Pareto-Efficient Emission Cuts. Are They Really Possible and Plausible?

Gianfranco Pellegrino
LUISS University of Rome
yorick612@gmail.com

(Very early draft. Please, don't quote)

1. Introduction

In *Climate Matters* (2012), as well as in a previous paper, John Broome puts forward a proposal to finance emission cuts without imposing sacrifices on the present generation.[1] His proposal has a pragmatic aim: getting "a better chance of successfully tackling climate change," by breaking the current "logjam" and "moving the political process forward," toward bigger emission cuts (Broome, 2012, pp. 38, 47; see also p. 48). Roughly, Broome's proposal consists in borrowing funds from the future in order to compensate present emission cuts. Decreased savings and increased consumption of resources will do this.[2]

Broome qualifies his proposal in different ways. First, he clearly admits that his proposal is unjust as, at most, it alleviates an even grosser injustice – namely the injustice of leaving things as they are, thereby imposing all the harms caused by climate change on future generations (from now onwards, *climate-related harms*). Broome's proposal represents an improvement of the predicament of future generations, because they trade-off less climate-related harms against less inherited resources from their predecessors. However, this exchange is unfair – as present generations would have the duty to abstain from harming future people, and complying with such a duty requires no compensation. Nobody deserves a compensation for the costs she incurs in by avoiding injustice.

Second, Broome seems to look at this strategy as temporary, merely as a way to speed up better mitigation measures. His hope seems to be that a scheme where the present generation undertakes big emission cuts with no further costs for future generations will be later implemented, as a consequence of a political process activated by the policy he puts forward. This is clear in the following passage: "I hope the availability of this option [scil. emission cuts without sacrifice, which Broome calls *Efficiency without sacrifice*] will get the political process moving, and a better option more like *Efficiency with sacrifice* [scil. emission cuts with sacrifices imposed on the present generations and benefit to future generations] will be the eventual result" (Broome, 2012, p. 48; see also pp. 46-7).[3]

Given the current political conditions, Broome's proposal is very attractive. However, such proposal needs to be further developed. This is important, as its appeal may depends on different ways to implement it. In this paper, my first aim is to have a closer look at the details of Broome's proposal, and some specific ways in

[1] See (Broome, 2010, pp. 102–3, 2012, Chapter 3).
[2] On borrowing from the future in the context of climate change, see (Rendall, 2011).
[3] Broome regards these policies as efficient because they both cure an externality, i.e. the fact that the social costs of emissions are unpaid, thereby wasting resources (namely, wasting potential possible payments for those costs). Broome's usage of an economic notion of 'efficiency' is clear in (Broome, 2010, p. 103, 2012, pp. 39–43). See also (Kelleher, 2015).

which it can be implemented. In particular, I shall explore the differences between three possible applications of Broome's proposal:

> i. a *one-shot, two generations application* (the policy is employed only once, and it involves two not overlapping, but succeeding generations);
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> ii. a *one-shot, multi-generational application* (the policy is employed only once, but it involves many not overlapping, succeeding generations);
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> iii. an *iterated application* (the policy is repeated across many not overlapping, succeeding generations).

My second aim is to show that these three applications yield counterintuitive results, and fall prey of objections. Specifically, if Broome's policy is applied only to the next close generation, it remains unclear how it may lead to substantial results. By contrast, if the policy is applied to many succeeding generations it can produce something similar to the worlds in Parfit's repugnant conclusion.[4]

Before proceeding, I should emphasize that these are only three of the possible ways Broome's proposal can be applied. There could be other ways to understand Broome's proposed policy, and other paths could be taken. If so, this paper would be an invitation to proceed further on the way to spelling out a sacrifice-free strategy for cutting greenhouse gas emissions. The possibility of a sacrifice-free path to abatement has an obvious philosophical and political significance. However, this significance can be shrunk if the prospects of implementing the sacrifice-free strategy lead to counterproductive or counterintuitive side-effects. And this is the worry that this paper primarily voices.

The paper proceeds as follows. In § 2, I elaborate on some details of Broome's proposal about emissions cut. I also give an account of the three ways to implement his proposal I want to focus on here. In § 3, I discuss the consequences of the three implementations presented in § 2, and I claim that some of these consequences are rather puzzling. In § 4, I consider possible counter-objections to my general objection and rebut them. I conclude in § 5.

