

Historical Emissions and Free-riding

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Summary: Should the current members of a community compensate the victims of their ancestor's emissions of greenhouse gases (GHG)? We argue that the previous generation of polluters may not have been morally responsible for the harms they caused. We also accept the view that the polluters' descendants cannot be morally responsible for their ancestor's harmful emissions. We show however that, while granting this, a suitably defined notion of moral free-riding may still account for the moral obligation of the polluter's descendants to compensate the current victims of their ancestors's actions. A concept of transgenerational free-riding is defined. Objections to the idea of using free-riding as part of a theory of justice are rejected. Two different views on moral free-riding are being contrasted, with consequences for the amount of compensation to be exigible from the polluter's descendants. Some final considerations are devoted to the possible relevance of this free-riding-based view for other issues of historical injustice.

Introduction

Global warming is a matter of concern for most of us. There are still plenty of uncertainties involved. Some people will no doubt benefit from it. Many others will certainly suffer heavy losses as a result of it. A problem of this nature raises various important normative questions, and most notably, issues of justice. For example, at which level should the global emission reduction target be set? Answering this question, which does not merely touch upon the issue of efficiency, clearly involves taking into account both intra- and inter-generational justice issues.¹ Moreover, how should the reduction effort be shared among the States involved? Should it be done through the allocation of tradable or non-tradable emission quotas? And along which lines should such quotas be allocated?

The present paper is devoted to one of these questions: how relevant should *historical emissions* be made in the context of allocating emission reduction obligations between countries? We refer to historical emissions as emissions of pollutants that took place in the past, as a result of the activities of previous generations. Some claim that those who have polluted more in the past should be granted extra entitlements through some form of "grandfathering". Political feasibility arguments, or even the ethically justifiable need to pay

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¹ Contra: Schokkaert & Eyckmans (1998: 210-211, notion of allocational efficiency)

minimal respect to people's legitimate expectations, may justify some temporary reliance on grandfathering in domestic systems where emission permits are being allocated between already established firms, or even at the international level. Defending grandfathering further than this seems far less easy. One may e.g. be tempted by the following "exit" strategy: as long as products from historically polluting firms or countries are widely available, what would be wrong with privileging such firms and countries through granting them extra allowances, as long as their hence "privileged" products could be bought by any consumers, anywhere in the world? One problem with this view is that while shifting from one product to another may be costless for a consumer (under some circumstances as well), as workers or citizens, the same people might not have the same exit options. And it is unlikely that differentiated emission quotas will see their associated costs passed merely onto end consumers. Workers (in firms) and citizens (in countries) will also be (unequally) affected by them, without benefitting from equally costless exit options.

Conversely, others claim that rather than leading to extra entitlements, historical emissions should in fact give rise to *extra obligations* on the descendants of those who polluted in the past. It is on this latter claim that we shall focus in the present paper. In the debates related to climate change, voices have been heard claiming that this should indeed be the case. Hence, the 1991 Beijing Ministerial Declaration on Environment and Development states:

"Ever since the Industrial Revolution, the developed countries have over-exploited the world's natural resources through unsustainable patterns of production and consumption, causing damage to the global environment, to the detriment of the developing countries. Responsibility for the emissions of greenhouse gases should be viewed both in historical and cumulative terms, and in terms of current emissions. On the basis of the concept of equity, those developed countries who have contaminated most must contribute more".²

In fact, it is probably the 1997 so-called "Brazilian proposal" submitted by Brazil in the context of the Kyoto negotiations that has become the most emblematic illustration of this view.³ The Brazilian delegation proposed a methodology to calculate the induced temperature changes of current and past CO₂ emissions. It submitted estimations going back to 1840 of the historical emissions of various countries involved and called for the inclusion of cumulative historical emissions in the definition of the current targets of the Parties. The

² Cited in Schokkaert & Eyckmans (1998: 205)

³ *Proposed Elements of a Protocol to the United Nations Framework Convention on Climate Change*, Presented by Brazil in Response to the Berlin Mandate (submission dated May 1997), FCCC/AGBM/1997/MISC.1/Add.3.

Brazilian proposal will thus be taken here as a departure point, as it links each country's responsibilities in the anthropogenic part of climate change to their current and earlier emissions. In other words, it enables us in practice to adopt a burden sharing scheme sensitive to historical emissions dating back to 1840. We shall not question however the accuracy of the method used to estimate the amount of historical emissions and their current impacts.⁴

For the argument's sake, a few assumptions and simplifications are in order. *First*, at this point we limit ourselves to two generations of US people and of Bangladeshi people, a current generation and an early 20th century one – we shall later leave aside one of these Bangladeshi generations, and we shall also introduce the EU as an actor further on.⁵ Both current US and current Bangladeshi people had no means of influencing whatever took place in the early-20th century as they did not exist at that time, either biologically (they were not born) or politically (they did not yet have the right to vote). We are thus dealing with *non-overlapping* generations. *Second*, let us take it for granted that no uncertainties are involved and let us limit ourselves to past CO₂ emissions. Thus, we exclude other greenhouse gases (such as methane, nitrous oxide, sulphur hexafluoride) and we also don't consider current emissions, assuming for the argument's sake that the current generation found a way of not emitting any CO₂ into the atmosphere anymore. *Third*, we leave aside the past Bangladeshi generation. We do so for two reasons. On the one hand, early 20th century Bangladeshi emissions can be regarded as relatively negligible, and we shall thus do here as if they did not take place. On the other hand, - and more importantly - due to the *residence time* of greenhouse gases – and singularly of CO₂ - in the atmosphere,⁶ past emissions can be expected to have a *direct* negative impact on current Bangladeshi people's physical environment, e.g. through flood. In standard historical injustice issues involving two generations and two communities, the current generation of the victim community is typically suffering harm as a result of the harms suffered by her own ancestors (e.g. current consequences of past slavery). In such cases, the connection between the past harmful action

⁴ For a detailed examination of the Brazilian proposal's methodology: den Elzen et al. (1999). For figures on historical emissions: Hayes & Smith (1993); Banuri et al. (1995: 94); Schokkaert & Eyckmans (1998: 197).

⁵ We take the US merely because they currently have the highest level of emissions per capita and because they don't seem to be willing to ratify the Kyoto protocol. One should not see however in such a choice any anti-Americanism.

⁶ For figures on such atmospheric lifetime: Houghton *et al.* (2001: 38/244) (ex: CO₂: up to 200 years, nitrous oxide: 114 years, sulphur hexafluoride: 3200 years). For further developments on the philosophical relevance of residence time and delayed effect: *infra* section 4.

and the harm suffered by the current victim generation is a merely *indirect* one. Here, in contrast, the relatively long lifetime of chemical particles allows for a *direct* causal relationship between an act of the past US generation and a harm suffered by the present Bangladeshi one. This does not necessarily imply that CO₂ emissions may not have any immediate effects upon the contemporaries of the polluting generation as well (here: the past Bangladeshi generation).⁷ It only means that as a significant part of the effects of past emissions will apply directly to members of the current generation, immediate effects on the past generation (here: of bangladeshi people) can be left aside for the sake of our argument. *Fourth*, we assume that past CO₂ from the US community generates net benefits to the current US generation and net costs to the current Bangladeshi one. In other words, we consider that technological developments or the production of durable goods (e.g. buildings, roads, bridges) made possible through such pollution far outweigh the negative impacts on the US population that global warming may have today. Conversely, we take it to be realistic that despite some possible positive spill-over effects (e.g. through technology transfers or through an effect of the US economy on global growth), the impact of past US emissions on Bangladesh will be largely detrimental.

Current US (net beneficiaries of past US emissions)	Current Bangladeshi (net victims of past US emissions)
Past US	

Table 1: The simplified model. The bold line refers to the absence of generational overlap.

