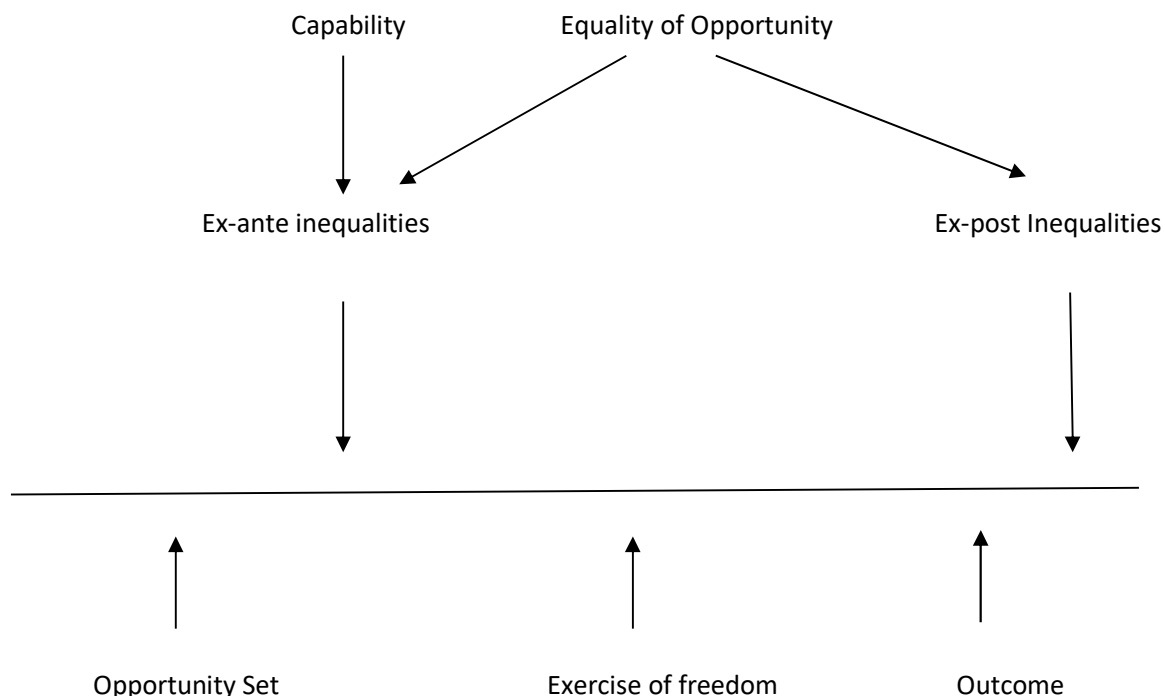
philosophy as the intellectual realm where concepts are created[3]. Even if he also admits that scientists create concepts, the difference comes from the fact that philosophers do not bind their thinking to a particular field. They illustrate a concept through examples, and use counterexamples whenever they are about to invalidate some general philosophical statement. These examples and counterexamples can be drawn from the whole set of the real world and parallel worlds that we can imagine. The only bound is that of imagination. Even if the ideas about social justice are the same, the way they are discussed in economics makes them probably too narrow for philosophers and other social scientists but also more palatable for economists! This paper is about "social justice for economists" and focuses on some ideas gathered under the general umbrella of "Equality of Opportunity". This survey is intended to help the non-specialist to grasp some of the main ideas and issues that are discussed in the specialized literature.

This concept has progressively emerged since the pioneer work of John Rawls (1971) who offers a sound criticism of consequentialism, and among consequentialist doctrines utilitarianism in the first place. When utilitarianism comes to the scene, many scholars are thinking about the zero-inequality aversion hypothesis embedded in it. Yet, Rawls' criticism is deeper than that and deals with the fact that the issue of justice in society is argued from an inspection of the consequences of actions. In other words, the social decision-maker is contemplating ex-post inequalities to say something about the fairness of the allocation. Ex-post refers to the situation where the whole economic and social process determining the outcomes has ended up to produce all its effects. In some sense, it is the end of the race. Rawls emphasizes that ex-ante inequalities matter much more for social justice with his idea of primary goods. In particular, this category includes rights (civil rights and political rights), freedoms, income and wealth, the social bases of self-respect. However, the presence of income and wealth in this list is intriguing since they typically arise from her actions and likely from actions of many other individuals. The maximin principle according to which society should act to the greatest benefit of the least advantaged belongs to an ex-post perspective as well. So it can be claimed that Rawls provides a social justice theory which borrows both from the ex-post and ex-ante perspective about inequalities. Amartya Sen (1979) was the first to formulate an alternative to the idea of primary goods with the capability

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[3] « *La philosophie c'est l'art de former, d'inventer, de fabriquer des concepts* » Deleuze and Guattari (1991)

approach which is fully entrenched in the ex-ante perspective. Ronald Dworkin (1981a and b), Richard Arneson (1989) and Gerard Cohen (1989) have been the prominent philosophers who articulate a consistent philosophical view about equality of opportunity, even if each of them offers some variant with respect to the main theme. Both the capability-set literature and the equality-of-opportunity (EOp) moral philosophy refer to this ex-ante perspective explicitly. However, and it is only recently that it has been fully understood (Fleurbaey and Peragine (2013), even if the distinction was already present in Fleurbaey (2008)), EOp also refers to an ex-post perspective when freedom has been exercised. This duality of equality of opportunity in terms of ex-post and ex-ante inequality singles it out and in particular differentiates it with respect to the capability approach. Suppose that opportunity sets have been equalized – their value for some index is more or less equal – or even more are the same. For the capability approach, it is enough in terms of social justice while it is not so for the EOp perspective. In particular, nothing prevents full equality of outcome with the capability approach, whereas, in general, such an outcome will be viewed as unfair by the EOp approach. To help understand the distinction between capabilities and EOp in a more intuitive way, we build up the below timeline (See Figure 1) which is only implicit in the analysis. The exercise of freedom comes after the knowledge of the possibility set which is determined by family and social background conditions. Next, the outcome produced by the mix of the exercise of freedom and initial conditions is revealed to the individual (and to the society if the outcome is public knowledge, an assumption that we will make here).

Figure 1. *Time line and ex-post and ex-ante inequalities*

Capability   Equality of Opportunity

Ex-ante inequalities   Ex-post Inequalities

Opportunity Set   Exercise of freedom   Outcome

Ex-ante inequalities mean that you look at the situation once the opportunity set of each individual in society is known and before the freedom has been exercised. Ex-post inequalities are assessed at the outcome stage. Equality of opportunity states both requirements at the ex-ante and the ex-post stages, contrary to what the words might suggest. We would not go so far as to say that equality of opportunity is a misnomer but still the product is more complex than the name suggests at first glance.

The outline of the paper is as follows. A first section will deal with theoretical issues and will shed some light about the ex-post and ex-ante duality of EOp. I will then focus on measurement issues and will present some empirical results. I will end up with reviewing EOp enhancing policies, a domain that is far from being well-developed and in some sense is not articulated so far with the main literature about equality of opportunity in the social choice theory. It is a first attempt to build a bridge between two literatures which are ignoring each other. We end up with some remarks which have been recently formulated against EOp.

To be honest, this progress report is far from being comprehensive and is biased toward my own works at least in the first two parts, with John Roemer (survey articles (Handbook chapter, JEL forthcoming article)), with Arnaud Lefranc, (article in JPubE with Nicolas Pistolesi and more recently about introducing luck into the framework of EOp), with Niaz Asadullah, Florence Jusot, Sandy Tubeuf et Gaston Yalonestky about the correlation between effort and circumstances in health and education, with Olivier Chanel, Stephane Luchini, Miriam Teschl and Ivy lu about the results of questionnaires and experiments regarding the feelings of people about EOp. The reader who wants to read comprehensive reviews of the literature about EOp is invited to refer to Fleurbaey and Maniquet (2011b), Ramos and Van de gaer (2013), Ferreira and Peragine (2015) and Roemer and Trannoy (2015, 2016).

Section 1. Theoretical Issues

I will mainly review three points, first, the conflict between two principles, the principle of reward and the principle of compensation, then the issue of the correlation between effort and circumstances, and finally the inclusion of luck.