2. Broome's no-sacrifice strategy and its possible applications

In this section I have two aims. First, I want to give some details of Broome's proposal on emission cuts. Some of those details are clear in Broome's writings; others are implicit, and I try to bring them up to the surface. Second, I want to point at three distinct ways to implement Broome's scheme of emission cuts.

Broome starts from this premise: Cutting emissions is costly for the present generation (the 'emitters'), whereas the harms brought about by emissions yield costs for future generations (the 'receivers').

Consider now the following policies:

1. *Business as usual*: Emitters go on with their present levels of emission, thereby getting all the benefits from carbon-based consumption and production, while receivers will suffer all the costs from climate-induced harms. In this situation, the harm done by emissions of greenhouse gases "is not paid for",

[4] See [ref].

and for this reason, Broome explains, such harm is an "externality" (Broome, 2012, pp. 38, 39–40).

2. *Efficiency with sacrifice*: Emitters cut a big amount of their present levels of emission, losing many of the benefits from carbon-based consumption and production. Receivers will get the benefits of avoiding climate-related harms and the benefits of inherited natural and artificial resources (the latter being basically economic capital: "buildings, machinery, cultivated land, irrigation systems, and so on", Broome, 2012, p. 44).

3. *Efficiency without sacrifice*: Emitters cut a smaller amount of their present levels of emission than they do in *Efficiency with sacrifice.* But they get a compensation for the costs incurred through increased consumption of the stock of natural resources and decreased production of durable artificial resources, as well as decreased investments for the future generations. As a consequence, receivers get the benefit of less climate-related harms, and the costs of less inherited resources. However, the latter costs are more than compensated by the benefits coming from suffering less climate-related harms. As a consequence, receivers are better off than in *Business as usual* (even though they are worse than in *Efficiency with sacrifice*). Likewise, emitters are better off here than in *Efficiency with sacrifice* (because the costs of cutting emissions have been compensated by borrowing resources from the future), even though they are worse off than in *Business as usual.* As a consequence, this strategy is Pareto-efficient.[5]

In *Efficiency without sacrifice*, greater costs of abatement for the present generation are compensated by smaller costs from savings and investments for the future, whereas greater future benefits of abatement more than compensate future generations for the reduction in benefits from inherited resources. This distribution of costs and benefits is better for both groups – for future generations it is better than the distribution in *Business as usual*, and for the present generation is better than the distribution in *Efficiency with sacrifice.*

Broome claims that being better for everyone, we should go for *Efficiency without sacrifice* instead of *Efficiency with sacrifice*, at least as a temporary strategy, in order to unblock the current stalemate in negotiations, due entirely to the fact that "governments are unwilling to commit their people to sacrifices" (Broome, 2012, p. 38).

Broome does not provide details concerning the implementation of *Efficiency without sacrifice*. There are many ways to implement it, and different results can be obtained if different modes of implementation are actuated. I think that each of the following applications is consistent with *Efficiency without sacrifice*:

> i. *One-shot, two generations*: The policy is implemented once, and it covers only two not overlapping, succeeding generations. The present generation cuts its emission of a given amount, increasing its consumption and decreasing its savings of an amount sufficient to compensate the costs. These amounts are calculated with the aim of producing a decrease in inherited resources for the next generation that can compensate the cuts,

[5] See (Broome, 2010, pp. 103–4, 2012, p. 45).

> but it is also smaller than the gain in terms of avoided climate-related harms. Later generations do not implement *Efficiency without sacrifice.*
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> ii. *One-shot*, *many generations*: The policy is implemented once, but it is meant to cover many succeeding generations – the bargaining, so to say, is among the present generation and its descendants along the generational chain. In order to have Pareto-efficiency, the present generation should cut its emission of an amount whose future benefits more than compensate the losses in inherited resources for each of many succeeding generations.[6]
>
> iii. *Iterated borrowing*: The policy is implemented for each not overlapping, succeeding generation. Each generation makes compensated cuts, great enough to bring about benefits for the next generation, these benefits more than compensate losses in inherited resources.

