Germ-line Enhancements and Rough Equality

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ABSTRACT. Enhancements of the human germ-line introduce further inequalities in the competition for scarce goods, such as income and desirable social positions. Social inequalities, in turn, amplify the range of genetic inequalities that access to germ-line enhancements may produce. From an egalitarian point of view, inequalities can be arranged to the benefit of the worst-off group (for instance, through general taxation), but the possibility of an indefinite growth of social and genetic inequality raises legitimate concerns. It is argued that inequalities produced by markets of germ-line enhancements are just if it they are embedded in a framework of social institutions that satisfies two conditions: (i) Rawls' Difference Principle, which states that inequalities of income and wealth should benefit the worst-off group; (ii) the lexically prior "principle of rough equality", which states that citizens' initial life-chances should be similar enough, so that extreme inequalities in income, wealth and power are not produced or accumulated through institutions justified by the Difference Principle. The principle of rough equality replaces the Rawlsian principles of the Fair Value of the Political Liberties and Fair Equality of Opportunity in a post-genomic society and expresses a concern with background political equality, which is argued to be a condition of the freedom and equality of citizens that should not be traded off with material benefits. Extreme inequalities are defined in terms of political equality.

KEYWORDS. Germ-line, enhancement, justice, equality of opportunity, Rawls

I. INTRODUCTION

Some scientists think that we are on the verge of discovering techniques that would allow us to modify the human genome in ways that would be beneficial to human beings.[1] While this research hypothesis currently lacks any implementation in humans[2], it has already had a tremendous

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impact on bioethics and political theory (Harris 1992; Fukuyama 2002; Habermas 2003; Dworkin 2000, 446-451). In this essay, only one of many ethical questions concerning this opportunity will be asked, one having to do with social justice. Suppose that on a desert island with only one family, there are no valid ethical objections against an unlimited freedom for parents to enhance their children's genome. Does it follow that every couple, in a country, ought to be free to buy the same genetic manipulations available in an unregulated market? This is a question for a theory of social justice to address.

The aim of the present contribution is to argue that access to germline enhancements should be regulated, even prohibited (in certain cases), in order to preserve some rough condition of equality, *both* in citizens' starting positions and in distributive outcomes. Rough equality is necessary, it will be argued, for accomplishing justice within a society where goods and political responsibilities are distributed, respectively, by markets and democratic institutions. Rough equality is of such great importance for the fairness of institutions, that it has to be achieved even at the cost of reducing expectations of income and wealth for the worst-off group. For the sake of rough equality, even the prohibition of certain enhancements can be justified (when required by the circumstances), even if nobody is made better-off thereby in terms of expected income and wealth and expected realized abilities.

I will use a three-stage argument in support of this thesis. The first stage (part II) is a speculative description of the pattern of inequality in a 'post-genomic society', one in which parents can modify or select the genomes of their children. It is argued that in a post-genomic society where inequalities of income and wealth satisfy Rawls' Difference Principle, socio-economic inequalities can grow very large. The Difference Principle, (henceforth, DP), states that:

> [T]he higher expectations of those better situated are just if and only if they work as part of a scheme which improves the expectations of the least advantaged members of society (Rawls 1999, 65).

The DP is meant to express an idea of reciprocity: the idea that nobody should gain at the expense of someone else. It is satisfied when social and economic inequalities created by social institutions are necessary to raise the expectations of the worse-off. When inequalities cannot be reduced without reducing the expectation of those who are worst-off, a society is just (Rawls 1999, 68). In the second stage (part III), it is argued that excessive inequalities lead to socio-economic inequalities that do not benefit the worst-off group, even if the DP is satisfied. It is also to be argued that in order to be fair inequalities must be produced by institutions that satisfy the 'principle of rough equality' in addition to the DP, which states that:

> Citizens' initial life-chances should be so similar, that extreme inequalities in income, wealth and power are not produced or accumulated through institutions justified by the DP.

The argument demonstrates that when background social inequalities are too large democratic institutions and markets have a tendency to be unfair, inefficient and unstable, even if expectations of income and wealth are maximized. In the third stage of the argument (part IV), it is argued that in order to guarantee rough equality in a post-genomic society, the regulation of access to germ-line enhancements is sometimes required. In part V some objections are considered and rejected.

My aim here is to bring issues of justice to the foreground, assuming for the sake of the argument that the manipulation of human life is not bad or evil as such. The present contribution is neither *for* nor *against* germ-line enhancements. It is presumptively maintained that all moral questions about enhancements (justice is but one of them) should be decided after a careful weighing of benefits and costs, including long-term, unintended consequences (Buchanan 2011). I deal here with one possible cost, extreme social inequality, explaining why it counts as a 'cost' and discussing what carefully designed social institutions can do to prevent it.