The key concept underlying EOp is the idea of responsibility. This is far to be a new idea and to some extent it is one of the oldest theories of action, as Max Weber (1918) puts it, "*in which case one has to give an account of the foreseeable results of one's action*". Equality of outcome cannot be maintained as a reasonable social objective in all configurations. Because, once the playing field has been leveled up, you should be deemed to be responsible for your misery, say political philosophers like Dworkin, Arneson, Cohen, etc. EOp then distinguishes between illegitimate inequalities which are due to non-responsibility characteristics and legitimate inequalities due to responsibility characteristics. The following issue is how to define variables that you should be held responsible for. Those who hope that there will be a kind of list will be disappointed. When deliberating, people may be inspired by the reasoning of political philosophers but at the end society will say, John Roemer argues. Regarding the arguments of political philosophers, two competing views have been proposed about how to define responsibility characteristics. They oppose those who think that you are responsible for your preferences and those who think that you

should be responsible for what you control. The former view has been forcefully defended by Ronald Dworkin (1981a and b). Other social scientists might use a different expression and words like ambition, goals, aspiration can come out as well but all these concepts are related to what the individual wants to do with her life and how to construct her life plan. The latter view has been supported by Gerard Cohen (1989) and a person should be deemed responsible for what she controls. In principle, people with a good mental health, should control their actions but one should take into account what set of actions a person can access. The availability of, or access to, is not simply an issue of material constraints but of psychological ones, which may be determined by one's family and social background. Bourdieu (1979) and a long sociological tradition is famous for having shown the prevalence of family influences for instance in education or esthetic choices. For example, according to this quote of Bourdieu (1979) "*the ethic of sobriety for the sake of slimness, which is most recognized at the highest levels of the social hierarchy*," contrasts with the "*convivial indulgence*" characteristic of the lower classes. In some sense, according to the control view, the taste for fat food is not fully under the control of many people originated from lower social classes.

Among, let us say, normative economists, Marc Fleurbaey (2008) has clearly chosen the preference side whereas John Roemer has chosen the control side. Therefore, although for both Fleurbaey and Roemer, there are two boxes of variables, the content of the two boxes are different. For John Roemer (1993,1998), the *circumstances* are factors beyond people's control, while *effort* designates the remaining factors, a kind of residual, whereas for Marc Fleurbaey and François Maniquet (2011), people should be responsible for their preferences and non-responsibility factors are the remaining factors. This is clearly an important divergence between Fleurbaey and Roemer – not the only one, by the way – as explained in Trannoy (2016).

A) *The conflict between the principle of compensation and the principles of reward*

However, there is a common ground among these two branches of equality of opportunity literature, the fact that they stick to the principle of compensation. This principle requires that the impact of factors that you are not deemed to be responsible for on outcomes should be neutralized. In other words, for a given level of effort, the impact of circumstances on outcomes cannot be

detected. Two observations are in order here. First, it raises the issue to know whether an ex-post or an ex-ante view of inequality is expressed here. When it is said that the principle of compensation will be checked once the level of effort is exercised (and observed), it is quite clear that an ex-post perspective is favored to look at an ex-ante inequality, the disparity of circumstances. Second, the word of compensation that has been chosen to name this principle can somewhat bias the discussion about policies aiming at establishing equality of opportunity. Compensation evokes a remediating policy such as a tax and benefit policy. However, a curative policy aiming at giving extra public resources to those who have a deficit in private resources (at school for example) can also do the job according to the compensation principle (see below section 3 for examples). Thus this principle can perfectly vindicate both ex-post and ex-ante EOp policies.

Although there is mainly one principle of compensation, there are several principles of reward. The principle of reward refers to how far we should respect the impact of responsibility variables.

Basically, there are two principles of reward, the principle of natural reward which has been proposed by Fleurbaey (1994,1995) and Bossert (1995) and the principle of utilitarian reward which more or less corresponds to a formulation originally proposed by Roemer (1998). They convey the same idea, namely, the fact that once the inequality due to non-responsibility has been neutralized, the remaining inequality is legitimate and we should respect a kind of zero aversion to inequality in designing the transfer policy. The variation comes out from the way of defining inequality aversion. In the principle of natural reward, it comes in through the simplest way to define the lack of inequality aversion whereas in the principle of utilitarian reward, it goes through the use of a social welfare function exhibiting a zero aversion to inequality, utilitarianism.

Herewith, the classic formulation of the principle of natural reward: Take two individuals with the same circumstances, and therefore belonging to a type according to the terminology introduced by John Roemer. Before state intervention, effort represents the only source of variation in income. The transfers then should be the same. There is clearly a flavor of libertarianism in the formulation of such a principle.

With the principle of utilitarian reward, the initial starting point is similar to the one in the principle of natural reward but the transfer should now maximize the sum of the utilities of both individuals.

Since the maximization of the sum is well known to be insensitive to inequality aversion, this version captures a variant of the same idea; the transfer should be designed in a way to respect a zero-inequality aversion among people for which the playing field has been leveled up.

The clash between the principle of compensation and the principle of natural reward can be illustrated by the following picture. Y denotes the outcome, e the effort and c the circumstances. The ascending lines figure out the positive impact of circumstances on outcome for a given level of effort. Two different lines have been drawn corresponding to two levels of effort. We also assume that a higher level of effort will translate into a higher outcome ceteris paribus. The issue at stake is to understand if there exists a redistribution policy which is able both to comply with the principle of compensation and with the principle of reward.

Figure 2. The clash of the principle of compensation and natural reward. A diagrammatic exposition
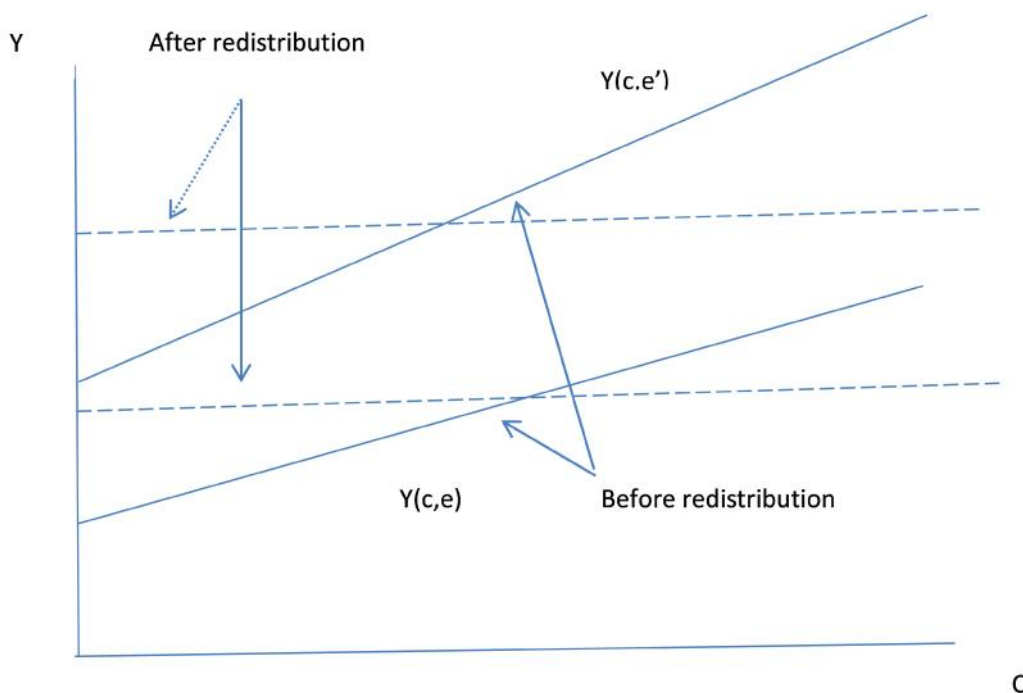
A compensation policy should erase the effect of circumstances and then the two solid lines should become completely flat as suggested by the dashed lines. Moreover, the principle of natural reward

requires that the deviation of outcome between two individuals with the same circumstance will be preserved. In other words, the deviation between the two dashed flat lines should be the same as the deviation between the two solid ascendant lines. Clearly it is possible only if the two solid lines are already parallel. What does it mean from an economic point of view? The impact of effort on outcome should not depend on circumstances, a separability assumption. So we conclude with this diagrammatic exposition that there does not exist a redistribution policy aiming to fulfill both the principle of compensation and the principle of natural reward in full generality.

Fleurbaey and Peragine (2013) have recently offered a more general perspective on this conflict and have shown that it extends to a conflict between the ex-ante and ex-post approaches.