In the next section I shall consider which results each of the applications above would likely bring about. I shall claim that some results of these applications are counterproductive and counterintuitive. On the basis of this, I shall claim that Broome's sacrifice-free abatement scheme may be practically impossible and implausible.

3. *Going through applications*

In order to assess the different applications of *Efficiency without sacrifice*, two assumptions should be made. First, this policy is not optimal, in at least two senses. It is not optimal because it is not the best possible distribution of well-being or resources: the best distribution is *Efficiency with sacrifice*, because investments for the future will produce greater output than present consumption.[7] But *Efficiency without sacrifice* is not optimal also as a solution to climate change. Broome seems to think differently, as he claims that by implementing *Efficiency without sacrifice* "the problem of climate change can be solved", and that this policy "eliminates the problem of climate change" (Broome, 2010, pp. 102, 104). It is not clear what grounds this claim.

Solving the problem of climate change can mean two things. First, it might mean 'to prevent *any* future climate change.' This is obviously impossible, as many changes will be necessary and irreversible – this is known as 'climate commitment.'[8] Second, solving the problem of climate change might mean 'to prevent, or decrease, dangerous climate change.' As Broome himself reminds us, "answering the question of what is dangerous" is a matter of philosophy, or better of ethics:

> the notion of dangerousness is plainly an evaluative one. To work out what interference with the climate system is dangerous, we need to know, not only what

[6] For obvious reasons, I am not assuming here an infinite generational chain. To my purpose, it is enough to consider an indefinite succession of generations, assuming that there is a stopping point – a (very far) generation whose loss and gains are not considered. On this topic, see [ref].

[7] See (Broome, 2012, p. 46).

[8] See [ref].

> effects would result from different degrees of interference, but also how good or bad those effects would be. Ethics, and specifically value theory, is the discipline that assesses goodness and badness. So we need ethics. (Broome, 2015, pp. 184–5)

I agree with Broome on the role of ethics in assessing the effects produced by climate change. But if this is the case, to claim that '*Efficiency without sacrifice* eliminates climate change' should mean that 'it prevents the *dangerous* effects of climate change,' and what count as 'dangerous effects' is to be established through an ethical inquiry. This means that the distribution of well-being created by implementing *Efficiency without sacrifice* should be ethically plausible in the first place. Now, for one thing, I think that Broome himself doubts this, as he clearly suggests that this distribution is unjust and sub-optimal. Moreover, in what follows I will cast further doubts on this regard. (I will come back to this issue in the next section.)

To sum up: a total stop to climate change is impossible because some processes have been activated in the past and they are likely to be irreversible. Moreover, it is not clear that *Efficiency without sacrifice* eliminates any dangerous climate change in the future, assuming an ethically-grounded notion of 'dangerousness'. However, if *Efficiency without sacrifice* should be significantly different from *Efficiency with sacrifice*, the former musy yield a smaller amount of cuts than the latter, whatever the amount produced by the latter will be. As a consequence, I shall assume that *Efficiency without sacrifice* will produce more future climate-related harms than *Efficiency with sacrifice.*

The second assumption I made is the following. Climate-related harms are *cumulative* – some impacts of greenhouse gases emissions can non-linearly increase their scope and extend across generations, due to the magnifying effects and the overcoming of thresholds. As a consequence, harms produced by sub-optimal policies such as *Business as usual* and *Efficiency without sacrifice* can non-linearly increase across generations.[9]

Having said all of this, consider *One-shot, two generations*. This strategy will leave many harmful effects of present emissions unaddressed. Indeed, it might be argued that the impact of it will be very small. Some harms to the next generation will be avoided, but many harms will still happen. If so, it might be questioned whether *One-shot, two generations* is relevantly different from *Business as usual*.

In various places Broome suggests that *Efficiency without sacrifice* can be a way to 'solve' climate change, as well as an intermediate step to a more demanding policy. If it takes the shape of *One-shot, two generations*, I don't think that this is the case. Indeed, this strategy could even be counterproductive and arbitrary. It gives the present generation a way to avoid the more demanding policy that would be needed, thereby causing future generations more harm.