I shall assume that the social and economic inequalities to which the DP applies are defined by expectations of income and wealth.[3] These are (in Rawls' terminology) primary goods: general purpose goods that every person can be presumed to want whatever else he or she wants (Rawls 1999, 54-55). But they are not the only primary goods: self-respect (or rather its institutional bases) is another. A good argument for the simplified index involving only wealth and income is based on the value of *publicity,* the idea being that the measure of social advantage should be widely shared and detectable. Wealth and income satisfy this condition, while it is more difficult to reach public agreement on measures of well-being, capabilities or human perfection, because questions concerning the nature of well-being (as in welfarist approaches) or important human functionings (as in the capability – and in the perfectionist – approach) tend to be socially divisive. The application of the DP to primary goods besides income and wealth, such as self-respect, is also problematic, because we lack public standards to evaluate tradeoffs between such different primary goods. The rationale of the DP is intuitive enough: it is an idea of reciprocity. Rawls writes:

> [W]hat the difference principle requires, then, is that however great the general level of wealth – whether high or low – the existing inequalities are to fulfill the condition of benefiting others as well as ourselves. This condition brings out that even if it uses the idea of maximizing the expectations of the least advantaged, the difference principle is essentially a principle of reciprocity (2001, 64).

What Rawls means here is that the DP is not a consequentialist principle concerned with the maximization of the advantage of the least advantaged group, but rather a principle that specifies how *inequality* is to be justified. Improving the expectations of income and wealth of the worst-off group can *justify* an inequality, but justice does not *require* improving these expectations. Inequality can be justified when produced by economic incentives that increase efficiency, from which the worst-off benefit the most through

taxation and redistribution. My argument here is addressed to those who share this idea of reciprocity.

Following this line of thought, some philosophers have claimed that reciprocity in genetic justice obtains when genetic inequalities are necessary to improve the expectations of natural primary goods – general-purpose natural abilities – of the citizens otherwise born with the worst expectations.[4] But this position forgets that according to Rawls' theory *several other conditions must be satisfied prior to the application of the DP*.

These are expressed by the first principle of justice (Equal Liberty), the Principle of the Fair Value of the Political Liberties (FVPL) (Rawls 1999, 197-199), which is a special clause of the Equal Liberty Principle, and the Principle of Fair Equality of Opportunity (FEO; Rawls 1999, 77-78), which is the first part of the second principle of justice. I shall not discuss the first, because I assume that inequalities produced by germ-line enhancements cannot undermine the justification on which the Equal Liberty Principle rests.[5] Let us now consider the other two. They are very problematic in the scenario of a post-genomic society, one in which a child's genetic endowments can be chosen or modified by his or her parents. FEO states:

> [A]ssuming that there is a distribution of natural assets, those who are at the same level of talent and ability, and have the same willingness to use them, should have the same prospects of success regardless of their initial place in the social system (1999, 63).

The FVPL is defined in a similar way (1999, 197), but applies instead to citizens' chances of obtaining political roles. Neither principle implies that all inequalities due to the distribution initial natural assets are unjust; both imply, instead, that only those due to unequal initial *social* circumstances are unjust. What counts as a social circumstance is, paradigmatically, such property as being born in a wealthier sector of society, with parents able to afford the best and most expensive private schools, etc. But the central distinction on which both principles rely, the one between initial endowments and

social circumstances, is difficult to draw if a child's genetic endowments can be chosen or modified by his or her parents. It is not clear whether artificially enhanced genomes should be regarded as social circumstances, unequal natural assets, or both, because there are good reasons to place them in either category, or in both. Each interpretation has a different implication for how FVPL and FEO should be applied to institutions governing access to germ-line enhancements. This is not, however, a point on which I wish to insist further. Instead of engaging with the daunting hermeneutic task of finding out which interpretation of the Rawlsian categories in question is more appropriate, I will propose a strategy that bypasses such a problem.

My proposed strategy does not mention FVPL and FEO, thus avoiding the question of interpretation in its entirety. I propose that we replace FVPL and FEO with another principle, called the 'principle of rough equality': citizens' initial life-chances should be similar enough, so that extreme inequalities in income, wealth and power are not produced or accumulated through institutions justified by the DP.

The property that makes inequalities 'extreme' and the connection between opportunity inequalities and outcome inequalities will be clarified in part III, where its justification is offered. The scheme of the argument of part III is the following:

> (i) Institutions that satisfy the DP can produce extreme inequalities of income, wealth, and initial opportunities.
> (ii) Extreme background inequalities affect the procedures of democratic institutions, so collective decisions will be unfair, even if the DP is satisfied.
> (iii) They also affect the economy (via the political system), making it less competitive and efficient.
> (iv) Extreme inequalities undermine the socio-institutional basis of social stability.

If so…

> (v) A different set of principles is needed, one which avoids the result described by (i).

And…

(vi) One such set of principles described is the conjunction of the DP and the principle of rough equality.

Hence…

(vii) Social institutions ought to satisfy the principle of rough equality in addition to the DP.

Before examining the arguments step by step, some preliminary qualifications and specifications are needed. I only address questions of justice between citizens of the same country or nation, that is to say only those that have a local, as opposed to a global or international dimension. I likewise do not consider the important question of justice between generations. It is true that germ-line enhancements mainly affect future generations, but not all the inequalities that they might create are inter-generational ones. An example may help to clarify this distinction. Inheritance affects household savings, which in turn contribute to determining the transmission of capital from one generation to the next: this is the inter-generational dimension. At least in a moderately inegalitarian society, inheritance is a further cause of inequality between those who inherit different amounts of wealth from their parents: this is the intra-generational dimension of inequality. Here I only deal with the latter, except at one point where I will briefly touch on the problem of inter-generational justice, for the sake of illustrating how the two issues intersect.