Suppose that we can describe the process relating outcomes to effort and circumstances by the following generic matrix with circumstances in rows (indexed by *i)* and effort in columns (indexed by *j*):

$$\text{Circumstances} \qquad \begin{pmatrix} & & \\ & y_{ij} & \\ & & \end{pmatrix}$$

The ex-ante approach means that we look at the matrix from a row perspective while the ex-post approach demands that we look at the matrix from a column perspective. Natural and utilitarian reward principles are ex-ante since they require that the redistribution policy is the same for a given level of circumstance. Compensation principle is ex-post, since it requires that each column should be a constant column. Fleurbaey and Peragine (2013) prove that there is an incompatibility in full generality (for a universal domain of matrices) between the principle of compensation and the principles of reward.

Since the compensation principle is a corner stone of EOp, we should weaken the natural reward principle. Fleurbaey (2008) proposes to gives priority to the principle of compensation and the natural reward principle is only respected for a reference type (a given reference circumstance). As can be shown in Figure 2, it is indeed always possible to require the deviation between the dashed lines to be the same as the deviation between the solid lines for only one circumstance.

B) Correlation between effort and circumstances

As illustrated by the quote of Bourdieu above, responsibility variables may be influenced by non- responsibility variables. Fleurbaey and Maniquet (up to now) maintain that individuals should be held responsible for their preferences, wherever they come from. In contrast, the pioneer of the control approach among economists, John Roemer argues that we should clean effort from the impact of circumstances. It may be thought that the cleaning operation seems more sensible in the control approach than in the preference approach. Indeed, in the control approach, correlation is suspect and suggests that the individual does not have real control. But if I am less able to read music or to contemplate painting because of my origins, it seems all right that the individual asks for compensation at the bar of social justice. While in the preference approach, if someone says "Take my preference for the countryside, I know it comes from my origins, but please respect my preference anyway" it is quite sound anyway.

Still, there is a controversy in the control approach between John Roemer and the philosopher Brian Barry which is recounted in Roemer's book (Roemer 1998) about the case of Asian children. "*Asian children generally work hard in school and thereby do well because parents press them to do so. The familial pressure is clearly an aspect of their environment outside their control.* » Roemer added that we should respect the individual effort "*if we could somehow disembody individuals from their circumstances*". In other words, effort should be purged of any contamination coming from circumstances. Barry supports the opposing view and argues "*that the fact that their generally high levels of effort were due to familial pressure does not make their having expended high levels of effort less admirable and less deserving of reward than it would have been absent such pressure. »* According to Barry, true effort should be respected as it should be in the incentives literature. Do we hold sons of smokers less responsible for smoking than sons of non-smokers? Clearly, this is a matter of value judgment and this issue cannot be settled in a scientific way.

Suppose that we follow Roemer in aiming to clean effort from the impact of any circumstances. It leads to an interesting definition of the "Roemerian" effort. Suppose that effort is observed. Then there is a distribution of effort by type. Let us call it $G(e \mid c)$. If the distribution of effort

depends on type, it is a type characteristic and then a circumstance. Then, the cleaned effort, the effort that we should respect is the rank of effort in each type. If we denote e_r, it satisfies $e_r = G(e \mid c)$. Two persons at the same rank of their distribution of effort have exerted the same Romerian effort. Let us see the illustration in Figure 3 where the CDFs of effort of two types are reported. The highest CDF (bold line) corresponds to the lowest type (type 1), assuming that people who grew up in lower family backgrounds are in some sense discouraged to exert effort (an assumption that is made for the illustration, it may be the other way round[4]).
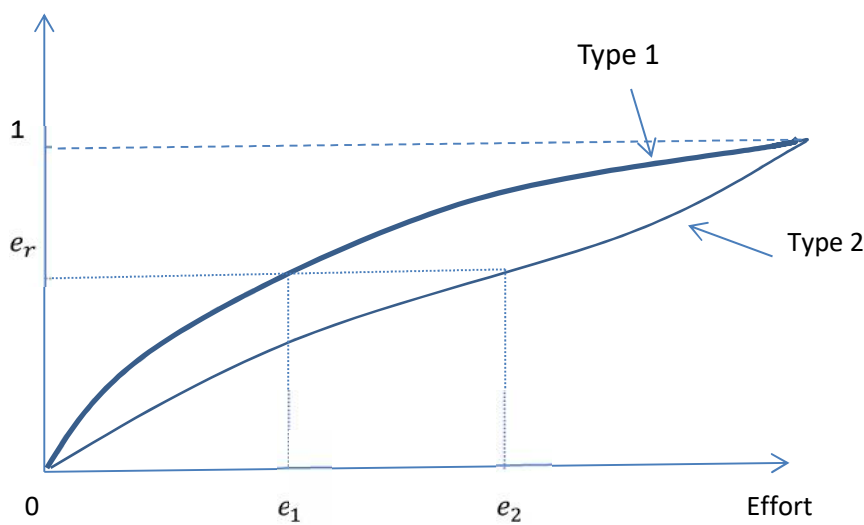

FIGURE 3. Roemerian Effort

Effort e_2 is higher than e_1 but since the cumulated proportion of people who have exerted an effort lower than e_2 in type 2 is the same as those who have exerted an effort lower than e_1 in type 1, it is sensible to say that they have exerted the same relative effort. In other words, e_1 and e_2 are at the same quantiles of their type distribution. According to Roemer, it is this notion of effort cleaned from the impact of circumstances that we should respect when defining the reward principle.

C) *Introducing luck: the Dworkin Cut*

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[4] For life style in health, it seems to be true. People coming from lower background have less healthy life style.

Up to now, luck has not been introduced in the framework while luck is pervasive in everyday life. In decision theory, luck is nature's move at a chance node and this is what we have in mind when speaking of luck. The first reaction may be to think that we do not need to introduce it explicitly because it has already been introduced under another name, circumstances. It is indeed clear that luck is out of control of the individual. It is not by coincidence that equality of opportunity is sometimes called luck egalitarianism, a term coined by Elizabeth Anderson (1999). And still, in the philosophical literature devoted to equality of opportunity, things are less clear than just putting luck on the circumstance side. Ronald Dworkin introduced the difference between brute luck and option luck. Brute luck is strictly a nature move at a chance node whereas gambling is nothing but option luck. Dworkin defended the view that brute luck should be obviously compensated while option luck should not because nobody forces people to bet. Fleurbaey (2008) answers that things are not so simple about option luck since it can be split into two parts: an action, a responsibility variable and a random draw, a non-responsibility variable. Next, Fleurbaey introduces an ex-post perspective and thinks it is important to know whether the losers are regretting of not having gambled. If they do not regret, fine we do not have to compensate them. However, it is the opposite if they regret. Both arguments are perfectly compelling and at this stage we should simply know what people think about the "Dworkin cut". Where do they locate the divide between responsibility and non-responsibility variables ?

Below (see Figure 4) are the results of an experiment about the Dworkin cut (% of respondents for non-compensating the factor) conducted in Marseille with 400 ordinary people (See Chanel et al (2013) for details). The results are given for the sake of illustration.
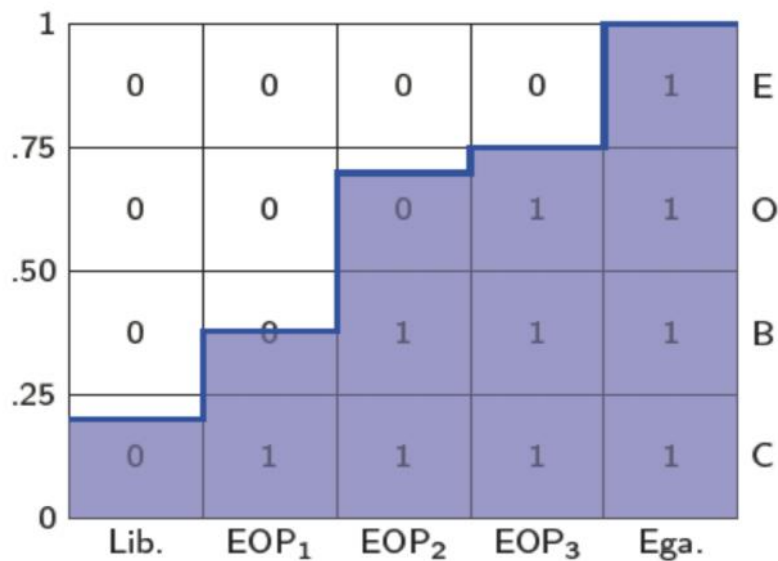
Figure 4: Results of vignettes about the responsibility cut (% of respondents for not compensating the factor) E: Effort; O option luck; B brute luck; C circumstance. On the horizontal axis, Lib stands for libertarians meaning no compensation for all factors (0 in all the column). EOP_1 means compensation for only circumstances (only 1 for circumstances). EOP_2 means compensation for circumstances and brute luck. EOP_3 compensation for all factors except effort and Ega means egalitarianism and therefore full compensation for all factors. In grey the proportion of the sample of people in Marseille's experiment who support the different views.