The question we are then asking is: should today's US citizens not pay some compensation to current Bangladeshi people, and if they do, how much and on which grounds? The paper will begin by addressing two serious challenges to the possibility of moral obligations falling upon current US people due to the harms caused by their ancestors' CO₂ emissions (section 1). We then defend the view that the notion of transgenerational free-riding can justify conferring on current Americans a moral obligation to compensate current Bangladeshis, even though the former are not morally responsible for their ancestors' actions (section 2). In

⁷ It will depend on the stock of greenhouse gases already present in the atmosphere.

so doing, we address Nozick's challenge to the suitability of using such a notion within a theory of justice. Moreover, we offer an account of two very different interpretations underlying a reference to such a notion of free-riding and analyse their implications for the obligations of current Americans towards current Bangladeshi people (section 3). The last section of the paper is then devoted to other possible applications of the notion of moral free-riding, beyond the case of historical CO₂ emissions (section 4).

1. Philosophical challenges to the Brazilian proposal

Significant challenges can be raised against the view implied in the Brazilian proposal regarding a State's responsibility for historical emissions. *First*, some might be tempted to doubt whether the idea of collective responsibility is compatible with moral individualism, that is, with the view that individuals, as opposed to e.g. communities, are the focus of moral concern. For example, how could I be held morally responsible for the decisions of my generation, if I have been unsuccessfully opposing them since the beginning? *Second*, others might want to deploy the non-identity argument according to which, whenever alternative courses of action entail the existence of different people, the consequences of such actions would fall outside the scope of a standard concept of harm. The latter presupposes the possibility of comparing an actual and a counterfactual state of the same person, resulting respectively from the given action or its absence. Such comparison is made impossible in a non-identity context. It could be shown that the actions giving rise to CO₂ emissions generally fall within the scope of the non-identity problem. As a result, we may be unable to assess such activities and their alternatives on the basis of a standard concept of harm. For those willing to stick to the latter, this could mean that whatever our past CO₂ emissions, they may remain morally unobjectionable forever. *Third*, others still might claim that since it is only recently that we *know* about the harmful impact of CO₂ emissions, people should not be held responsible for the harmful consequences of emissions that took place in such times of ignorance. *Fourth*, it can also be argued that even if our ancestors had known about the harmful consequences of their emissions, there is no reason why *we* should compensate the current victims of our ancestors' actions, which brings us back to the moral individualistic assumption.

We shall assume that adequate answers can be provided to the first two challenges, i.e. the "collective responsibility" and the "non-identity" challenges.⁸ Let us thus concentrate on the two latter challenges – the "ignorance" and the "non-contemporaneity" ones – that both affect more specifically the Brazilian proposal. The former is primarily a challenge to the responsibility of earlier generations whereas the latter is a direct challenge to our own generation's responsibility.

1. 1. The ignorance argument

The ignorance challenge is frequently being raised in the climate change debate.⁹ To address it, let us imagine our world composed of only two States (the US and Bangladesh), each State being only populated with a single person whose life extends over the whole existence of her State. Let us assume that the US person has been emitting CO₂ for ages, which negatively affects her own, as well as the Bangladeshi environment, although much more significantly for the latter. The ignorance challenge asks us to address the following question: As the US person, do I have to compensate my Bangladeshi neighbour for any harms flowing from GHGs emissions that took place while I was *unaware* of their adverse consequences? A first possible answer would imply the following principle:

The Ignorance Exemption (IEX): A person should not be held morally responsible for the harmful consequences of her own act if they were unknown to her and could not reasonably have been known at the time the action took place.

⁸ On collective responsibility: Kutz (2001). On the non-identity argument: Parfit (1984); Gosseries (2003) (discussing various avenues, including the notion of "complete life obligations"). For a specific discussion on the non-identity argument's relevance to the current issue, see below section 3

⁹ Grubb (1995: 491) ("Historical responsibility as an equity principle has strong support in the literature and politically in developing countries, but there are also valid counter-arguments. These include (1) ignorance of past generations about the consequences of their actions [...]"); Ghosh (1995: 272) (countering Grubb's view); Schokkaert & Eyckmans (1998: 206) ("A few decades ago, nobody was aware of the negative environmental consequences for the environment of emitting CO₂, and it seems difficult to blame economic agents in the developed countries for the decisions they have taken in this situation of ignorance"); Torvanger & Godal (1999: 8) ("Responsibility of the present generation for past emissions when global warming was unknown, is a disputable principle"); Singer (2002: 34) ("Although, even here, one could argue that ignorance is no excuse and a stricter standard of liability should prevail, especially since the developed nations reaped the benefits of their early industrializations"). Notice, regarding the latter quote, that we do not advocate the adoption of a stricter standard of responsibility (such as no-fault liability). Instead, we call for a shift towards a free-riding approach clearly distinct from the former, or at least from a notion of *causal* responsibility/liability – this being true despite the fact that some causation aspect is involved.

Notice the way ignorance operates in this IEX proviso. If I knew *by chance* about the harmful consequences of my action, even if I *should not* have known, then IEX does not exempt me from being held responsible for my act's consequence. Conversely, it is not enough just to claim that I *did not* know about such harmful consequences for the rule to apply. What also matters morally is whether or not I *should* have known. Of course, a lay person should not be expected to spend all her time assessing even the most remote consequences of all her actions. On the other hand, high standards are being imposed on those involved in producing e.g. drugs or pesticides. Such high testing standards are generally not regarded as ethically indefensible, all to the contrary, and no matter what epistemological difficulties they may raise. Similarly, States may be expected to assess the impact of their decisions to a larger extent than individual citizens. It is therefore plausible to claim that a gap *may* exist between what we actually know and what we should have known and that such a gap may vary, depending on the type of actor and sector of activity. This means that simply answering "we did not know" is not enough.

Let us then assume that t_k stands for the moment from which either one came to know or one should have found out about the harmful consequences of CO₂ emissions. Which date should we then put on t_k in the case of the greenhouse gases, and singularly of CO₂. The Brazilian proposal takes 1840 as a starting point. Others may assume instead that, while 1840 is a too early date, Svante Arrhenius's 1896 article "On the Influence of Carbonic Acid in the Air Upon the Temperature of the Ground" should have attracted more attention than it did among the public.¹⁰ Still others may object that we should wait for the first serious modelling exercises on the matter, as they appear in a 1967 article by Manabe and Wetherald who use a one-dimensional (vertical) model.¹¹ The publication of the Intergovernmental Panel on Climate Change (IPCC)'s first report has also been proposed by at least one author as a starting date.¹² Or perhaps, we should not even expect people to be held liable for the harmful consequences of CO₂ emissions before 1995 when the scientists meeting in the IPCC context published their second report.¹³ It is only then that they unanimously considered that anthropic CO₂ emissions *do* impact on the world's climate, which still did not cancel all remaining uncertainties as to the *extent* of such an impact.

¹⁰ See Arrhenius (1896); Crawford (1996).

¹¹ See Manabe & Wetherald (1967). See as well Manabe & Wetherald (1975)

¹² Houghton et al. (1990). See Singer (2002: 34)

¹³ Houghton et al. (1995)

There are thus several candidates: 1840, 1896, 1967, 1990 or 1995.¹⁴ It is beyond the scope of this paper to mobilise the necessary elements from the history of Earth sciences, the history of computer sciences, epistemology and the ethics of knowledge to propose a plausible time location for t_k . This does not mean however that no meaningful position can be defended on this issue. Complexity does not necessarily entail impossibility. At the very least, it seems implausible to consider 1840 as the t_k point, as in the Brazilian proposal. On the other hand, adopting a date such as 1995 while endorsing the ignorance exemption as defined above would reduce to nearly nothing the practical importance of the historical emissions argument – which is not of course a sufficient argument against taking 1995 as an appropriate date. Depending on the value assigned to t_k , the ignorance exemption may thus have more or less significant implications for the problem at stake.