Let me clarify some definitions before I proceed. I call 'disease genes', individual genes, such that inheriting one (dominant) or both (recessive) homologous genes is sufficient to cause a disease in the vast majority of cases (high penetrance). By *genetic* disease, I mean one caused by 'disease genes'. By a 'complex disease' I mean one that is not caused by a single gene or a very limited number of genes, but by several genes and/or by a combination of genetic and environmental factors. Genes that are statistically correlated with a disease when environmental factors play a significant role in the etiology of a disease are not defined here as 'disease genes'.

What do I mean by genetic enhancement? (i) As a first approximation, I shall use the label 'genetic enhancement' only for interventions that are *not* meant to repair, de-activate, or compensate the disruption brought about by disease genes. This comprises interventions that affect a person's susceptibility to complex or environmental diseases (such as selecting away genes correlated to multifactorial diseases or immunity enhancements). It also comprises the possibility of boosting abilities within the normal range.[6] I shall only deal with genetic enhancements and assume, for the sake of simplicity, that my analysis applies to a population in which no genetic diseases exist (this possibility might become real, after genetic diseases have been screened away).

(ii) The vocabulary of 'enhancement' is value laden, as the English word 'to enhance' means to 'increase' or 'improve' (Savulescu, Sandberg and Kahane 2011, 6), i.e. to make something 'more' or 'better in some respect. 'Better' can have as many different meanings as the word 'good'. For our present purposes, I shall assume that 'better', as applied to enhancements, is equivalent to the phrase 'affording a competitive advantage in the competition for social positions higher in hierarchy of income or responsibility'. In other words, I consider 'enhancements' to be *only* those manipulations that are *improvements* relative to a person's ability to compete for a career. This operational definition is justified because the allocation of the goods of wealth, income and responsibility is key to the justice problem with which we are dealing here.

Conditions (i) and (ii) are necessary and jointly sufficient conditions for something to be regarded a genetic enhancement in the present context. Germ-line enhancements are a proper subset of genetic enhancements. By definition, they are performed on the genome of the egg cell or of the one-cell embryo before implantation in the mother's uterus. For that reason, these enhancements affect citizens' capacities from a very early stage of development. Our argument here applies to all germ-line enhancements, but it applies equally to all enhancements that parents buy for their children and for which children are not responsible. All the

arguments concerning germ-line enhancements apply *mutatis mutandis* to 'early' enhancements.

II. Germ-line Enhancements and the Threat to Equality

In this section it will be argued that institutions that satisfy the DP can allow very large inequalities of initial opportunities, income, wealth and responsibilities. This section thus describes an instance in which the premise (i) of the argument above is true. It will also be argued that in a post-genomic society extreme social inequalities go hand in hand with inequalities in citizens' genetic predispositions and realized abilities. The second claim is important as a premise for the arguments elaborated in section IV.

Let us begin with an illustration of the social and economic inequalities that an unregulated market of germ-line enhancements could cause. Suppose that germ-line enhancements are so expensive that they are only available to upper middle-class parents.[7] Given this background, it is likely that a market of genetic enhancements will amplify the existing inequality of opportunity between the children of the rich and the poor. Inequality of *access* to germ-line enhancements between wealthier and less wealthy parents causes an inequality of opportunity between their children.[8] The children of the latter will turn out to be more resistant to disease and enjoy superior physical and mental capacities. Moreover, they will also have access to the best educational facilities and have plenty of opportunities to cultivate their talents. In a private job market, firms compete to recruit people whose high potential has been realized and cultivated through education and training. Here even *environmental* and *motivational* circumstances are systematically skewed in favour of those born in the wealthiest sectors. Thanks to the germ-line enhancements their parents purchase for them, genetically advantaged individuals tend to come predominantly from the ranks of those who *also* tend to obtain, on average, a higher level of education and who develop greater ambitions. I shall

label this phenomenon 'coupling', the fact that natural and social advantages are likely to be combined. It is to be acknowledged that coupling takes place already to *some* degree without genetic technology, because genetically advantaged parents who have been socially successful have the means to improve the abilities of their children through education and other social opportunities. Notice, however, that the association between genetic potential and social advantage is definitively looser in today's society, since many parents have great economic means in spite of average genetic endowments, namely those who benefited from initial social inequalities[9], those who are very lucky, and those who despite their predispositions developed extraordinary motivations; moreover many children of genetically advantaged parents may not inherit these genes through natural reproduction. If wealth can buy much better genetic endowments, the association of social and natural advantage tightens up more considerably.

The second important post-genomic social phenomenon could be labelled 'accumulation', referring to the fact that the combined advantages of social circumstances and natural endowments can be reliably passed on to the next generation, with an inter-generational accumulation effect. *Ceteris paribus,* enhanced citizens are more likely to obtain positions at the top of the hierarchy of income and prerogatives of responsibility and to be able to buy germ-line enhancements for their children. In contrast to somatic enhancements delivered at a later stage, germ-line enhancements can also be inheritable.[10] Gradually, the inheritance of enhancements by the children who also receive the new ones may engender an accumulation of advantageous endowments in line with most advantaged families. In like fashion to large concentrations of wealth, large initial genetic inequalities can be inherited and accumulated through generations in the long term.[11]

It will now be argued that coupling and accumulation can take place even under institutions that satisfy the DP, assuming that the principle applies only to wealth and income. In this interpretation, the DP is used

"for income and property taxation [and] for fiscal and economic policy" (Rawls 1996, 283). The DP does not prescribe policies for correcting inequalities of opportunity due to the initial advantages each generation inherits from the former. As it has been pointed out:

> Might it not be to the 'greatest benefit of the least advantaged' to focus educational subsidies […] on those (often socially advantaged) students for whom such investment would offer the highest rate of return and then tax them for the benefit of the poor? Rather than fighting a costly and possibly futile battle against family and class privilege, one might instead put such privilege to work for the least advantaged among us through redistributive taxation (Taylor 2004, 335).