Things are different in *One-shot, many generations*. In this strategy, the demands to the present generation can be very high. Present people should consider which amount of avoided harms future generations would accept as a compensation for less inherited resources. This statement may be interpreted

[9] See (IPCC, 2013, pp. 16, 27–9, 70–2).

aggregatively. The idea would be as follows. The present generation should calculate the amount of avoided harms that each future generation would be willing to exchange for less inherited resources. In order to get the deal, present people should produce an emissions cut able to prevent the aggregated amount of harm across many succeeding generations. Even assuming that the number of generations considered is finite, and that the marginal value of avoided harms is greater than the marginal value of inherited resources, if climate-related harms were cumulative, the emissions cut that present generation should do in order to get the deal would be enormous. *Efficiency without sacrifice* assumes that the emission cuts should be both **i.** compensated by consumptions and dissavings of the present generation, and **ii**. able to produce a differential benefit for future generations (i.e. the value of prevented harms should be greater than the disvalue of lost inherited resources). This may require that the present generation cuts enormously its emissions. In order to compensate these cuts, present people should reduce almost to zero their investments for the future and increase enormously their consumption of natural resources. Future generations will be better off than they would have been in *Business as usual*, though, because they collectively suffer less climate-related harms. However, each generation will be poorer and poorer, at least in terms of resources. At some point across the chain of generations, *One-shot, many generations* will produce a world with less climate-related harms, but also with radically reduced wealth and opportunities, in terms of enjoyment of natural and artificial resources. At some point, people may be living a barely worth-living life. This scenario may be similar to a repugnant conclusion world – namely, to a world where people live barely worth-living lives, due to the choices of their ancestors. For those of us who find the repugnant conclusion counterintuitive, this may be a ground to reject *One-shot, many generations* as a general policy, and as an application of *Efficiency without sacrifice.*

One may claim that the mistake in *One-shot, many generations* lies in aggregating across generations. One may also suggest that the present generation should consider only the amount of avoided harm that the next generation would be willing to exchange for less inherited resources. This is *One-shot, two generations,* which has its defects.

One may then argue that the problem lies both in aggregation and in limiting the cuts to the present generation, or to the first generation in the chain. Why not having each generation making cuts, with the aim of preventing an amount of future climate-related harms that the next generation would be willing to exchange for less inherited resources? This produces *Iterated borrowing*. In it, each generation bargains emission cuts with the next generation in exchange with increased consumption and decreased savings. However, as climate-related harms are cumulative and any single application of *Efficiency without sacrifice* will not be able to eliminate all the harms across generations, *Iterated borrowing* will produce a repugnant conclusion scenarios as well. Each generation will progressively have less and less inherited resources. At some point, people will be living barely worth-living lives.

Let me take stock here. *Efficiency without sacrifice* can be applied in three

possible ways. It may be employed once, involving only two close generations. It can be applied once, extending its reach to many generations. It can be applied repeatedly, with each generations bargaining cuts, increased consumptions, and dissavings with the next generation. The first application makes *Efficiency without sacrifice* too lenient, and not relevantly different from *Business as usual*. The second and third applications will produce repugnant conclusion scenarios, which are counterintuitive. This will weaken the plausibility of *Efficiency without sacrifice*.

4. Objections to my objection

In § 3 I have claimed that *Efficiency without sacrifice* is either not really different from *Business as usual* or counterintuitive, as it leads to repugnant conclusion scenarios. Against this objection some counter-objections can be raised. In this section I list some of them, and give some tentative answers.

I listed only three ways in which *Efficiency without sacrifice* can be applied. It might be argued that other paths of implementation are possible, and that they will be immune from this objection. Call this the *different application objection.* My answer to it is that I had no intention to claim that the three ways to implement *Efficiency without sacrifice* I have considered here are the only possible ones. Other implementations can be devised and they can be immune to my objections. This paper is an invitation to fill the gap.

A different objection can be put as follows. In the repugnant conclusion scenarios I mentioned above future people live in worlds with increasingly less climate-related harms and increasingly less natural and artificial resources. Some might suggest that these are not poorer worlds, and the quality of the lives of people living in them is not so bad. After all, at some point across the generational chain we may find people whose lives are free from even the minimal climate-related harms that present people are already suffering – for instance, harms from floods and hurricanes, or forced displacement. Even though their lives are also devoid of many natural and artificial resources they would have inherited had their ancestors cut with sacrifice, these lives are not poorer than many lives are today in less developed and developing countries. Indeed, these lives can be less poor. To this objection another one can be related, to the effect that what *I* find repugnant in these scenarios it is not repugnant at all – and my repugnance is simply the product of my incapacity to deal with the kind of worlds where the repugnant conclusion scenarios can happen. Call this the *no repugnance objection*.