Instead of discussing this point in detail, we may adopt two alternative strategies to address the ignorance challenge. Both rely on the view that ignorance should not have the final word. The *radical* strategy denies that ignorance be at all relevant to our duty to compensate for our actions' consequences. If I damage your property, no matter whether I knew or should reasonably have known about such harm, no matter whether I derived benefits or not from such harms, the mere fact that this harmful action would be physically mine makes me liable for full compensation of its harmful consequences. This is perhaps justifiable for those engaging in very risky activities. It is hard however to see how such no-fault liability can be defended as a general view. If it is on mere distributive grounds, then at least it cannot justify *full* compensation in all cases. For, in many circumstances, the benefits derived from it by the risk-taker will not be as great as the harms caused to third parties. In contrast, I shall adopt a *moderate* strategy here. It accepts the intuition underlying the ignorance challenge while relying on the existence of benefits on the harmdoer or third parties's side to justify on such a basis an obligation to compensate. From this perspective, the proviso can be modified in a way that makes it relatively immune to the ignorance objection. Here is such a modified version:

The Modified Ignorance Exemption (MIEX): A person should not be held morally responsible for the harmful consequences of her own act if they were unknown to her and could not reasonably have been known at the time the action took place. *However, she may still be held liable*

¹⁴ In the case of ozone depletion, a possible date is 1985 with the publication of Joseph Farman and its colleagues from the British Antarctic Survey (Farman *et al.* , 1985), although the earlier date of 1974 when the phenomenon had been predicted by Molina & Rowland (1974) could also be used. See as well: <www.nas.nasa.gov/About/Education/Ozone/history.html>

for compensation for such harmful consequences on others if and only if, once the latter were or should have been brought to light (t_k), she still enjoyed correlative benefits.

Let us illustrate this with an example. Roberto bought a new house. A few months later, he discovers under a carpet a set of notes of 100 Euro and decides to use them to acquire something that he would not have bought otherwise. He goes to Alexandra's wine shop and buys 50 bottles of very good Portuguese Alentejano wine. Over the following year, he drinks 10 bottles with his family and friends. He decides to keep the other 40 bottles for later. Alexandra only brings her cash once a year to the Bank as most of her clients pay with credit cards. It is only then that she discovers that Roberto's notes were fake. Neither Roberto, nor Alexandra were morally (and legally) expected to use fake notes detectors, and none of them actually knew that the notes were fake. Neither of them was thus at fault at the moment Roberto bought the 50 bottles. While Roberto thus turned out not to have actually paid Alexandra, this is not to be regarded as a *wrong*. For he did not have to know that the notes were fake. Nor does the fact that we now found out about it make his past behaviour retroactively wrong.

How should a theory of justice deal with such a case then? Consider the following twofold approach. On the one hand, regarding the 10 bottles that have already been consumed, we could argue that this is brute bad luck for Alexandra and that there is no reason why she should bear the costs alone. Roberto should probably pay Alexandra the value of five bottles, at least if this corresponds with an equal apportionment of harms and benefits between the two. Asking Roberto to pay the value of 10 bottles would however be too much as this would shift the burden of brute bad luck fully on him, considering the fact that if he had not found this money, he would not have bought such bottles. On the other hand, we have the 40 other bottles left and, there does not seem to be any good reason – assuming that the distributive background is fair – why Roberto should not either give them back to Alexandra, or pay their full price with real notes. Even for those who do not agree with the brute bad luck view regarding the 10 consumed bottles, such a treatment of the 40 other bottles might still be acceptable. And this is what the Modified Ignorance Exemption (MIEX) is about. Of course, there is something peculiar here. Roberto's initial action will remain morally unobjectionable forever, even after we discover that the money he used was fake. Still, we would consider it wrong for Roberto to leave things as they are once this was discovered. His present obligation to retribute the 40 bottles (or their equivalent) is thus not to be derived from the fact that he *did* wrong Alexandra. For he *did* not.

1. 2. Non-contemporaneity and powerlessness

“Australians of this generation should not be required to accept guilt and blame for past actions and policies over which they had *no control* ”.¹⁵

Let us now address a second challenge to the Brazilian proposal, a challenge that could still stand, even if the ignorance challenge were not to hold anymore. We have assumed so far in our hypothetical example that there were only two States, each being populated with only one inhabitant, each inhabitant having a life as long as her State's existence. Let us now relax the latter assumption and imagine that across each State's history, there have been two inhabitants, the current one and his ancestor. They were never contemporaries, the ancestor having died on the current inhabitant's very birthday. We thus assume the absence of generational overlap, which is realistic beyond one or two generations ahead and backwards. The current US citizen is then being asked to compensate the current Bangladeshi for harms caused to him by the US ancestor. The current US citizen may however deny being bound to any compensation on the basis of the following principle:

The Powerlessness Exemption (PEX) : A person should not be held morally responsible for the harmful consequences of someone else's act if she was (physically) unable to do anything against such an act.

For a moral individualist, it is persons (as opposed to communities) who are the core units of ethical concern. And it is also each person who is responsible for the consequences of her own acts, unless it can be shown that she acted under someone else's or Nature's constraint. Moral theories, at least individualistic ones, generally do not consider that a person may be held responsible for the consequences of someone else's action.

Admittedly, legal systems contain exceptions regarding the legal responsibility of a parent for his child's action or of an employer for some of her employee's activities. While a child (or a pet) cannot be regarded as a fully competent moral agent, the employee can be regarded as such. In both cases however, what matters is the authority, the subordination relationship in which they find themselves, either due to social rules (parental role) or to contract (employment relationship). This authority involves the right to exercise a certain power,

¹⁵ J. Howard, Australian Prime Minister, in the context of aboriginal claims, in Thompson (1998: 2) (our italics). Compare with Kutz's control principle (2001: 116).

which presupposes that such exercise be physically possible. Both the parent and the employer can thus be held legally (and morally) responsible for the consequences of some of their children or employee's action because we assume that they are physically able and morally entitled to stop the latter from acting in certain (harmful) ways. Responsibility then simply rests on the presumption of some indirect causation at stake, i.e. an unacceptable lack of attention or abstention on the employer's or the parent's side, indirectly causing the accident.

Such authority-based relationship does not obtain in our intergenerational case however, for in the absence of generational overlap, the current generation lacks the physical power to prevent the earlier generation from acting in certain ways. In such circumstances, moral individualists are unable to consider that a current US person should bear any responsibility regarding the consequences of the earlier's US inhabitant's action. While the ignorance challenge relies on a cognitive barrier to responsibility for one's own action, the "non-contemporaneity" challenge refers to the existence of a physical barrier to responsibility for other's actions.

One possible way out would consist in adopting a holistic/collectivist approach, i.e. consider that collective responsibility may apply not only among contemporaries, but also between non-contemporaries. This would certainly require that moral individualism be abandoned. It is a move we want to resist here, however, for we want to show that even within the boundaries of moral individualism, some morally legitimate and significant demands can be made upon the descendants of past polluters. Notice by the way that such a shift to moral collectivism would not ease at all our task regarding the ignorance challenge. It would only help dealing with the "non-contemporaneity" challenge.

Hence, it is possible to remain within the ambit of moral individualism while still justifying some degree of compensation, as the following modification of our proviso suggests:

The Modified Powerlessness Exemption (MPEx) : A person should not be held morally responsible for the harmful consequences of someone else's act if she was (physically) unable to do anything against such an act. *However, she may still be held liable for compensation for such harmful consequences on others if and only if, once the latter were or should have been brought to light (t_k), she still enjoyed correlative benefits*

The move from PEX to MPEX is identical to the one from IEX to MIEX. In each case, we concede that holders of the ignorance and of the non-contemporaneity (or powerlessness) challenge may well be using the right premiss regarding moral responsibility for the consequences of an action. We believe however that it does not follow that no compensation be due for the harms resulting from actions falling within the ambit of IEX or PEX. From this perspective, the absence of moral responsibility in such circumstances implies e.g. that sincere apologies for someone else's harmful deeds do not make sense.¹⁶ Still, there remains room for moral accountability without such moral responsibility, by using a properly extended moral notion of free-riding. This is what we shall now explore.