Not only may resources be directly redistributed to lower income households, but having to buy private education for their children may give parents an incentive to work more, adding to the efficiency of the economy. From the point of view of economics, it is not *impossible* for this scenario to occur.

Let us now consider inequality of access to germ-line enhancements from the point of view of the DP. In a society in which income and wealth inequalities satisfy the DP, inequalities of access to germ-line enhancements can be tolerated, if the resulting income and wealth inequality contributes through fiscal policy to improving the expectations of income and wealth of the worst-off group. Higher income households may still be able to buy germ-line enhancements that the least advantaged parents cannot afford. Even if income and wealth inequalities are regulated by the DP, coupling and accumulation can take place.

III. A Defence of Rough Equality

The argument in this section involves two stages. It will be argued, first, that in order to be just, a society ought to avoid excessive inequalities in

citizens' expectations of income and wealth, as well as excessive inequalities in citizens' 'realized' abilities (or skills). Second, it will be argued that extreme inequalities should be tackled by equalizing *initial opportunities*. The connection between initial opportunities and excessive inequalities obtains in virtue of economic laws. If society provides ample opportunities for all citizens to acquire sophisticated skills (by equalizing the initial social circumstances in which they live), a larger supply of sophisticated skills is produced. If access to social positions is open to all on the basis of the relevant competences, a large supply of skilled labour drives down the income of the social positions requiring more sophisticated skills. Thus equality of opportunity drives down the inequalities that the DP can justify (Rawls 2001, 67; Freeman 2007, 130). This explains the connection between outcomes and opportunities in the principle of rough equality, which states that "citizens' initial life-chances ought to be similar enough, so that extreme inequalities in income, wealth and power are not produced or accumulated through institutions justified by the DP".

In the first stage, I shall provide three arguments in defence of *outcome* equality, each based on a different value: fairness, efficiency, and stability. The fairness argument states that extreme inequalities are incompatible with the proper functioning of democratic institutions, in the absence of which collective choices will be unfair. The efficiency argument states that extreme inequalities are associated with inefficient markets (in the traditional economic sense). The stability argument claims that envy caused by very large and evident inequalities can undermine the (moral) motivation of citizens to abide by the rules of the (just) society in which they live. The kind of stability that is in question is 'stability for good reasons', not stability achieved by political violence, treachery or delusions. Stability for the right reasons is morally desirable because it makes a just society an enduring result and a goal worth striving for.

I assume that justice within a country is realized in practice through democratic political institutions (involving universal suffrage elections with a choice among different independent candidates) and competitive

markets. Democracy and markets are not taken for granted merely because they exist in most technologically advanced countries (where germ-line enhancements are more likely to be developed), but because they offer 'procedural' solutions for two difficult collective action problems: collective political decisions (required at least for public goods such as defence and the protection of the environment) and allocating productive resources in the private economy.[12] In ideal conditions, these procedures can be 'fair', in the sense that they do not create further inequalities that harm the interests of the worst-off citizens in society.

Let us begin with the fairness argument, which states that when large inequalities of income, wealth and responsibilities exist, democratic political procedures are unfair, even if income and wealth satisfy the DP. To illustrate this, let us consider a society that has to make choices concerning the environment, transportation, workers' rights, bioethics and foreign policy. Suppose that these choices have no influence on the distribution of income and wealth but, at the same time, the most wealthy and powerful citizens can set the political agenda and promote their corporate interest (for instance by lobbying for favourable legislation; see Hacker and Pierson 2010). The resulting choices can harm the worst-off even if the DP for income and wealth is satisfied. For instance, a privileged elite may lead a country to war. The policy could harm the interests of the worst-off citizens, even if they are made richer by it: for instance, because people in that sector have relatives who are citizens of the country against which the war is waged. If a privileged elite controls a significant proportion of a society's resources and is able to influence elections, the war may be approved in spite of the fact that a larger sector of society is harmed by it than the sector benefiting from it. More generally, if wealth is concentrated in few hands, a minority is able to set the political agenda and pursue its narrow corporate goals (Rawls 1999, 197-199).

I define an 'extreme inequality' to be any amount of inequality sufficient to engender a tendency among democratic institutions to disregard the interests and moral outlook of the citizens in the worst-off group in

the distribution of income and wealth. By definition, there is 'rough equality' in a society, if and only if that society does not include extreme inequalities.[13] Rough equality in income, wealth and power is therefore required in order to ensure fairness in the operations of the political system. Rough equality is compatible with *moderate* inequality, because large resources are needed to set the political agenda and lobby for favourable legislation. When the DP for income and wealth justifies even extreme inequalities, the preservation of rough equality has priority over the satisfaction of the DP.[14]