Obviously we do not claim any external validity. However, we stick to the Roemer view according to which, it is society which decides about what are circumstances and effort respectively, a majority of the micro-Marseille society that has accepted to play the game has the same opinion as Dworkin. People should be held responsible for effort and option luck and should be compensated for brute luck and circumstances.

It is very likely that the opinions people have about the Dworkin cut depend on the context – income acquisition, education, health, etc. Below are the results of a vignette administered in Marseille that shows that the Dworkin cut at majority voting is depending on the context, school or work place. Clearly, effort, talent and option luck are viewed as responsibility variables on the job,. At school, only effort is regarded as a responsibility variable and still opinions are split about that.

Figure 5: Proportion of people whot think that we should not compensate depending on the context, a salesman versus pupils at school. (Results of a vignette see Lu and al. (2013))
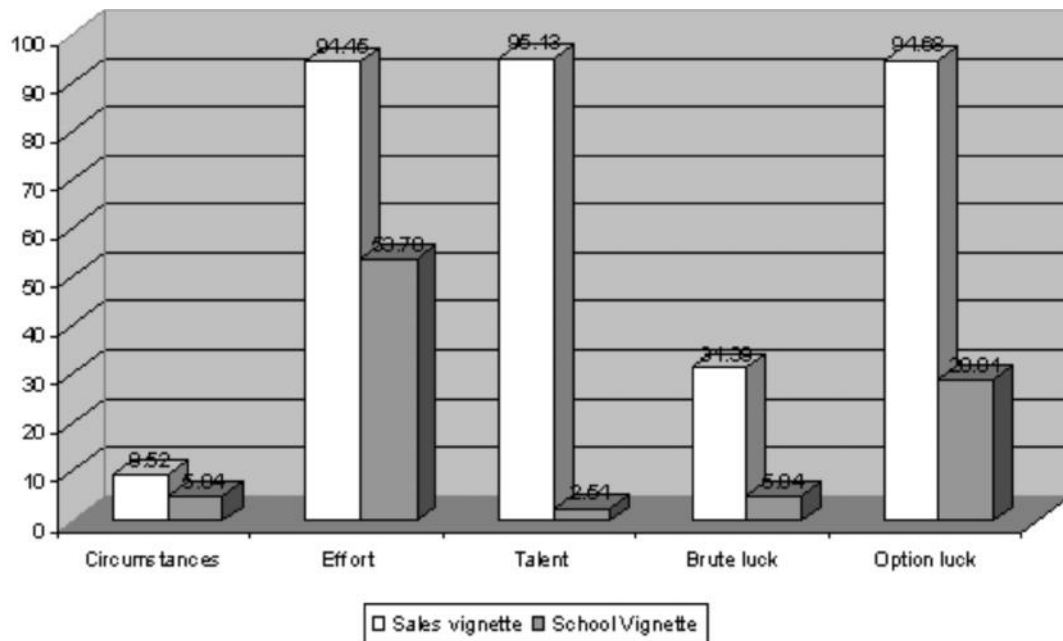
Lefranc Trannoy and Pistolesi (2008) and Lefranc and Trannoy (2016) have proposed a more qualified way to tackle luck within the framework of EOp. Basically, they remark that since many luck factors occur well after effort has been exerted, it is implausible that all these luck factors should be detected and compensated. Next, it has to be understood that the matrix representation is not any more useful and sufficient. There is another dimension, luck which stands for any luck factor that can come up with the outcome. They proposed then an adapted version of EOp with a suitable transformation of both the principles of reward and compensation. The definitions are given in terms of the CDF of post-state intervention outcome, in short the post-tax outcome, even if the intervention of the state can and likely should be broader than just activating the tax-benefit system. It should be clear that for given circumstances and effort the post-tax outcome CDF gives the distribution of luck.
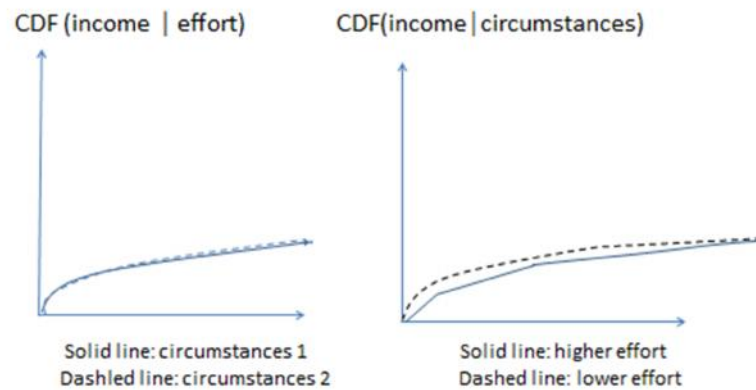
The adapted principle of compensation states that the distribution of post-tax outcome

conditional on effort should not depend on circumstances. In other words, the distribution of luck is even-handed with respect to circumstances, meaning that first the impact of circumstances cannot be detected any more, and second the correlation of luck with circumstances has been neutralized. It must be understood that the support of the luck distribution may be reduced to reduce ex-post inequalities. But at this stage, we do not offer guidelines to tell the decision-maker how far the ex-post inequality due to luck should be reduced.

Regarding the principle of reward, it is asked that for a given circumstance, if effort increases, the distribution of post-tax outcome conditional on effort and circumstances should improve in terms of the first-stochastic dominance test. The correlation of effort with luck should be preserved as it is also required in the theory of incentives with moral hazard.

Figure 6 illustrates both principles with the left panel corresponding to the compensation principle and the right panel to the reward principle. The left panel shows a situation where the two CDFs corresponding to two types who have exerted the same effort melt down. This is what the principle of compensation requires: the impact of circumstances cannot be detected any more. The right panel shows a configuration where two CDFs are drawn. They correspond to 2 given levels of effort for the same type. The CDF corresponding to the highest effort should shift to the right with respect to the CDF corresponding to the lowest effort.

Figure 6: Principles of compensation and reward with luck

CDF (income | effort)

CDF(income | circumstances)

Solid line: circumstances 1
Dashled line: circumstances 2

Solid line: higher effort
Dashed line: lower effort

Section 2. Measurement issues and Empirical Results

The non-observability of some determinants is the dominant challenge faced by the empirical literature whose aim is to measure the EOp. The main bulk of this section is devoted to this issue. Next, we are reporting the preliminary results about the nascent literature attempting to quantify the importance of the correlation between effort and circumstances.

A) *Lack of relevant information*

First, it has been realized that the measurement of EOp is much more difficult to implement than equality of outcomes. A first reason is that effort is private knowledge. Next, it is difficult to describe all circumstances, without speaking about luck. Checking EOp is plagued with problems of identification. Roemer (1993, 1998) represented a first attempt to taking account for non-observability of some factors. The issue is here how we can test EOp when some circumstances and effort are not observable. Let us speak first about the lack of relevant effort information and the way to remedy it.

It can be illustrated for two popular effort variables, the number of hours of work and the years of education. For the former, it is true that we have a good effort variable for the control view at least for the self-employed. However it is another story for wage-earners at least for a snapshot distribution because involuntary part-time jobs, overtime, unemployment cannot be said under the control of the individual in all contexts. In the lifespan, maybe we can claim that the degrees of freedom of an individual are more important but still the analyst has to cope with the dependency of the trajectory of the individual to initial conditions. An individual starting with a long spell of unemployment just due to bad luck will have a stigma which will take time to be rubbed out. For years of education, things are even worse because first primary and even secondary education take place before the « *age of consent* » (Arneson 1990). Arneson suggested that teenagers should not be held responsible for anything before the age of consent. If we follow this stance, which is quite sensible, it means that only tertiary education and lifelong learning can be termed effort. However, it is crystal clear that tertiary education is path-dependent.