2. Transgenerational free-riders and their obligations

2.1. What is transgenerational free-riding?

The proposed modifications to the IEX and PEX provisos rest on a concept of moral free-riding. Let us thus begin with a definition. Gauthier is a good place to start for he defines free-riding in a relatively broad way and contrasts it with what he calls parasitism. He writes:

"A free-rider obtains a benefit without paying all or part of its cost. A parasite in obtaining a benefit displaces all or part of the cost on to some other person. [...]. The shipowners whose vessels take navigational advantage of a lighthouse although they have contributed neither to its erection nor to its maintenance are free-riders. Although they do not displace the costs on to others, they do gain without paying any of the costs required to provide the gain. The factory owner who disposes of her gaseous wastes by polluting the atmosphere without compensating those who suffer the pollution she causes is a parasite, displacing part of the costs of her activities on to others".¹⁷

When does free-riding occur under such a definition? Let us assume that action *x* produces both benefits and harms. If action *x* is *mine* and some of the harms related to it are imposed on other people, I am a parasite, no matter whether the harms falling on me are greater than the benefits I have derived from this action. In contrast, if action *x* is *not mine* while still being beneficial to me, I will be regarded as a free-rider to the extent that I did not participate in the associated costs incurred by the author or third parties. While parasitism requires an action, free-riding does not, at least not beyond the one of *accepting* the relevant benefits. Free-riding

¹⁶ Compare Thompson (2001: 135). In this respect, it is worth stressing that there is a difference between recognising that an injustice took place, which can be done by anybody, and apologising for such an injustice, which – for moral individualists – only makes sense if it is done by the very person who is morally responsible for this injustice.

¹⁷ Gauthier (1986: 96). Compare this with an economist's concept of free-riding: Tulkens (1998)

thus occurs when (1) another person's action (2) benefits me (3) while the costs involved in it are being more than proportionately covered by other people (i.e. the author and/or third parties). Notice that the person that I am free-riding upon does not need to be a parasite herself. Once you benefit without paying anything from a positive externality made possible through costs to others, you are a free-rider. Once your action imposes costs on others while bringing benefits to yourself, you are a parasite.

We shall now extend this notion of free-riding to the transgenerational context. Three steps are required. First, let us imagine a world with three island communities: the US community, the European Union and Bangladesh. We assume that there is extensive trade between the US and the EU while trade barriers prevent any economic exchanges between the two former countries and Bangladesh. Moreover, we take for granted – contrary to fact – that the US has a heavily polluting industry while the EU would in fact not emit any CO₂ into the atmosphere. Here is a possible analysis of such a situation. The US can be regarded as a parasite on Bangladesh as it is clearly inflicting costs on the latter as a result of greenhouse effects induced by CO₂ emissions to which Bangladesh – due among other things to its low altitude, is especially vulnerable. The EU is clearly not a parasite on Bangladesh, as we have specified that they have no economic or climatic interaction with each other.¹⁸ Nor is the EU a parasite on the US since – on the economic side – there are no special reasons to believe that their transactions would not be fair and since – *ex hypothesi* – the EU does not emit CO₂. The latter does not need to be a free-rider on the US either. Admittedly, it may well be importing products that require heavy CO₂ emissions at the production stage. However, the US could very well include in the price of these products the costs incurred by them as a result of such production processes. We can thus assume that the EU actually does not free ride upon the US, because all the climatic costs falling on the US and related to benefits that would accrue to the EU, are – *ex hypothesi* – proportionately assumed by the EU. Moreover, the US could be a parasite on the EU, since the CO₂ emitted to produce goods that she does not export to the EU may well have a negative impact on the EU's climate. However, we assume that the EU receives some financial compensations for this. We can thus move to the most important point. Without being in any way a parasite or a free-rider on the US, the EU could still be a

¹⁸ Such a view could be challenged as follows: as soon as we would enter into a commercial relationship with another actor, the acts of the latter would *de facto* become joint actions of the two partners, in which case the EU would be a parasite as much as the US is one. This would however imply that a separation between actions and abstentions (admittedly a problematic distinction from a

free-rider on Bangladesh. And this is actually the case in our example. For the EU is importing (hence, benefiting from) US products that required carbon-intensive modes of production. This means the emission of massive amounts of CO₂ into the atmosphere. As CO₂ is a uniformly mixed pollutant, this affects not only the US and the EU atmosphere, but also the Bangladeshi one. For the latter however, there are no associated benefits. The US may thus be regarded as a parasite on Bangladesh. This does not stop the EU from being a free-rider on Bangladesh as well.

Time has come for the second step. Here is another hypothetical world, the post-catastrophe world. It shares all the features of the former world, but one: all in a sudden, due to a totally unexpected phenomenon, the US island gets completely flooded. The whole population dies instantaneously. One day after the flood, the EU receives new US products that had been sent before the flood. Does the flood affect the EU's status towards Bangladesh? The view here is that it remains as much a free-rider as it would have been in the unfortunate flood's absence. If Bangladesh had been entitled to claim some compensation to the EU in the absence of such flood, there is no reason why it should not still be the case. In this post-flood world, the EU thus remains a free-rider, even in the absence of the associated parasite.

More precisely, the extension of the free-riding concept defended here implies the identification of situations involving cost bearers who are not themselves the benefit generators, contrary to what happens in the typical lighthouse case above. In other words, it implies that situations where costs are not all self-inflicted could still fall under the scope of a free-riding concept. A shift is thus required from a bilateral to a tripartite relationship. Some may understand such a triangular situation as one where the cost bearer could only turn to the parasite. It would then be up to the parasite in turn to ask the free-rider to compensate the costs weighing both on her and on the (other) cost bearer. In our example, Bangladesh would then not be entitled to turn directly to the EU in order to ask for compensation on free-riding grounds. Admittedly, such a triangular moral relationship only arises because of the causal impact of the parasite's action on the situation of the other two other parties. However, this does not entail that moral claims should necessarily pass through the parasite. If the parasite could not be by-passed, two consequences would follow for Bangladesh in our post-flood world. First, Bangladesh would have no direct claim against the EU now, since it

normative point of view) should be abandoned and that free-riding and parasitism should actually be treated as equivalent.

never had any. Second, it would have no claim against the US either, since the latter would now have vanished. Admittedly, the harshness of such a situation for Bangladesh does not constitute *per se* an argument against denying the latter a direct claim on the EU. However, it is equally unclear which intuition can justify the view according to which claims from Bangladesh against the EU should transit through the US. Hence, it is reasonable to believe that once the US has vanished, the EU can still be regarded as free-riding on Bangladesh.

Let us then move to the third step. This time, we have a world similar to the first one, with no flood. However, two of the three communities involved share the same island, and they do so successively, with no overlap. Compared with the previous hypothetical world, Bangladesh becomes the current generation of Bangladeshi, the US becomes the old generation of US people, and the EU becomes the current generation of US people ("New US"). Thus, if we were ready to regard the post-flood EU as a free-rider in the former world, there is no reason why we should not regard the New US as a free-rider in the current imaginary world. Moreover, we can derive from the first imaginary world that New US can perfectly free ride on Bangladesh without being in any way a free-rider or a parasite upon the previous US generation.¹⁹ Finally, it is worth coming back to the "direct claim" issue. Due to the ignorance problem (and for that reason only), the past US generation certainly harmed the current Bangladeshi people, - be it in a delayed manner -, but it did not *wrong* them (in the same way as Roberto did not *wrong* Alexandra through buying wine with fake notes). This is so at least if we assume that t_k was not anterior to the moment of their death. If the past US generation never wronged Bangladesh (in our example), then it would not make sense to expect Bangladeshi people to turn to the past US generation if they believe that the *current* US people ("New US") are free-riding on them. This is why it matters to grant Bangladeshi people a *direct claim* against current US people.

The claim according to which New US is free-riding on current Bangladeshi people is true in our hypothetical example. We claim that it is also true in the real world insofar as current US citizens still benefit from the consequences of emissions performed by their ancestors (as suggested by the systematic correlation between GNP and historical emissions), and to the extent that such past emissions still have harmful consequences on the other countries' current inhabitants, including Bangladeshi ones. We could also easily argue that, insofar as

¹⁹ Thus, transgenerational free-riding does not presuppose intergenerational free-riding. On this distinction: *infra*, <...>.

their *current* emissions are concerned, the current US generation is also a parasite on Bangladesh. Current US people are thus free-riders on Bangladesh for what historical emissions are concerned and parasites of Bangladesh for what their current emissions are concerned. Of course, in the real world, the same could also be said about any European country towards Bangladesh.