Let us now turn our attention to markets. When extreme inequality exists, the individuals and organizations that control a significant proportion of a country's wealth can protect themselves from competition by lobbying for favourable legislation. This is morally relevant in so far as monopolies, oligopolies and cartels produce economic inefficiency. Society as a whole (including the worst-off) does not benefit from such policies. As the last and least important point, the stability-based argument needs to be considered. Large inequalities of income, wealth, and prerogatives of power and responsibility are important for the stability of a just society, for reasons connected to self-respect, self-esteem and envy. When inequalities are very large, the distance between the lifestyle and the level of participation in culture and politics of the members of different income groups is considerable. Thus, it is easier for some to feel diminished and inferior and fall prey to envy, a socially divisive emotion (Rawls 1999, 471-474). Envy undermines the 'stability for good reasons' of society, which is a stability achieved on the basis of the moral motivation by its citizens to abide by shared just laws. While stability for good reasons is not a criterion of justice, in a Rawlsian perspective the fact that a conception of justice can be realized by institutions that are stable (for good reasons) is – other things being equal – a desirable feature thereof (Rawls 1999, 398).

The conclusion of the first stage of the argument is that in order to achieve fairness, efficiency and stability, society ought to avoid extreme

inequalities. It will now be argued that in order to achieve rough equality, the state should mitigate initial inequalities of opportunity. Society could attempt to 'insulate' democratic deliberation from the influence of economic power, for instance through laws that limit private contributions to political campaigns. This approach may work in theory, but in practice it is very unlikely to be implemented by a society with a tendency to growing inequality. Income and wealth inequality could be mitigated by redistributing wealth in favour of the worst-off, but this leaves already existing large inequalities of *skills* intact. These inequalities are also problematic when they are very large, because highly skilled individuals can use their superior abilities and social responsibilities strategically for promoting their private or corporate interests through political institutions. It seems that while differences in human ability will always exist to some degree in a free society[15], the degree of inequality is affected by social circumstances, especially at the beginning of citizens' lives. Citizens have 'adaptive preferences' (Elster 1983, 109-14), that is to say, they tend to develop ambitions that suit the circumstances in which they find themselves. When initial social circumstances are very unequal, their ambitions tend to be more unequal and as a consequence also their realized abilities. This inequality can hardly be corrected by redistributing wealth to mature citizens, which is why rough equality should be pursued by equalizing initial social circumstances, which affect the development of ambitions and skills. This reasoning leads to the principle of rough equality, which states: citizens' initial life-chances ought to be so similar, that extreme inequalities in income, wealth and power are not produced or accumulated through institutions justified by the DP.

Let us now consider the policies that can be justified by this principle. Before genetic biotechnology, they were roughly equivalent to those prescribed by Rawls's principles of Fair Equality of Opportunity (1999, 73-78) and Fair Value of the Political Liberties (2001, 148-150). In addition

to redistributive taxation justified by the DP, the state is required, for instance, to fund access to 'social' enhancements such as education and facilitate early career opportunities necessary to acquire marketable skills for those who would otherwise be cut off from them. The principle of rough equality probably does not prescribe compensation or correction of initial natural inequalities. The amount of social and economic inequality due solely to initial genetic differences is probably not sufficient to cause extreme equalities, once *social* opportunities are equalized.[16] In the next section, it will be argued that equal social opportunities in the traditional sense will not be sufficient if genetic assets are open to direct control by parents via germ-line technology.

Of course this leaves open two problematic areas of inequality: (i) by hypothesis, I am assuming that citizens have initial endowments in the normal range. In theory, once all social causes of inequality are addressed, citizens born with severe disabilities can still form a marginalized social group. (ii) Global inequalities in access to genetic enhancements, as opposed to inequalities within a single country, are also not considered here. I am not claiming that these are not authentic problems of justice, or less important ones, but I need to simplify the issue in order to derive some concrete answers from a philosophical argument of manageable simplicity and size.

IV. Post-Genomic Institutions for Rough Equality of Opportunity

What about a post-genomic society, in which parents can modify or select the genome of their children? In section II, I argued that an unregulated market of germ-line enhancements can contribute to the build up of significant inequalities. The main difference between the two scenarios is that, even if traditional equal opportunity policies are perfectly implemented, they may fail to satisfy the principle of rough

equality. Consider, for example, a state that delivers equality of opportunity by ensuring equal access to health care for mothers and children, equally good and healthy nutrition, and access to equally good sport facilities and education from kindergarten to university.[17] These policies do not produce rough equality in a post-genomic society: the children whose genome has been improved may derive a larger benefit from nutrition, sport and education. Traditional equal opportunity policy is compatible with very different outcomes between the citizens who have been and those who have not been enhanced since a very early stage.

It should be evident that no regulation of germ-line enhancement is required if after the redistribution of wealth from higher income to lower income households no one has a sufficiently higher income to buy enhancements for his or her children that are better than those of anyone else. That is to say, if taxes are very progressive, parents with very different pre-tax incomes end up being able to afford equally good germ-line enhancements, or no enhancements at all for their children. Hence rough equality could be achieved, even in a post-genomic setting, by traditional economic policies such as steeply progressive income taxation. This is true in theory, but in practice the required rate of taxation may too high, to be achievable politically (or have huge opportunity costs in terms of its impact on the economy). At least as a matter of non-ideal theory, it might therefore be more viable to attempt to regulate access to germ-line enhancements *directly*.[18] I shall focus on a special type of germ-line enhancements, namely "strong" enhancements:

> a germ-line enhancement or combination of germ-line enhancements E is (1) *strong,*
>
> *if and only if,*
>
> a free market distribution of E would determine such an unequal distribution of ambitions and skills in a society that implements 'traditional' measures of equality of opportunity, that extreme inequalities of political power are produced in one generation.