A solution to remedy this lack of information regarding effort is to appeal to an idea proposed by John Roemer (1998). This idea is somewhat related to the Roemerian effort but it should be emphasized that it is distinct. You can abide by the way to clean effort for circumstances suggested by Roemer and still not be convinced by his proposition to cope with the lack of information regarding effort.

Effort is a residual in Roemer's analysis. Suppose that you do observe outcome and circumstances. In addition, suppose that circumstances can be reduced to a scalar and that luck does not play any role. Let us look at the type distribution of outcome, that is, the distribution of outcome for a given circumstance. We insist here, it differs from the type distribution of effort that we do not know by assumption. Since there are only two determinants of outcome, the rank of your outcome in your type distribution of outcome gives the rank of your effort in your type. If your performance is higher than that of your neighbor with the same, let us say, social family and social background, it must be because the level of effort is not the same. This point admitted, the following step is easy. Since two persons at the same rank of their type outcome distribution have exerted the same relative effort, John Roemer proposes that we check the principle of compensation with respect to

this relative effort.

For the sake of illustration, we exemplify about how this principle of compensation can be checked quite easily. The partition into types in examples below is quite crude but in my own experience it already gives a first glimpse at how well the principle of compensation is verified in a society. The graphs below are drawn from Roemer (2013) and are depicted for two countries, Denmark and Hungary, 3 type distributions where a type is defined by the level of education of the father, primary, secondary and tertiary education. They are sample distribution but it is quite obvious that the principle of compensation is almost achieved in Denmark where the situation is quite close to a situation where we cannot distinguish the different type distribution whereas it is frankly the opposite in Hungary, while despite the fact that communism has been the rule for many years the social origin of individuals matters a lot for their income destiny.

Figure 7. Male worker income distribution

Left Panel: Denmark   Right Panel: Hungary
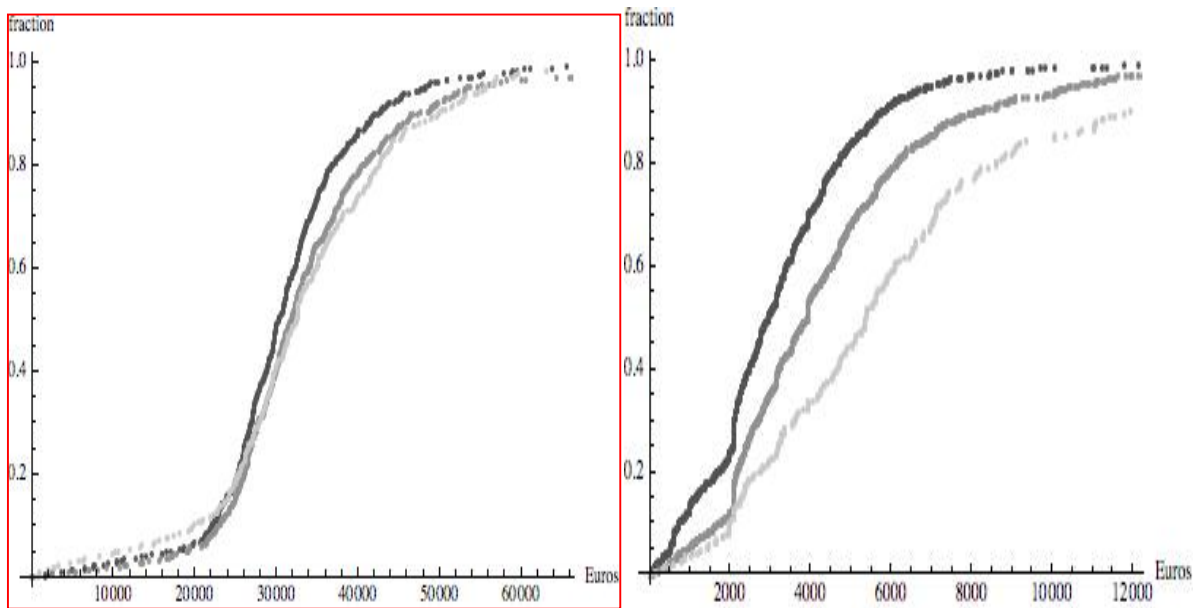
This procedure, although interesting, has some weaknesses. First, it is not clear how multi-dimensional effort can be aggregated into one indicator (see Fleurbaey (1998)). In addition, this procedure is not immune to omitted circumstances. They induce wrong identification of the relative effort unless the unobserved circumstances, after conditioning on observed circumstances, no longer affect outcome (Ramos and Van de gaer (2013)). In addition, effort is a residual for Roemer. However, if the residual is a mix of luck and effort, it is no longer possible to identify the residual with some pure notion of effort.

To go one step further, Lefranc, Pistolesi and Trannoy (2009) propose a framework to check the principle of compensation with luck when effort is not observable. It depends on the property of the conditional distribution of effort with respect to circumstances G(e   c). In general, without any assumption on this conditional distribution, we cannot say anything. However, if e is distributed independently of c or if we retain the Roemerian effort in the principle of compensation, that is, $e_r =$ G(e   c), then we get at least one necessary condition to check the principle of compensation.

Definition: The "type approach" means looking at the conditional distribution of outcome and requiring full equality of these distributions $F(y \mid c) = F(y \mid c')$ for all c, c'.

Proposition: If either for any c, c' $G(e \mid c) = G(e \mid c')$ or if we substitute e_r for e in the definition of the principle of compensation, then this principle implies the type approach.

The next step is to know whether this necessary condition is robust to partial observability of circumstances. To fix ideas, suppose that the set of circumstances is $c = \{c_1, c_2\}$ and we can only observe c_1 whereas c_2 is the unobserved circumstance. Can we still assess the compensation principle? The good news is that the proposition remains valid. It does not even require that c_1, c_2 are independently distributed.

At this stage we can be disappointed by having only necessary condition but it still allows us to make some normative statements for instance on the above Hungarian and Danish examples, admitting that luck is present. For Hungary we can conclude straight away that there is inequality of opportunity. For Denmark, we can conclude that below the median, a necessary condition of EOp is satisfied although for high achievers, it is less clear. However the type set has only 3 elements. Nevertheless the idea emerges that Nordic countries are the benchmark countries for EOp and this is confirmed by Björklund et al. (2012) study on the Swedish society. This study is amazing because of the fine-grained typology (1152 types) considered, parental income quartile group (four groups), parental education group (three groups), family structure/type (two groups), number of siblings (three groups), IQ quartile groups (four groups), body mass index (BMI) quartile group at age 18 (four groups). This study is based on a very large sample of 35% of the total male Swedish population born between 1955 and 1967. Outcome is an average of pre-fisc income over 7 years (age group: 32-38). It turns out that 'social' circumstances account for between 15.3% and 18.7% of the overall Gini. In the counterfactual situation where the only factors of inequality would be these social circumstances, the Gini coefficient would attain a very modest value of 0.043 for the oldest cohort! The contribution of IQ represents about 12% of the overall

Gini (16% for cognitive and non-cognitive skills). So it is fascinating that in the case of Sweden, basically about 2/3 of inequality is legitimate according to equality of opportunity, if talent is put on the circumstance side. This is a remarkable performance that has probably not been overcome in the past and due to the increasing trend of inequality all over the world including Scandinavia, it will not likely be in the next future.

B) Does cleaning effort for circumstances make a difference?

There are not so many studies trying to contrast the share of illegitimate inequality when effort is cleaned from the impact of circumstances and when it is not cleaned. We are briefly reviewing two studies.

Jusot et al. (2013) represents a first attempt at quantifying the impact of the correlation for measuring inequality of opportunity in health in France. The effort is lifestyle and the indicator of health the self-assessed health status (SHS). The bottom line is that the impact of the correlation is modest but it can be claimed that some important dimension of lifestyle are missing. Another attempt is Asadullah et al. (2016) who revisit this issue in the field of education concerning the correlation between a pupil's effort and circumstances. They make use of the survey called "*Quality of Secondary School Madrasah Education in Bangladesh*" (QSSMEB) (collection in 2008, by the World Bank). In every sampled union (a Bangladeshi sub-district larger than a village but smaller than sub-districts called *upazilas*) all secondary schools were surveyed. The sample is sizeable with 9,021 pupils (3,373 boys; 5,598 girls). Based on the 1988 National Education Longitudinal Study (NELS; US Department of Education, 1988), both the mathematics and English teachers filled out a subjective assessment of every sample student on seven aspects of students' behaviour in the classroom:

- (1) how often student performs below ability;
- (2) how often student submits incomplete homework;
- (3) how often student is absent;
- (4) how often student is tardy or lazy;
- (5) how often student is inattentive in class;
- (6) how often student is disinterested;

- (7) how often student makes noise (disruptive).