<p>EU: No CO₂ emissions, negative climatic impact of US emissions, benefits from imports of carbon-intensive US products and other spill-over effects</p> <p><i>Free-rider on Bangladesh</i></p>	<p>US: CO₂ emissions, possible negative climatic impact of these emissions, economic benefits</p> <p><i>Parasite on Bangladesh</i></p>	<p>Bangladesh: No CO₂ emissions, negative climatic impact of US emissions, no benefits from any imports, no economic spill-over effects</p>
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Step 1: The three contemporary island communities

<p>EU: No CO₂ emissions, negative climatic impact of US emissions, benefits from imports of carbon-intensive US products and other spill-over effects</p> <p><i>Free-rider on Bangladesh</i></p>	<p>Flooded US Island</p>	<p>Bangladesh: No CO₂ emissions, negative climatic impact of US emissions, no benefits from any imports, no economic spill-over effects</p>
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Step 2: The post-flood world

<p>Current US: No CO₂ emissions,²⁰ negative climatic impact of US emissions, benefits from imports of carbon-intensive US products and other spill-over effects</p> <p><i>Free-rider on Bangladesh</i></p>	<p>Bangladesh: No CO₂ emissions, negative climatic impact of US emissions, no benefits from any imports, no economic spill-over effects.²¹</p>
<p>"Flooded" US Generation</p>	

Step 3: The transgenerational equivalent

²⁰ This assumption is of course aimed at isolating historical emissions from current emissions
²¹ This assumption aims at mimicking the assumption made at the beginning of the paper according to which Bangladesh would be a net victim of the US's historical emissions.

Table 2: The three steps

Before moving further ahead, it is worth introducing a distinction between *transgenerational* and *intergenerational* free-riding. The latter refers to a case of free-riding by one generation over another (set of) generation(s) of the *same* community. In contrast, transgenerational free-riding refers to a case of free-riding of one community's current generation over *another* community's current generation. It is transgenerational because benefits to the current free-rider community and harms to the other one are causally connected through an action (here: historical CO₂ emissions) performed by an earlier generation of the currently free-riding community.

We shall limit ourselves here to a closer examination of *transgenerational* free-riding. Let us say however a few words about the potential importance of *intergenerational* free-riding. Theoretical discussions on justice between generations have devoted some attention to one view - the so-called "indirect reciprocity" view - according to which "we owe something to the next generation because we received something from the previous generation" as well as "we owe to the next generation at least as much as what we received from the previous one". Reciprocation is *indirect* since it is directed to a (set of) person(s) different from the one who benefited me/us in the first place. This mode of justification and definition of our intergenerational obligations has been challenged.²² As Barry puts it, "if someone offers me a toffee apple, out of the blue, and I accept it, does my enjoyment of the toffee apple create even the tiniest obligation to distribute toffee apples to others?"²³ As we shall see, this is exactly the core Nozickian challenge that moral theories of free-riding have to address. Were we able to do so successfully, it may follow that Barry's objection to the indirect reciprocity view could vanish as well.²⁴ There may then be room for an account of the "indirect reciprocity" idea, based on a notion of intergenerational free-riding, roughly along the following lines. If the previous generations made efforts in order to transfer to the current one at least as much as what the former received from their own ancestors, it is clear that this entails costs on the previous generations and benefits for the current one. Were the current generation not to contribute at all to such costs, it would clearly be a free-rider on the previous generation as well as upon all those that preceded. However, the tricky element is that the only valid way of compensating the *previous* generation(s) for the costs incurred

²² For a detailed discussion: Gosseries (2001)

²³ Barry (1989: 232)

²⁴ For Barry's view on such a possibility: Barry (1989: 232-233).

consists in the current generation directing "compensation" towards the next generation.²⁵ Hence, under such an interpretation of the indirect reciprocity view, not transferring "at least as much" to the *next* generation would amount to free-riding upon the *previous* generation(s).²⁶

2. 2. Nozick's challenge

"If a free-rider harms no one, what is it about her conduct that makes it unfair?"²⁷

Should we deem that any free-rider defined as a person who "obtains a benefit without paying all or part of its cost" is behaving in a morally objectionable way? In other words, is Gauthier's definition sufficient to identify a *moral* concept of free-riding? Consider Nozick's following hypothetical public entertainment example:

"Suppose some of the people of your neighbourhood (there are 364 other adults) have found a public address system and decide to institute a system of public entertainment. They post a list of names, one for each day, yours among them. On his assigned day [...] a person is to run the public address system, play records over it, give news bulletins, tell amusing stories he has heard, and so on. After 138 days on which each person has done his part, your day arrives. Are you obligated to take your turn? You *have* benefited from it, occasionally opening your window to listen, enjoying some music or chuckling at someone's funny story. The other people have put themselves out. But must you answer the call when it is your turn to do so? As it stands, surely not."²⁸

Why not? Nozick suggests a first possibility: devoting a full day to this scheme may constitute a much larger sacrifice than what the benefits I enjoy as a result of the scheme are

²⁵ For an argument as to why such compensation could not be directed towards the previous generation itself without forcing the latter to be a free-rider itself: Gosseries (2001: 301-302)

²⁶ Notice that one reason why some may be sceptical about extending the notion of free-riding to the *transgenerational* case is that current Bangladeshi people certainly did not engage voluntarily in bearing the costs associated with the benefits of past US carbon-intensive production processes. Were this objection to hold, it would still be ineffective against extending the notion of free-riding in the *intergenerational* domain. For in the latter case, each previous generation clearly engaged voluntarily in bearing costs to the benefit of the next generation.

²⁷ Cullity (1995: 22)

²⁸ Nozick (1974: 93). Notice that in Nozick's mind, this story was not directed at Gauthier. It was aimed at challenging the acceptability of the Hart-Rawls principle of fairness defined by Nozick as follows: "when a number of persons engage in a just, mutually advantageous, cooperative venture according to rules and thus restrain their liberty in ways necessary to yield advantages for all, those who have submitted to these restrictions have a right to similar acquiescence on the part of those who have benefited from their submission" (Nozick, 1974: 90). On free-riding in connection with the Hart-Rawls principle of fairness and Nozick's challenge: Arneson (1982); Cullity (1995)

worth (1974: 93). If one believes this to be a sensible claim, one could simply add the following restriction to Gauthier's definition:

Free-riding and the no net cost proviso: I am a morally objectionable free-rider if I obtain a benefit from an action or scheme without paying all or part of its cost, at least *until the point where* the costs participation imposes on me would start to outweigh the benefits I derive from it.²⁹

In fact, Nozick does not merely imply that the costs should not outweigh the benefits (hereinafter: the "no net cost" requirement). He requires that "the benefits to a person from the action of the others [be] greater than the costs to him of doing his share".³⁰ The absence of net costs would thus not be enough. Net benefits should still remain after one's share has been done. The reason why this should be so is obscure though. Nozick's view seems to be based on the incorporation of a notion of opportunity costs in the costs to be considered here.³¹ However, the mere requirement that costs do not outweigh the benefits is perfectly capable of taking this dimension into account. Why should we then require that once the beneficiary of the cooperation has done his share, there should still be some benefit left to him? While the absence of net costs may be a sound requirement, requiring the presence of net benefits seems much more difficult to justify.

There is however an additional requirement suggested by Nozick's following remark:

"The benefits might only barely be worth the costs to you of doing your share, yet others might benefit from this institution much more than you do; they all treasure listening to the public broadcasts. As the person least benefited by the practice, are you obligated to do an equal amount for it?"³²

This can be a sensible objection as well. For one could indeed envisage a mutually beneficial scheme allocating costs equally and benefits unequally in a way that for each of us, the benefits would be at least worth the costs. Still, if someone else benefits much more than I do from the cooperative scheme, it may be legitimate on my part to decide not to contribute as

²⁹ This condition would certainly not be met in cases where "all things considered, I would be *worse off* getting the benefit and paying than if I did neither" (Cullity, 1995: 17).