It might be objected that strong germ-line enhancements are impossible as a matter of *biological* fact. Even if that is true, they might exist as an artefact of social attitudes: if genetically enhanced persons are *perceived* to be more talented than the 'naturals' by teachers and employers, germ-line enhancements will indeed correlate with higher ambitions, skills and access to more strategic goods, as in a self-fulfilling prophecy (Buchanan 1995, 133-134).[19]

How should access to *strong* enhancements be regulated? I shall consider four possible policies: (i) subsidizing opportunities for *compensation* through environmental means, (ii) subsidizing *equal universal access* to one or a combination of effective germ-line enhancements, (iii) a *lottery* of access to germ-line enhancements (Mehlman 2000, 573-574), and (iv) a *ban* on a market of effective enhancements. When effective and implementable, all four are *equally fair*, yet, as it will turn out, *other* legitimate political values and concerns can potentially be brought to bear on the choice of a specific policy.

The first and the second are preferable, other things being equal, as they involve no interference with parents' procreative freedom (Robertson 1996) and may increase the 'common asset' of citizens' abilities that can be used to the advantage of all. Compensation may not work when the competitive advantage produced by germ-line enhancement is an artefact of social attitudes towards citizens *perceived* to be enhanced. Either can be extremely costly to deliver. A *lottery* is less costly, with the only advantage of avoiding the social segmentation of genetic inequality. This reduces the 'coupling' of genetic and social inequalities, but appears to be a very arbitrary way of disseminating initial advantage. What if *each* of these options is too costly to pursue or objectionable on other grounds? Should effective enhancements then be banned?

Of course the answer to this question depends on what one means by 'too costly' in the given context. In other words, the answer depends on the opportunity cost of a fair but moderately 'liberal' policy. The opportunity cost represents the goods forsaken by a society that uses a

significant proportion of its resources to fund access to germ-line enhancements. Consider the following example. I define 'basic education' as the amount of learning (both practical and theoretical) most citizens need to be capable of if one generation is to pass its 'essential cultural capital' to the next. I define 'essential cultural capital' as the amount of knowledge needed for reproducing the material and cultural conditions of a decent democracy, a society in which all citizens can enjoy – to a minimally morally significant degree – the liberties to which they are entitled by the constitution.[20] History shows that citizens do not need genetic enhancements in order to pass essential cultural capital, but they need some minimal amount of education: basic education. If implementing the *cheapest* more liberal fair enhancement policy deprives society of resources essential to deliver fair access to basic education, then I believe education should receive higher priority than germ-line enhancements.

V. Objections

I have conceded that significant genetic inequality produced by inequality of access to germ-line enhancements needs to be prevented by a suitable arrangement of social institutions. I have also admitted that this inequality is *only* one cause of socio-economic inequalities and that environmental factors, in particular the education one gets from one's parents, are at least as important. What if the lifestyle of the family has a much larger influence on initial life-chances than any genetic difference produced by germ-line enhancements? Should the state then abolish the family? Or should it tolerate both inequalities due to the family and unequal access to germ-line enhancement, because like cases ought to be treated alike? In answering this question, it is important to distinguish between two cases. In the first case, the lifestyle difference is explained solely by the different socio-economic conditions of the parents and produces unequal life-chances between their children. There is as good a reason to limit

these inequalities as there is a reason to limit inequalities in access to germ-line enhancements: hypothetically, they depend on socio-economic conditions that depend on the choice of basic institutions. Consider now life-style differences between families in the same socio-economic sector, which are only due to individual variations or cultural differences, which are not shaped by socio-economic circumstances. Suppose, for instance, that some parents read bedtime stories to their children while others do not, and that bedtime stories substantially improve a child's life-chances. Should the state equalize access to parents who read bedtime stories? The practice of reading at the bedside seems constitutive of a special relationship that some parents develop with their children, which is an important prerogative of parents the state has reasons to respect. Thus some inequalities of opportunity ought to be tolerated (Brighouse and Swift 2006). But clearly it does not follow that the state ought to tolerate any inequality that is equal to or smaller than that produced by bedtime stories. If the state can equalize access to genetic enhancements without interfering with the internal life of the family, then it ought to do so, whether the inequality is smaller or greater than one that is tolerated.

It might be argued that the justification of the principle of rough equality contradicts the justification of the currency of the DP, invoked in the introduction. If one assumes that there can be no public standard for assessing tradeoffs between income (or wealth) and other goods, how can one claim that the least advantaged citizens are worse-off in a society S1, where extreme inequalities exist, than in S2, where they have a larger share of political influence, despite the fact that their expectations of income and wealth are higher in S1 than in S2? It seems that this claim presupposes a comparison of heterogeneous goods (income and political influence) that can only be made if the benefits of political influence, income and wealth can all be stated in a common currency. But if a common currency exists, why not apply the DP to inequalities stated in this currency?