This is a complex objection, as it involves a vexed question – the question of how to judge repugnant conclusion scenarios and the relevance of our current intuitions when they are applied to worlds that are quite different from ours. (Broome himself claimed that, under certain assumptions, there is "nothing repugnant in the repugnant conclusion," Broome, 2004, p. 212.)

I cannot deal with these issues in the space of this paper. However, I can say something for drafting a possible response to these two objections (future people's lives will not be so poor if *Efficiency without sacrifice* is actuated and their

condition will not be repugnant). Consider the overall well-being of future people after *Efficiency without sacrifice* is actuated. Two items constitute it: benefits deriving from avoided climate-related harms and costs deriving from less inherited natural and artificial resources. *Efficiency without sacrifice* rests on the assumption that the benefits are larger than the costs.

This assumption might generate two different scenarios. On a first scenario, in being relieved by the potential climate-related harms to their lives, future people are so well off that their well-being is on a par with the well-being of previous generations, who enjoyed more resources. Here, the thought is that the loss in resources is greatly overridden by the gain in avoided harms to the point that the overall well-being of those people does not diminish across generations. This scenario assumes perfect fungibility between natural and artificial resources and avoiding climate-related harms.

On a second scenario, when *Efficiency without sacrifice* is actuated, each future generation is better off than it would if *Business as usual* were actuated, even though – due to cumulative climate-related harms and decreased inherited resources – it is worse off than each previous generation.

Now, I think that the first scenario is unlikely, at least for what we know now. It seems to me that losing resources is a positive evil, even though it is obviously better to lose resources in exchange of a smaller amount of climate-related harms. Moreover, climate-related harms are cumulative: they will grow across generations; within the bargaining dynamics of *Efficiency without sacrifice,* climate-related harms need greater and greater compensation across generations; therefore, later generations will have less and less resources. And losing resources, as I said, is a positive evil.

In the light of the reasoning above, I think that a scenario in which people in the distant future will live very poor lives is the most likely outcome of *Efficiency without sacrifice*. As said, it might be suggested that this is not a repugnant world to live in. I shall not try to counter this point here. However, it seems to me that this result of *Efficiency without sacrifice* should be emphasized.

A final objection can be this. My remarks above raise ethical objections to *Efficiency without sacrifice.* But this policy is explicitly aimed at political purposes – it concerns political feasibility conditions, not ethics. Related to this is the following remark. In framing his proposal, Broome clearly distinguishes concerns for distribution and value from the more limited purpose of addressing climate change. In *Climate matters* Broome writes,

> curing the externality [scil. the fact that some costs of emissions are not paid and are imposed on future generations] is extremely urgent. Each year greenhouse gas floods into the air, and each year that passes makes it harder to keep the concentration of gas within limits. Improving the distribution of resources between generations is not so urgent. Nor is primarily a response to climate change. It should be tackled separately. (Broome, 2012, p. 47)

Call this the *Politics, not ethics objection.*

It should be clear from this passage that Broome does not separate ethics from politics and economics, and the *Politics, not ethics objection* might then be

misplaced. In the passage from *Climate matters* quoted above, Broome points at the urgency of certain ethical issues concerning climate change. If so, then, my previous worries come up again. *Efficiency without sacrifice* assumes that a poorer world is better than a world with more climate-related harms. Is this plausible? Even independently of distributive concerns, someone can find difficult to swallow a policy that leads to a progressive impoverishment. And it is not clear that gains in avoided climate-related harms are able to counterweigh the inherent evil of progressive impoverishment.

4. Conclusions

In this paper I did three things. First, I have analyzed Broome's policy proposal of an efficient scheme of emission cuts. Second, I have pointed at three possible ways to implement this policy. Third, I have tried to show that implementation of the policy can bring about counterproductive or counterintuitive results. As said, these are not fatal objections. Rather, they are an invitation to elaborate a more comprehensive picture of Broome's proposed scheme.

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