³⁰ Nozick (1974: 94). Cullity similarly requires that "the practice of participation in the scheme is to represent a net benefit for me" (1995: 18)

³¹ Nozick (1974: 94). Positive opportunity costs occur each time the benefits derived from an alternative course of action would have been greater than the ones we currently derive from our actual course of action.

³² Nozick (1974: 94)

much as she would be expected to do. Hence the following additional amendment to Gauthier's account of free-riding:

Free-riding and the proportionality requirement: I am a morally objectionable free-rider if I obtain a benefit from an action or scheme without paying all or part of its cost, at least *until the point* where the costs participation imposes on me would start to outweigh the benefits I derive from it, and in the *same proportion* as other people incur costs for the benefit they get from the scheme.

We have thus amended Gauthier's definition with two requirements, the "no net costs" and the proportionality requirements. Should we add the further requirement that benefits (and their associated costs in terms of participation) should have been *voluntarily* accepted?³³ I do not think so. One may very well imagine a net beneficiary of the scheme, after deduction of his contribution, who simply did not feel like obtaining such benefits (and the associated costs), or did not feel like acting in order to forgo them. Such benefits were imposed on him. Not enjoying them may have required him to act. This is the case for example when not enjoying the benefits of my neighbour's wonderful garden would require me not to look out my window. But once we take into account the opportunity cost involved in not having access to my window, it may well be that if any additional contribution were asked from me by my neighbour to cover part of the costs involved in his gardening activities, the "no net cost" requirement would no longer be met.

Three additional remarks are in order on this voluntariness requirement. First, in the case of fare evasion in public transport or cinemas, the requirement does not raise particular problems. Provided that the rules of the game have been suitably advertised, and meet the "no net cost" and the proportionality requirements, the idea of voluntary acceptance of benefits and associated costs can be inferred from a person's decision to enter the bus or the projection room. Things are different whenever there is real *non-excludability* such that the people are not only incapable of excluding other people without prohibitive costs from the benefits they generate (positive externalities),³⁴ but also - more importantly - incapable of

³³ See also Arneson's revised principle of fairness including further requirements (1982: 623) and Cullity's critique of such revision (1995: 12f.) as well as his own proposal (1995: 14f., esp. at 18-19). Cullity's extra requirements include the view that "the fair generalisation of the scheme's requirement must not make practically everyone worse off" (which clearly overlaps with the "no net cost" requirement) and a "conscientious objector" requirement.

³⁴ Cullity (1995: 3). Note that free-riding is classically being used in connection with public goods. While *non-excludability* is to be connected with the problem of "voluntary acceptance of benefits", *non-rivalness* is to be connected with the idea that in the case of rival goods, my enjoyment of benefits would necessarily *harm* other people (by diminishing their enjoyment of the same good), hence bring

excluding themselves, again without excessive costs, from the benefits generated by other people. In the latter case, the fact of enjoying the benefits of positive externalities could hardly be interpreted as implying a voluntary acceptance of such benefits and their associated costs. Pure cases of that sort are hard to find however. Take for example a country that would globally benefit from the impact of CO₂ emissions, as such emissions would help increase the productivity of its cornfields. It is admittedly hard to prevent foreign CO₂ particles from flying above one's territory. Still, if the extent of this increase in productivity attributable to an increase in CO₂ concentration were quantifiable, it would not be hard for this country simply to decide not to consume the relevant amount of corn, as a way of expressing its refusal of such benefits and their associated obligations.³⁵

But even in pure non-excludability cases (or in cases where benefits are more diffuse and difficult to quantify such as with national defence systems), one does not see why voluntary acceptance should be needed as long as our two requirements are met. In fact, one may suspect that each time test cases are being provided to suggest the need for the voluntariness requirement, they could in fact be satisfactorily dealt with on the basis of the "no net cost" and the proportionality requirements. More precisely, voluntary acceptance might be valuable in real life situations, merely because it allows the recipient herself (as opposed to society as a whole) to assess the respective value that the benefits and their associated obligations would represent for her, and to refuse the unsolicited benefit in case it would

us on the parasitism side. On the notion of public goods: Cullity (1995: 32f.) (suggesting that it is in fact a "family resemblance" concept, i.e. that the various definitions all refer to a given subset among seven features, without all sharing at least one of these features).

³⁵ Rawls's requirement according to which "one has voluntarily accepted the benefits of the arrangement or taken advantage of the opportunities it offers to further one's own interest" (1999: 96) would then not be met in this case. It is worth stressing as well that if the refusal of harm-related benefits is generally possible through refusing the benefits themselves, and if the existence of such *harms* related to benefits could in principle have been known in many cases, generations could then generally be regarded as having in fact, be it in an implicit or hypothetical manner, accepted to inherit both benefits and their associated *debts*. This "implicit or hypothetical package acceptance" strategy, were it to be relied upon in a systematic manner, would thus address the "voluntariness" challenge to the idea of moral free-riding by assuming that, as a matter of fact, each generation would indeed have accepted to inherit the whole package of benefits and debts from their ancestors. This may well overlap in most cases with the "trans-generational free-riding" approach adopted here. However, in at least one case, the two strategies could diverge. Let us assume that the previous generation of US people did not (have to) know about the harmful consequences of its CO₂ emissions on current Bangladeshi people. Morally speaking, such harmful behaviour did not generate a debt towards the latter, given its non-wrongful nature. It follows that since the previous US generation had no debt in the first place (at least in relation to its CO₂ emitting behaviour in the present case), no debt could be inherited in this respect by the current US generation. This is at least one reason why the trans-generational free-riding strategy may be more satisfactory than the "package acceptance" one. For another possible occurrence of the latter: *infra*, *texte* attached to note 51.

entail net costs for her. This can be seen however as implied in a given interpretation of the "no net cost" proviso (the view that the value of benefits and associated obligations should be assessed by the "beneficiary" herself),³⁶ rather than as an extra requirement.

Second, one may claim that there is a difference between costs (not benefits this time) incurred by those who voluntarily initiated a cooperative scheme and costs falling on other people who would get the benefits without having at all asked for them. Further amendments to our general view on free-riding cannot be excluded to answer this worry. However, such amendments would not affect the specific situation identified here as transgenerational free-riding. For the costs that current Bangladeshi people must bear have clearly been imposed upon them, as much as benefits may have been imposed upon the current US generation. The situation of the current Bangladeshi generation is thus significantly different from the one of the previous US generation that chose to emit CO₂ and can thus be considered as having chosen to incur costs at the same time as benefits. The case of historical emissions is thus special: it involves two *non-actors*, one claiming compensation from the other on free-riding grounds. They are "non-actors" to the extent that, for what historical emissions are concerned, none of them can be said to have *generated* the benefits and their associated costs, that they are enjoying and incurring to a different extent. This contrasts with Nozick's public entertainment example as well as possibly with cases of *intergenerational* free-riding (parents choosing to have kids, etc). There is thus no way in which we could say in the present transgenerational case that current Bangladeshi people *imposed* CO₂ emissions-associated benefits upon current US citizens. And if a case for compensation were to hold in the non-transgenerational free-riding cases, an *a fortiori* argument would thus hold in the case of transgenerational free-riding. Provided that we amend Gauthier's definition in the two ways indicated above, Nozick's challenge can thus be regarded as having been successfully addressed, at the very least in the transgenerational free-riding case.