For all questions the possible answers are: "Never", "Rarely", "Sometimes", "Somewhat", and "Always". For the econometric analysis, binary effort indicators are constructed by merging the "never" and "rarely" versus "sometimes", "somewhat"", "always". The authors decompose the variance of the English and Maths scores both by sources (effort and circumstances) and by subgroups (between schools and within schools). The preliminary results show a sizeable decrease in the contribution of the effort variables in the Roemer scenario with respect to the Barry scenario (the contributions sum up to 100%). The results should be confirmed.

Table 1. Decomposition of explained inequality (variance) Source Asadullah et al. (2016)

	Mathematics		English	
	Barry	Roemer	Barry	Roemer
Efforts (%)	7.01	3.95	18.89	11.84
Circumstances (%)	9.41	10.32	9.53	10.76
School (%)	68.68	70.76	69.94	76.01
Demographics (%)	14.89	14.97	1.63	1.39
Total inequality	3.09	3.09	3.64	3.64

3. Opportunity-enhancing policies

In this section, we review examples of policies which are based on the philosophical view that motivates equality of opportunity, that individuals should be compensated for their disadvantageous circumstances. When circumstances are restricted to family background, implementing equality of opportunity may be viewed as weakening the traditional role of the family. Roemer (2004) considers that parents affect the opportunities of their children through four channels: (C1) the provision of social connections, (C2) the formation of beliefs and skills in children through family culture and investment, (C3) genetic transmission of ability, and (C4) the formation of preferences and aspirations in children. He views the first three as circumstances, deficits which should be compensated by an equal-opportunity policy. The status of the fourth

category is more debatable. It is both an effort for the parents and a circumstance for the children. If we give priority to the young generation, the whole initial background represents circumstances. If we give priority to the past generation, parental effort must be respected whatever its consequences to the next generation. For the philosopher Adam Swift (2005), the principle of natural reward for the past generation is viewed as more important than the principle of compensation for the young generation as the following quote shows "*To the extent that the reproduction of inequality across generations occurs through the transmission of cultural traits, it does so substantially (though not exclusively) through intimate familial interactions that we have reason to value and protect. Preventing those interactions would violate the autonomy of the family in a way that stopping parents doing spending their money on, or bequeathing money to their kids would not.*" If we follow Swift, then EOp does not require the full neutralization of the intergenerational transmission of advantages from one generation to another. One consequence of viewing preference transmission to children from parents as morally legitimate is to recognize that even a perfect regime of equal opportunity should not aim at equalizing the rows of the intergenerational mobility matrix. Parents may legitimately induce differential preferences in their children, *leading to differential incomes,* even if the effects of all other circumstances were compensated for. If one does not admit this, then it is difficult to justify why we do not advocate raising children collectively.

Moreover, the *nature of the objective* must be taken into account. Three important objectives appear frequently in the empirical discussion. First, education, which takes place mainly during childhood and adolescence; second, income, which is closely related to conditions in the labor market; and third, health, which matters for a lifetime. Education is peculiar because a good part occurs before the 'age of consent,' that is, the age at which people should be held at least partially responsible for the various choices they make. Health, by many, is viewed as a right, in which matters of choice should not count. Thus, the *scope* of equal-opportunity policy may differ substantially depending upon the nature of the objective.

We focus on more concrete policies and address the issue of their efficacy when the social objective is to maximize the average outcome of those who belong to the most disadvantaged type. We must limit our scope, because the relevant literature is huge, and did not begin with EOp literature. We here limit to policies that causal impact have been proved by robust empirical

methods. To some degree, labor-, education-, and health-economists have been addressing these issues for decades. To wit, much of the literature on affirmative action addresses the issue of inequality of opportunity based on race and will not be reviewed here (see, for instance, Fryer and Loury (2005)). We will focus on a few examples: human-capital-enhancing policies, including those which attempt to neutralize the differences in the distribution of effort across types, policies that address differential opportunity in health, and policies to equalize opportunities for income and wealth outcomes. An important feature of all these policies is that they are curative policies. To a large extent, they try to level up the initial conditions. It is specifically true for education policies. It is simply too soon to conclude that remediation policies are too expensive and should be discarded. We are in need of cost-benefit analysis comparing ex-post and ex-ante inequalities but clearly the state of research is premature to foresee quick results in this direction.

A. Human-capital-enhancing policies

Human-capital policy[5] is a catchword popularized by James Heckman (see Heckman (2012), (2013) and Carneiro and Heckman (2003)) to cover policies whose aim is to develop cognitive skills and non-cognitive skills over the entire life-cycle. Education (years of schooling) is an omnibus variable that explains good outcomes in different dimensions during adulthood. In the Mincer equation, education is the main observable variable, along with seniority, that explains job-market success. It influences lifestyle, saving and fecundity, once income is controlled for. Although primary and secondary education are publicly provided in all western democracies, the distribution of years of schooling remains dependent on social origin (for empirical evidence for the US, see Heckman and Krugman (2003)). It does not suffice to provide equal access to achieve equality of opportunity in the acquisition of human capital – that is, to achieve a distribution of human capital that is independent of socio-economic and ethnic/racial background. A human-capital policy that compensates disadvantaged children for the paucity of resources provided by their families is required.

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[5] We are reporting results for the US. France is not well ahead in this vein of research and it is a pity.

We start by addressing two issues: Is the failure of children growing up in poor families to achieve good educational outcomes due to low innate talent?   And can we help disadvantaged children other than by raising incomes of parents?

An affirmative answer to the first question was offered by Arthur Jensen (1969) in his attempt to explain the relative failure of President Lyndon Johnson's War on Poverty. After arguing that environmental factors are not nearly so important in determining IQ as genetic factors, Jensen presented evidence suggesting that social class and racial variation in IQ tests must be attributed partially to genetic differences. Jensen's evidence has, however, not stood the test of time.   To answer whether children growing up in poor environments are less intelligent, we must measure intelligence before the family environment has had an influence, which is to say, very early.   Empirical evidence of samples of infants stratified by SES is lacking, but there is evidence of black-white differentials. On tests of intelligence, blacks systematically score less than whites although the gap is diminishing.   However, incentives partly determine scores on IQ tests. The black-white gap in IQ completely vanishes by giving candies for correct answers (the evidence is summarized in Borghans et al. (2008) and Almlund et al. (2011)).   Using a newly available nationally representative data set that includes a test of mental function for children aged eight to twelve months, Fryer and Levitt (2013) find only minor racial differences in test outcomes (0.06 standard deviation units in the raw data) that disappear with the inclusion of a limited set of controls.   Interestingly, when introducing SES, higher SES children perform better but the effect is small (a top-quintile SES child outscores a bottom-quintile child by 0.08 of a standard deviation) and the deviation is not robust with respect to the introduction of other controls. Black children, however, lose ground in the first years of schooling (Fryer and Levitt (2004, 2006)). Differences emerge as early as age two, and by the time black children enter kindergarten they lag whites by 0.64 of a standard deviation in math. The gap continues to grow as children progress in schooling. According to these authors, there is suggestive evidence that differences in school quality may be an important part of the explanation for this widening in test scores.

The issue raised by the second question is whether it is possible to improve the schooling chances of the disadvantaged children with "micro surgery" techniques, that is, leaving unchanged the social and economic equilibrium that produce poverty. The spatial location and incomes of poor families are implicitly held constant in this approach.

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We are beginning to consolidate scientific evidence in this area (See Heckman and Krause (2014) for the up-to date survey). Robust causal relationships must be established, which will come only with many empirical studies. We must understand the different channels through which a child develops, and the role of different factors such as genes, investment, and environment. In Heckman's (2013) formulation, we need to "model human capability formation."