In reply, the argument does not rest on the presumption that the least advantaged citizens *are* worse-off in S1, which indeed would have to rely

on a common currency. The claim is, rather, that a political process that disregards the interests of the worst-off involves a particular type of *loss* for its members that is not compensated by any 'benefit' deriving from larger material resources. In section III, I imagined a possibility in which the least advantaged citizens *were* harmed by the decision to wage a war with another country despite earning a larger income, because they had affective ties to the citizens of that country. There seems to be no 'public' standard for evaluating tradeoffs between the benefits of war and its cost (in this specific situation) and the only reasonable way to reach a decision is the democratic confrontation of different points of view. In this case, however, it is also not clear why the ability to protect a *private* interest affected by the collective decision to wage war should matter *more* than the ability to promote other *private* interests through greater expectations of income and wealth. To see why the power to influence public choices should not be traded off with larger incomes, we need to focus on a different set of ideas. It is important to introduce the distinction between two important moral powers: a "capacity for a sense of justice" and a capacity "for a conception of the good" (Rawls 1996, 19). The capacity for a sense of justice is exercised when reasonable and impartial citizens seeking to build a just society reasonably disagree about policy, because the evidence is complicated and the principles of justice are vague. They participate in democratic procedures (including voting for democratic representatives and their decisions by majority rule) to settle such question (Rawls 1999, 318).

Being the most important means for realizing the capacity for a sense of justice in a democracy, a person's share of influence in the democratic process should not be given up in exchange for a larger share of material goods. This would express a significant devaluation of the first moral power in relation to the second, an idea that does not fit well with the role ascribed to the will of citizens within Rawls' political liberalism. There is something troubling in the idea of exchanging the possibility of exercising the capacity for justice with a more fulfilling realization of a personal life-

plan. The troubling idea is not that some specific citizen may value political participation less than other goals in his or her life plan. The problem is, rather, that the idea of sacrificing the first moral power for the sake of the second does not fit well with the idealized notion of a citizen and his or her moral powers, which forms the basis of Rawlsian political constructivism. The idealized citizen views him/herself not only as having a fundamental interest in his or her self-interest (as he or she conceives it) but also as a will whose moral reflection contributes to justifying social institutions, on an equal footing with that of other citizens. This is why institutions allowing a significant reduction of political influence are not justified.

It might be objected that even moderate income inequalities (justified by the DP) would harm the worst-off citizens because of the social gradient in health: lower income is statistically correlated to worse health outcomes and "worse health diminishes your opportunities and makes it more difficult to take advantage of the opportunities that you do have."[21] But that is obviously true only if lower income is connected to worse health outcomes in *absolute* terms. If your *relative* position in the distribution of health outcomes gets worse relative to that of other people, but your health improves in *absolute* terms as a consequence of a larger income (which may buy you better healthcare), it does not follow necessarily that the growth of inequality will harm you by making it more difficult to take advantage of the opportunities that you have. Income inequalities would certainly harm the worst-off groups if they led to lower *absolute* levels of health, as some epidemiologists have maintained (Wilkinson 1992, 1996, 2000). But the statistical evidence for this claim is not conclusive. For instance, the positive correlation between mortality rates and income inequality across the cities and states of the US may be confounded by the effects of racial composition, because, as it turns out, white mortality rates are higher in places where the black percentage of the population is higher (Deaton and Lubotsky 2003). The mechanism that relates white mortality to racial composition (lack of trust, perhaps) may entirely disappear in a society where racial inequalities are not extreme.

Finally, a word needs to be added about the inter-generational dimension of the inequalities caused by germ-line enhancements. As I pointed out in the introduction, this is a *distinct* problem, outside the scope of the present contribution.[22] I only want to elucidate, with one simple example, the way in which the two issues overlap in practice. Let us suppose for the sake of argument that the present generation ought to pass on to the next an amount of capital at least as large as the one inherited from the previous generation. The principle of rough equality is satisfied by either (i) a ban on very effective germ-line enhancements or (ii) distributing all enhancements through a lottery scheme, with a given (high) cost. Suppose that, according to the first scenario, one generation has exhausted natural resources and risks passing fewer resources to the next generation than it has received; in the second scenario, one generation has replaced the productive capital it has consumed and is going to pass on more resources to the next than it has received. In first scenario, parents have an obligation towards the future generation and should choose (ii). In the second, they have no such obligation and can choose (i).

VI. Conclusions

I have tried to show that a certain normative framework (including the DP and the principle of rough equality defended in part III) strikes a reasonable compromise between different demands of justice: priority for the needs of the worst-off, background fairness, stability, and publicity of the moral standard used to evaluate social justice. I have applied this framework to the question of regulating access to germ-line enhancements (IV) and the result is a multifaceted regulatory regime, involving different norms in different scenarios. The most significant normative implication, also that which may strike some readers as counter-intuitive given the Rawlsian liberal premises, is that there is a scenario in which a ban on strong germ-line enhancements is justified.[23]

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NOTES

1. For instance, increasing resistance to HIV (Campbell and Stock 2000; Capecchi 2000). In theory, it might be possible to boost physical and cognitive abilities, and alter social behaviour in ways deemed advantageous for the individual or society. This has already been tried with some remarkable success on some non-human mammals (Tang *et al.* 1999; Yang *et al.* 2001; Lim *et al.* 2004).

2. If anything, because research on the human germ-line (whether for therapeutic purposes or not) is prohibited by influential international bioethics guidelines, such as Art. 13 of the European Convention on Human Rights and Biomedicine.