Let me then add a third and final remark. The idea of a gift may be used as a test case in discussions on free-riding.³⁷ It is through a reference to gifts that Gauthier's definition has been considered to be too broad, as it would imply that gift-recipients could be regarded as

³⁶ It would be worth investigating the connections between risks of "predation on the involuntary beneficiary" and Dworkin's "slavery of the talented" problem. See Dworkin (2000: sect. 2). See as well Cullity (1995: 14)

³⁷ See as well Barry's argument above in the case of indirect reciprocity

free-riding on gift-givers.³⁸ It may however be objected to such an argument that once it is made clear by the gift-giver that she is not expecting anything in return, this simply amounts to renouncing her right to claim anything in return. Consequently, the recipient would not owe anything back, at least towards the gift-giver. She would thus not be a free-rider. Admittedly, more complicated cases can arise. What happens for example when a recipient sincerely took as a gift what was not meant as a gift? Such a case may be addressed along lines analogous to the ones developed to deal with the ignorance argument. If the recipient still benefits from what she took to be a gift after t_k , i.e. the moment she came to know or should have known that it was *not* a gift, the rules applying to free-riding should apply from that moment onwards.³⁹ It is thus far from clear that gift cases are decisive to justify a further narrowing down of Gauthier's definition.

3. Re-considering the "no net cost" and the proportionality requirements

We have argued that Gauthier's view on free-riding is able to stand Nozick's challenges, provided that we add two additional requirements, the "no net cost" and the proportionality one. These two provisos are sensible, but only under a particular understanding of free-riding. For, as we shall now argue, two possible rationales underlying the moral condemnation of free-riding can be identified. And the two requirements above may not necessarily hold in both cases.

3. 1. A fresh look at the "no net cost" requirement

Let us thus re-consider the "no net cost" requirement first. Imagine a *ceteris paribus* case (same population size, etc.) where the costs of past emissions to the current Bangladeshi amount to 10 units and the benefits to the current US population only reach 4 units. There are two possible schemes: either the US should compensate Bangladeshi people with 4 units, or they should compensate them with 7 units so that each people ends up with costs of 3 units. The

³⁸ Cullity (1995: 3, note 1). Another possible way of narrowing down the scope of moral free-riding consists again in limiting it to cases involving non-rival goods, i.e. goods – such as lighthouses – that "one person's enjoyment of the good does not diminish the benefits available to anyone else from its enjoyment" (Cullity, 1995: 4)(see supra note x). In a certain sense, it is true that taking advantage of an inherited benefit in the case of rival goods, deprives others from it, hence harms them. Still, some difference remains between actively taking away something from someone (parasitism) and benefiting from something that was taken away from someone by a third party (free-riding). Free-riding thus does not necessarily turn into parasitism as soon as we leave the domain of non-rival goods – which by the way is a very restricted one – as transgenerational free-riding illustrates.

³⁹ See as well Arneson (1982: 632)

"no net costs" requirement above calls for the former option. Is this the only appropriate answer however? In order to address this issue, free-riding-based claims need to be located among other justice-based claims.

Here is a simplified egalitarian theory of distributive justice revolving around two basic principles. *First principle*: All disadvantages resulting from circumstances (natural events or involuntary human actions) that were imposed on one should be compensated for. The assumption behind such a rejection of arbitrariness is that it is the most plausible interpretation of equal concern that we can come up with.⁴⁰ *Second principle*: none of the disadvantages that a person imposes on herself should entitle her to compensation. I have to cover the costs flowing from harms to myself resulting from my own voluntary actions. This could be referred to as the responsibility principle. A *third principle* – not generally regarded as part of the core definition of egalitarianism – is tightly related to the second: I should compensate others for the disadvantages I impose on them through my own choices if and only if these harms that can be regarded as wrongs.⁴¹ To sum up, the "rejection of arbitrariness" principle deals with the consequences of natural events or involuntary actions on people, the responsibility principle focuses on the consequences of one's voluntary actions on oneself, and the no-wrong principle covers the consequences of one's voluntary actions on others. The first two principles belong to distributive justice whereas the latter can be regarded as part of interactive⁴² justice, a field of justice where compensation only takes place between people directly concerned with the consequences of a given action – which is the logic underlying tort law in legal systems. To put things in a different perspective, interactive justice can be regarded as a way of rectifying unfair departures from the baseline situation resulting from the implementation of distributive justice. Now, how can we relate free-riding with these three principles? There are two avenues, at least in the case of historical emissions.

First option: free-riding *between non-actors* would fall within the first principle's ambit (rejection of arbitrariness) and could then be dealt with on the basis of an *action-specific*

⁴⁰ See Dworkin (2000: introduction)

⁴¹ This is not the case for example in a fair competitive context where pursuing your own interest will generally entail setting back other people's interests. Notice moreover that once we adopt a principle such as "no one should be forced to bear the costs for which others are responsible" (non-exploitation principle), principles DJ2 and IJ1 (see table 3) clearly appear as the two sides of the same coin. I am indebted to P. Bou-Habib for this remark.

⁴² This expression was suggested to me by Ph. Van Parijs

redistributive approach. The logic is akin to the rejection of arbitrariness present in egalitarian theories. But the scope is more restricted since it deals with benefits and harms that are *causally related*. They are derived from a single (set of) action(s). Thus, it does not require any compensation if the (lasting) harm is not *correlated* with any (lasting) benefit. The intuition is that once I have learnt about the harmful consequences of a past action that I am benefiting from, there is no reason why I should continue benefiting from it while others are still suffering from that action through no choice of their own. In our example, the US would thus have to pay 7 units to compensate Bangladeshi people, *ceteris paribus*. In fact, the action of the previous US generation would be treated as no different from a past natural event. The fact that the benefits (to current US people) and costs (to current Bangladeshi people) are causally related should not make any difference from the point of view of distributive justice. Imagine a two-States world. One of the two States is being heavily disadvantaged by a volcano's eruption. Whether the neighbour State benefits from an advantage due to the *same* volcano or due to another natural event is irrelevant as to whether or not redistribution should take place between the two States.

Second option: if benefiting from something is regarded as involving in some sense an action (accepting), then it would make more sense to add a fourth principle akin to the no-wrong principle. The rejection of free-riding principle would thus hold that: all advantages to *me* resulting from other people's actions involving costs for them should give rise to compensation by myself to these cost bearers. The rejection of free-riding would then be regarded more as part of interactive (or rectificatory) justice than as part of distributive justice *stricto sensu*. The practical consequence is that in our example, compensation would be limited to 4 units.

Rejection of Arbitrariness (DJ1)	<i>All disadvantages resulting to me from events or involuntary actions should be compensated for by society</i>
Responsibility Principle (DJ2)	<i>None of the disadvantages resulting to me from my own voluntary actions should be compensated</i>
No-Wrong Principle (IJ1)	<i>All the disadvantages I incur as a result of other people's voluntary actions should be compensated by these very people – and not by society as a whole – , at least if these harms are wrongs</i>
Rejection of Free-Riding (IJ2)	<i>All the advantages I get as a result of other people's action involving costs on them (or on others) should give rise to compensation from me, as long as the "no net cost" and the "proportionality" requirements are not being violated</i>

Table 3: Free-riding's location on the map according to the second option, assuming that we take distributive justice to be equivalent to one form of it, i.e. egalitarianism. DJ = distributive justice *stricto sensu* ; IJ = interactive justice

	Impact of past emissions	Impact after compensation under the redistributive understanding of the rejection of free-riding	Impact after compensation under the interactive understanding of the rejection of free-riding
US	+ 4	- 3	0
Ban.	- 10	- 3	- 6

Table 4: Two views on free-riding and the difference it makes (focus on the "no net cost" requirement)

It is worth stressing that no retroactivity is involved in implementing the interactive view on the rejection of free-riding. As in our fake notes example, there is a past harmful action that was not wrong when it took place because of a legitimate ignorance factor. If Roberto had known that the notes were fake before buying the wine, full compensation would have been in order, as required by the no-wrong principle. Since he did not (have to) know, he finds himself somehow in the same position as our free-riding US generation, benefiting now from a non-wrongful harmful action of his earlier self. In fact, Roberto was then a parasite, but a non-wrongful one. Once he finds himself in a post- t_k situation, he should be treated in the same way as a free-rider in a post- t_k situation. For what rectification (or interactive justice) is concerned, he should retribute no more than what he is still benefiting from after t_k as a result of his earlier non-wrongful harmful action. Similarly, from an interactive perspective, current US people should not be expected to compensate current Bangladeshi people beyond the value of what the former still enjoyed after t_k as a result of their ancestors's (non-wrongful) harmful emissions. If the no-wrong principle requires full compensation, no matter whether or not the wrongful actor derived any benefits from his wrong, the rejection of free-riding does not require compensation beyond the benefits the free-rider still enjoys as a result of other people's costly action, no matter whether or not such a compensation suffices to cover all such costs. This view may well seem insufficiently demanding to those who are ready to endorse a general egalitarian distributive approach. It could however be considered very demanding for others who are not such egalitarians (e.g. sufficientarians). The interactive understanding of the rejection of free-riding is thus especially meaningful to those who are not ready to endorse "demanding" theories of distributive justice.