According to all studies (see Cunha et al, (2010) for instance) cognitive skills are formed very early (by age eight, they are fairly well set), while non-cognitive skills can still be developed through adolescence. Herbert Gintis (1971) was the first to emphasize the importance of non-cognitive skills in schooling and on the job. The formation of non-cognitive skills is as important as of cognitive ones for schooling, employment and social behavior (See Heckman et al (2006)). Indeed, non-cognitive skills are often associated with what would be called 'effort,' rather than circumstances, in the EOp model. There is a complex interaction between cognitive skills and non-cognitive skills in the accumulation of knowledge (see Cunha et al. (2010)). Successful school learning depends on personal characteristics other than intelligence, such as persistence, interest in school, and willingness to study. The encouragement that is received from peers, family and teachers plays a key role. Good policy must affect all of these factors. Consider for instance the stigma that is sometimes associated with a person's behavior conforming to behavior of those in another type. 'Acting white,' among African-American youth, describes behavior for which individuals may be ostracized. Changing the role model – for instance, by having a black intellectual president -- may be instrumental in altering this kind of 'effort.' In his keynote address at the 2004 Democratic National Convention, Barack Obama said, "Go into any inner city neighborhood, and folks will tell you that government alone can't teach kids to learn. They know … that children can't achieve unless we raise their expectations … and eradicate the slander that says a black youth with a book is acting white (*Washington Post,* July 27, 2004). "

All specialists agree about the timing of the state intervention (see for instance Cunha et al. 2010)): the younger the better, and the cheaper, because of the accumulative nature of knowledge and the plasticity of the young brain. Dynamic complementarity has been found to be the crucial property in the production of skills, summarized by the motto "skills beget skills". Investments in the early years are important for the formation of adult cognitive skills. However, successful adolescent remediation strategies for disadvantaged children should be targeted on fostering non-cognitive

skills to be successful. One of the most important news brought by all this stream of literature and emphasized for a long time by James Heckman is that there is no trade-off between equality of opportunity and efficiency. Cunha et al (2010) conclude their article "*The optimal investment strategy to maximize aggregate schooling attainment or to minimize aggregate crime is to target the most disadvantaged at younger ages.*"

A first example is provided by the study of Havnes and Mogstad (2011) who evaluate the expansion of a large program of subsidized child care in Norway and find that this caused a very substantial reduction of the cognitive development and school attainment gaps between middle class and socially disadvantaged children. In aggregate terms, the additional 17,500 child care places produced 6,200 years of education. The child care expansion also raised the chances of completing high school and attending college, in orders of magnitude similar to the black–white race gaps in the US.

Drawing on Heckman and Krause (2014 see the references there), we here sum up what seems to be the efficacy of the different early childhood interventions such as the Nurse-Family-Partnership (NFP), the Abecedarian Project (ABC), Perry Pre-school, Head Start, looking just at the US. First only very early interventions (before age 3) improve IQ in a lasting way. This is the case for the NFP and particularly for ABC. Impressively, at age 21, the gain for girls represents 45% of IQ's standard deviation but however the gain fades away for boys. The preschool component was full-day child care five days a week, 50 weeks a year with a series of educational games that emphasize language, emotion development, and cognitive skills. For other programs, such as Perry and Head Start, the long term gains mainly go through better character skills and realize in better achievements in terms of health, employment, social behaviour. The Perry preschool program focuses on 3- and 4years old low-income black children with initial IQs below 85 at age 3. Participants plan a task, execute it and then review it with teachers and fellow students. Heckman and coauthors report a rate of return for this program as high as 7%.

As a substitute or complement of these early "collective" interventions, Carneiro and Heckman (2003) think that it is more important to offer the children a better family environment by teaching parents to be good teachers at home. They advocate different solutions, which may involve violation of parent sovereignty. "Paternalistic intervention in the early life of children in certain

dysfunctional families may be appropriate. If we are to violate the principle of family sovereignty anywhere in the life cycle process of learning, the case for doing so is strongest at the preschool stage (and only for some groups (Carneiro and Heckman 2003, p.164))". Clearly, society has values in addition to that of equalizing opportunities, and excessive interference in the family's raising of children is one of them. Here is a case where the specification of the policy space must include constraints that disallow certain kinds of interference: the policy space must respect a certain degree of parental hegemony. If that is the case, perhaps micro-surgery will never suffice, and we must address poverty, with social policy, in order to equalize opportunities for children. This may be indeed our conjecture.

We now ask whether "classical" improvement educational programs in primary and secondary education that try to level the playing field are successful. They can be classified in three main categories, boosting school governance & pedagogical methods, diminishing the class size and exploiting peer effects. We here briefly review the opportunity efficacy of these programs meaning that we are exploring the black box of the education production function.

Recent studies shed light on what seem successful charter schools in New York and Boston that apply the No Excuses program (See for Boston, Abdulkadiroglu et al. (2011), and Angrist et al. (2015) and for New York Dobbie and Fryer (2011)). The latter study presents evidence that micro-surgery can reduce and even eliminate the racial achievement gap in test scores. Harlem Children's Zone is a 97-block area in Harlem, New York, that combines "No Excuses" charter schools with a web of community services designed to ensure the social environment outside of school is positive and supportive for children from birth to college graduation. These schools typically allow the principal considerable administrative freedom, set measurable goals that are regularly tested using interim assessments, emphasize parent participation, and create a culture of universal achievement that make 'no excuses' based on the students' background. The authors exploit the fact that the charter school is required to select students by lottery when the number of applicants exceeds the number of available slots for admission. Both lottery and instrumental-variable identification strategies lead to the same conclusion. The effects of attending the Promise Academy charter middle school are enough to close the black-white achievement gap in mathematics and reduce it by nearly half in English. The same authors (Dobbie and Fryer (2013) see also Angrist et al. (2013)) try to explain school effectiveness by looking at data from 39 charter

schools. They find that traditionally collected input measures – class size, per-pupil expenditure, the fraction of teachers with no certification, and the fraction of teachers with an advanced degree – are not correlated with school effectiveness. In stark contrast, they show that an index of five policies suggested by over forty years of qualitative research – frequent teacher feedback, the use of data to guide instruction, high-dosage tutoring, increased instructional time, and high expectations – accounts for approximately 45 percent of the variation in school effectiveness. However, there is a more general point, that focusing upon the provision of charter schools may have the consequence of dis-equalizing opportunities, because charter schools may draw resources away from public schools generally, and those parents who make use of them may be the most highly motivated ones, leaving the most disadvantaged children to poorly resourced non-charter public schools. Although only 6% of students in New York City schools attend charter schools, they provide an escape valve that may reduce citizens' efforts to improve the public school system more generally.

One issue that remains unsettled is whether this kind of program will be successful nationwide, and what it would cost in the long run. A natural candidate for such a program is class-size reduction according to the highly praised study of Angrist and Lavy (1999). Frederiksson et al (2013) provide an example of an assessment of a school program at a national scale: they evaluate the long-term effects of class size in primary school in Sweden, exploiting variation in class size created by a maximum-class-size rule. Smaller classes in the last three years of primary school (age 10 to 13) are beneficial for cognitive and non-cognitive ability at age 13, and improve achievement at age 16. They also find that smaller classes have positive effects on completed education, wages, and earnings at ages 27 to 42. A cost-benefit analysis suggests that a reduction in class size from 25 to 20 pupils has an internal rate of return of almost 18%.

Class-size reduction, however, did not reduce the achievement gap among children from families of different SES.   For those children from families at the lower end of the parental income distribution, a reduction of class size by one pupil improves employment probability by 2 percentage points but has no effect on wages. For those from families at the high end of the parental income distribution, a reduction in class size yields no effect on the employment probability, but the wage effect is larger than for the rest of the distribution.

Other programs that try to break down or at least weaken the social connections between a child and his neighborhood through school vouchers or busing were not found to be particularly effective in the US, despite the fact that important peer effects have been documented for instance by Hoxby (2000). She found that a credibly exogenous change of 1 point in peers' reading scores raises a student's own score between 0.15 and 0.4 points, However the results were disappointing for busing, (see Angrist and Lang (2004)) and for vouchers (see for instance Rouse (1998); Cullen, Jacob, and Levitt (2006) and the review by Zimmer and Bettinger (2012). The recent negative results obtained by Abdulkadiroglu et al. (2014) about parents' strategy to move to benefit from better schools in Boston and New York questions the relative importance of peer effects in the education production function.