3. As Rawls writes, the goods that (ought to) vary in their distribution, to which the DP applies, are "the rights and prerogatives of authority, and income and wealth" (1999, 80). Prerogatives of authority are standardly assumed to covariate with income (1999, 80) and other primary goods, such as liberties, opportunities and the social bases of self-respect, are allegedly distributed by competing principles. As the reader will be shown, one will need to introduce an evaluation of the distribution of these goods in order to limit and constrain the application of the DP and its interpretation of reciprocity.

4. This is the gist of Farrelly's 'Genetic Difference Principle' (Farrelly 2002).

5. The argument for equal liberties claims that they are needed to protect certain fundamental interests of beings who have the capacity for moral personality. This capacity has the same moral value no matter how well developed, as long as it reaches a certain threshold (Rawls 1999, 443). If enhancements are improvement *above* the threshold of normality, they do not affect the ground of citizens' rights and liberties as understood by Rawls. For further discussion and defence of a strictly related claim (see Buchanan 2010, 209-242).

6. The line between these two types of intervention is less clear than one might think, because better *normal* abilities (e.g. higher IQ) can be significantly correlated to better health outcomes.

7. The past and current century has seen a rapid decrease in the price of many technological goods, such as computer processors. But services limited by the availability of skilled personnel tend not to decrease in price unless more skilled personnel becomes available (Crozier and Hajzler 2010, 172; Sandberg, Savulescu and Kahane 2011, 101). There is no guarantee that a large supply of well-trained personnel will be available and the same is true (as I shall later show) when economic institutions satisfy the DP.

8. Parents would try to enhance their children, not because they want to play God, but because they want to give them the best start in life (McGee 1997).

9. Conversely, many naturally talented citizens have little economic and social success because of the lack of opportunities open to them.

10. Germ-line enhancements can be designed *not to be* inheritable (see Capecchi 2000, 68-69).

11. Indeed, it will be argued that the state has a duty of justice to mitigate inequalities due to different initial social circumstances, for instance by subsidizing education at least for those who are born in the least advantaged sectors of society and by taxing inheritance. If it is true that genetic enhancement and education are analogous, this suggests that the state ought to intervene

on access to germ-line engineering. This will be argued in part IV.

12. The Austrian economist Friedrick Hayek and his followers maintain that there is a principled reason why market competition is needed in order to have an efficient solution to the problem of resource allocation, namely only *actual market exchanges* take advantage of the *tacit knowledge* (Polanyi 1998) which individual buyers sellers and businesses use when they decide how best to use their own resources and are held responsible for the full cost or reward of their risks (Nadeau 2011). This knowledge cannot be captured by abstract models such as those a Central Planning Agency would use, because it is by its very nature "inevitably fragmented, dispersed, local and inaccessible to any single person in its totality" (Nadeau 2011). Even contemporary forms of modern-day market socialism (take Bardhan and Roemer [1992] as an instance) try to mimic markets in order to reap the rewards of this; even non-proprietary markets – market exchanges that do not end up with changes in the property of assets – are a distinct possibility that I will not consider here.

13. The concept of rough *equality* – the opposite of 'extreme inequality' as I have used it – is employed by Rawls (1999, 358) to explain the *purpose* of the principle FVPL, mentioned in the introduction. Rawls claims that a "roughly equal chance of influencing the government's policy and of attaining positions of authority irrespective of their economic class […] defines the fair value of the political liberties" (*ibid*.).

14. The conclusion of the argument is in agreement with the claim that "political inequalities are a proper concern of justice, independently of their propensity to create or sustain extreme deprivation" (Buchanan *et al*. 2009, 6). However, Buchanan *et al*. argument for this claim, namely that 'inequalities in political power have the potential to exacerbate existing injustices and undermine justice where it exists" (*ibid*.), fails to explain *how* political inequality can exacerbate injustice *even when* it does not sustain deprivation and *even if* inequality of political power is not unjust *in itself.* What is the morally relevant feature of political inequality that makes it unjust (sometimes)? Buchanan *et al*. do not assume that this inequality is unjust *in itself:* they concede that 'some inequalities in political power are not unjust, including those that result from special excellence in the qualities of political leadership" (2009, 5-6). The argument in this section explains *why* and *when* political inequalities are unjust.

15. Because free citizens can choose to invest their time and energy in different kinds education and careers and these investments yield different abilities and opportunities.

16. This conjecture is confirmed indirectly by empirical studies that show that the intergenerational transmission of income and status in American society is mostly due to social factors (see Bowles, Gintis and Osborne Groves 2005). The result is robust with respect to the assumption of high values of IQ heritability, near 70% (*ibid*., 11).

17. Education as traditionally conceived is compatible with using more resources for the education of the most, rather than the least naturally talented individuals. This inequality is justified on grounds of efficiency. This value is relevant provided that the demands of rough equality have been met, as they are already at this stage in the traditional scenario.

18. On the other hand, it has to be acknowledged that regulation of germ-line enhancements will also be practically unachievable in the absence of international agreements, because people seeking enhancement will simply travel to other countries without such bans in place.

19. This scenario is described in the 1997 movie *Gattaca* directed by Andrew Niccol.

20. I am deliberately excluding from consideration citizens who are constitutionally unable to enjoy the worth of their liberty because they are affected by severe congenital diseases. This suits the methodological considerations about the scope of the paper highlighted in the introduction.

21. Bognar, "Enhancement and Equality," in this issue, p. 24.

22. For a thorough examination of the inter-generational aspects, see Agius 1998.

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