To sum up, so far, among the three main ways to enhance school ouput among the children of poor background, only the first two, school governance & teaching methods and class size seem promising at a large scale.

Another issue is that in the U.S., high income families pour private resources into their children; Corak (2013) reports that these 'enrichment expenditures' (books, computers, summer camps, high quality daycare, and private schooling) total about $8900 per annum per child for families in the top income quintile, while families in the bottom quintile spend $1300 per annum per child (2006 figures). An equal-opportunity policy should compensate low-income children with similar resources, publicly financed. However, the pessimistic result of Roemer and Ünveren (2013), that investment in the education of poor by the state may induce an 'arms race' in which the rich counter with even more expenditure on *their* children, might be important in the very competitive and status-conscious U.S. environment. The fact that private schools hardly exist in the Nordic countries surely contributes to the lower intergenerational income elasticities there.

B. Health

Little is known about which policy interventions are most likely to advance opportunity equalization in health status acquisition effectively. Recent evidence on field-leveling policies in the areas of labor, education and development economics provides indirect evidence on this issue and points to avenues for further research; the evidence is therefore briefly reviewed below.

Van de gaer et al (2013) take a step in the direction of narrowing this evidence gap. They use data from the Mexican conditional cash transfer scheme *Oportunidades* to evaluate the causal effect of this policy in the health opportunities of needy children. Their analysis exploits the fact that this program has been evaluated in terms of its mean impacts using a randomized control trial, which permits the identification of its causal impact on various dimensions of child development. Van de gaer et al (2013) take advantage of this clean identification strategy, and apply a stochastic dominance approach to the full conditional distribution of health outcomes (conditional on type) of children in the treated and control groups of the trial. Their results show the program had a strong field-leveling causal effect by improving childhood health outcomes (such as hemoglobin concentration and height for age) of disadvantaged children, in particular those of native origin. This approach can be used to extend our knowledge on the causes of inequality of opportunity and to design policies to tackle it.

Education and health are fundamental and complementary dimensions of human development. This suggests that educational policy may also have significant opportunity enhancing effects in health. Johnson (2010) addresses this issue indirectly by evaluating the causal effect of the US court-mandated school racial desegregation, and subsequent state legislation aimed to change the distribution and level of school funding, on health disparities between blacks and whites in adulthood. He exploits the wide time variation in the implementation of desegregation plans, as well as a rich desegregation case inventory, to identify the causal effect of these policy reforms. His results suggest that a ten percent increase in per-pupil school spending in adolescence is associated with an approximately three point increase in the Health Utility Index of the individuals exposed to it. As an alternative empirical strategy to evaluate the effect of school quality improvements on health in adulthood, Johnson (2010) also uses sibling comparisons: he compares adult health outcomes between siblings who benefited from the Head Start pre-school participations and others who did not. His results suggest that the field-leveling potential of this policy are high, reducing long-run health disparities between socially privileged and disadvantaged children. Although this evidence is obtained outside the strands of research directly concerned with the measurement of inequality of opportunity, it nonetheless provides invaluable evidence to design policies aimed at advancing them.

C. *Land, housing, wealth and income*

According to Hendricks (2001), in the US, only one-third of households report receiving an inheritance during their lifetimes. There have been many proposals to encourage a wider distribution of inherited wealth, beginning with James Meade's (1965), to tax those who receive inherited wealth at progressive rates, as opposed to taxing estates, in order to encourage donors to spread their inheritance across many recipients. Bruck Ackerman and Ann Alstott (1999) have proposed that all young adults receive a stake of $80,000 from the state. Tony Blair introduced the Child Trust Fund in the UK in 2005 with the aim of ensuring every child has savings at the age of 18. The grand plan was to give at birth every eligible child a voucher worth £250 to open the account, and also a further £250 directly into the accounts of children who live in low income families. Because the scheme allowed family and friends to top up trust funds, it was hoped to boost savings rates, particularly among the poor. The scheme was terminated by David Cameron in 2010.

Our final examples concern the allocation of urban housing and rural land. In a market economy, economic stratification according to income emerges as the urban equilibrium; see Benabou (1996) for a description, who writes that "in the US, a person's income, education, ethnic background and lifestyle can be predicted quite accurately from his zip code. Gated communities are multiplying while in other neighborhoods, poverty is becoming entrenched." The second issue of *Housing Studies* (2010) reviews international evidence about desegregation and social mixing (US, UK, Belgium, Netherlands, Sweden and France). In the US, *HOPE VI* demolishes large-scale public housing projects and replaces them with smaller-scale, mixed-income developments (Goetz (2010)). At the individual level, the gains are found to be modest, specifically focused on more safety and less fear of crime and social disorder. It is quite striking that the authors in the issue express pessimistic views about the success of these attempts at creating public housing projects to improve achievements of children. In the Netherlands, those displaced have a tendency to move to neighborhoods with a high percentage of non-Western minorities and a large proportion living in public housing. In the UK, it is concluded that neither demolitions nor dispersal are likely to generate social integration, unless they reinforce positive adaptation strategies that minority ethnic households already tend to pursue. In Sweden, the analysis shows these policies affect levels of segregation only marginally

Property in agricultural land now comprises a negligible part of total wealth in developed countries, but it remains important in developing countries. Historians agree that the French Revolution accomplished a vast land, and hence wealth, redistribution from the nobility and clergy to the peasantry, and more specifically to the richest of them. The conquest of the American west went together with the distribution of cheap land by federal, state and local governments to pioneers. Under provisions of the 1862 Homestead Act, individuals and families could secure title to 160 acres of land by working it for five years. Land reform did not take place in the colonial societies of South America in the nineteenth century and that fact is said to account for greater wealth inequality today in South than in North America. Land reform remains an issue in Africa.

According to Deininger (2003), the success of twentieth-century land reform was critically dependent on the way in which the land was used. In landlord estates, where tenants already cultivated the land and the reform implemented a reassignment of property rights, it was relatively successful and led to stable systems of production. Since the end of the second world war, landlord estates in Bolivia, large areas of China, Eastern India, Ethiopia, Iran, Japan, Korea, and Taiwan have been successfully transferred to tenants. By contrast, land reform in regions where tenants had small subsistence plots, but worked for most of their time on the landlord's estate, has been much less successful. This characterizes most Latin American cases. A superior alternative in this case to a reassignment of property rights is a wealth tax or comprehensive progressive income tax that reduces the concentration of wealth, and eventually the concentration of land ownership (Piketty (2014)). A wealth tax, however, often meets fierce opposition from the rich and middle classes, as it impedes the ability to pass down wealth to children.

We conclude this section with the observation that although policies enhancing EOp are to a large extent specific and distinct from policies the aim of which is to reduce outcome inequalities, the latter are often useful to reduce inequality of opportunity. Lefranc, Pistolesi and Trannoy (2007) show that under a loglinear relationship between parent and child earnings, whose slope is the intergenerational earnings elasticity, and choosing the mean logarithmic deviation (mld) as inequality index, then the following relation holds :

$$I_t^f = -r_t + s_t I_t^p.$$

The mld among descendants, I_t^f, can be written as an affine function of the mean mld among the fathers' incomes at date t, I_t^p, which is a circumstance for children. The constant $-r_t$ can be interpreted as residual inequality were there to be no inequality of parental income. We may interpret $\beta_t I_t^p$ as the inequality of opportunity due to the circumstance of parental earnings. Reduction of inequality of opportunity can derive from either a drop in the intergenerational transmission of advantages, or from mitigating income inequality in the parental generation. In the case of France, the authors found that the reduction of inequality of opportunity was a consequence only of a decrease of inequality in fathers' incomes without any clear contribution of the intergenerational link.

Conclusion

Despite the fact that the literature on equality of opportunity is developing at full speed, the first phase of theoretical research being now followed by a phase of intensive empirical research, it recently came under fire by two renowned economists, Ravi Kanbur and Adam Wagstaff (2016). In essence, the argument is to say that the distinction between effort and circumstances is fine but when we come to practical matters, there is always the risk to underestimate inequality of opportunity because we will not measure in a proper way how effort is related to circumstances and the importance of luck. Consequently, the goal of equality of opportunity will lead to much more restrictive redistribution policies in all dimensions than needed. The criticism is sound but only the development of research will help us to say how devastating it is. We conclude that at this stage it is too soon to throw out the baby with the bathwater.

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