What about the distributive understanding of the rejection of free-riding? Schokkaert & Eyckmans point out that there is a strong correlation between historical emissions and

current GNP/capita in various countries.⁴³ Such a correlation could imply that historical emissions may be regarded as a necessary condition for the current level of GNP/capita in countries like the US. But it also implies that a GNP/capita-based *general* redistributive scheme would lead to redistributive movements taking the same direction as what compensation for historical emissions would require on action-specific or sector-specific redistributive grounds.⁴⁴ Does this not indicate that if such a general redistributive scheme were politically available, the action-specific approach would be redundant?⁴⁵ It remains however that in the absence of such a general redistributive scheme, an action-specific redistributive approach is a valuable second-best. It should also be stressed that even in domestic systems that incorporate some central redistributive scheme (a social security system), sector-specific redistributive schemes often remain a valuable complement. For example, although a given country might have a fair general system of unemployment benefits or a universal basic income scheme, this may not stop subsidised concert halls or public transport companies in such a country from offering as well discounted fares to the unemployed.

How would we thus answer the following question from Schokkaert & Eyckmans: "do the developed countries have the ethical duty to pay more, just because they are rich, or do they have the duty because they have emitted more carbon dioxide in the past?"⁴⁶ First, the ethical duty to pay more in relation to historical emissions can flow from an action-specific distributive interpretation of the rejection of free-riding without necessarily having to base ourselves on the fact that developed countries are globally richer. Second, we can alternatively base our obligation to pay more on an interactive interpretation of the rejection of free-riding, as long as we can show that we are net beneficiaries of our ancestor's emissions while current members of developing countries are net victims of them. This can be done without assuming that our ancestor's emissions were *our* emissions, as is implied in Schokkaert and Eyckmans's quote above.⁴⁷ Of course, there is also the legitimate concern that

⁴³ Schokkaert & Eyckmans (1998: 210)

⁴⁴ Of course, such a convergence does not obtain in all transgenerational injustice issues. Sometimes, through mechanisms such as "making of necessity virtue", victims end up better off than they would have been if the harmful action had not taken place. This does not make the latter less harmful.

⁴⁵ See Schokkaert & Eyckmans (1998: 206)

⁴⁶ Schokkaert & Eyckmans (1998: 206)

⁴⁷ Here is Schokkaert & Eyckmans's position: "(...) let us return to the argument that richer countries should abate more because they are responsible for the bulk of past emissions. We argued that this argument is not fully convincing and that it is preferable to base the duty of the richer countries simply on the fact that they are richer. It is somewhat paradoxical that the past-emissions argument is

the richer you are, the less a given environmental cost imposed on you may affect you, and conversely (law of decreasing marginal utility). This may as well justify some adjustments in what you will be expected to contribute. However, none of this necessarily requires us to fall back on a general redistributive scheme. In short, despite the fact that for an egalitarian, the first-best approach will certainly remain one involving a general redistributive scheme, neither does it prevent the coexistence of such a scheme with "local" redistributive ones, nor can we exclude that in the absence of such a general scheme, a local/sector-based one relying on a distributive understanding of the rejection of free-riding would be a valuable second-best and one relying on an interactive understanding would be a third-best option worth defending. Each of the latter two would certainly be "fair" notwithstanding the fact that they would not be "fair enough".

3. 2. Another look at the proportionality requirement

So far, we have focused on the "no net costs" requirement and we have seen that it should only hold within the context of an interactive understanding of free-riding. What about the proportionality requirement? Let us envisage the following example. Out of a given amount of historical emissions, the previous and the current US generations got a benefit of 6 units each whereas the current Bangladeshi generation is suffering a harm of 6 units. If we were to abide strictly by the proportionality requirement, the current US generation should in principle cover *at most* half of the costs to the current Bangladeshi generation, since the former is merely a free-rider whereas the previous US generation was a parasite (which entails stronger obligations to compensate). The problem is that we are facing a problem of non-compliance, for - *ex hypothesi* - the previous US generation did not pay her share of compensation.

This problem is classically discussed in the literature on the "demandingness" of morality: does non-compliance by others regarding their obligations towards person x affect at all the extent of my own obligations towards that person x? Some will argue that other people's non-compliance may lessen or strengthen my obligations while others believe that it should

playing a central role in the argumentation by the third world. We suggest that this is due to the fact that the discussion remains centred on the global warming problem itself : in such a partial context, the past emissions argument may act as a roundabout means to introduce into the debate the issue of unequal global income distribution. In our broader setting, there is no need for this roundabout argument" (1998: 214).

leave them unaffected.⁴⁸ Take the case of two adults who are both good swimmers and don't know each other. They are sitting on the grass along a pond. All in a sudden, two small kids who were playing in the grass fall into the water and are in urgent need of rescue. As one of the two adults, I can see that the other one is not willing at all to move. Does it affect my moral obligations? And if it does, in which direction? Am I allowed to save no child at all (since the other adult will not either), to stick to saving one child (while being perfectly able to save the two) or do I need to save the two kids alone? Similarly, does tax evasion by others increase or reduce my obligations as a tax payer, or does it leave them unaffected?

There is something specific to our case, namely that the past generation's non-compliance is an *irreversible* one, as we are dealing with non-overlapping generations. This means that at least one possible rationale for not increasing a person's obligations when the others don't comply with theirs does not apply in this case. We are referring here to the following rationale: Increasing a complier's obligations as the amount of non-compliance of her neighbours keeps growing would just provide to the latter an incentive towards further non-compliance, as the goal pursued by such obligations (e.g. meeting some people's needs) will be met anyway. In the transgenerational case however, such a rationale should not be used, since there is no way we can still affect the amount of compliance of the previous generation.

Now, let us assume first that we adopt a redistributive understanding of the rejection of free-riding. The redistributive logic calls in fact for an *increase* of our share in such circumstances, up to a level of 6 units. Why would the current Bangladeshi have to suffer costs of 6 units while I would be enjoying at the same time a benefit of 6 units, in each case due to no action of our own? This would violate the "rejection of arbitrariness" understanding of equal respect. In contrast, under the interactive view on the rejection of free-riding, while someone else's non-compliance should certainly not justify a *reduction* of one's share of obligations, there is also no reason why such non-compliance should *increase* one's share. Under the interactive understanding of the rejection of free-riding, the current US generation should then compensate Bangladeshi people for a value of 3, as opposed to 6.

	Impact of past emissions	Impact after compensation under the redistributive understanding of the rejection of free-riding	Impact after compensation under the interactive understanding of the rejection of free-riding
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⁴⁸ See e.g. for a recent discussion: Mulgan (2001). See as well Arneson's notions of "nervous" and "reluctant" cooperators (1982: 622-623).

		(irreversible non-compliance of past US)	(irreversible non-compliance of past US)
Past US	+ 6	+ 6 (non-compliance)	+ 6 (non-compliance)
Current US	+ 6	0	3 (or more)
Current Ban.	- 6	0	- 3 (or less)

Table 5: Two views on free-riding and the difference it makes (focus on the proportionality requirement)

We have thus indicated that there are two possible rationale at stake behind the idea of rejection of free-riding in general and transgenerational free-riding in particular. In both cases, the current US generation owes some compensation to current Bangladeshi people. The extent of such a compensation will vary however, depending on which one of the two rationale is being adopted.

4. Towards Possible Extensions

In fact, most historical injustice issues are transgenerational injustice ones. The concept of transgenerational free-riding defended here is thus of potential interest to deal with issues as diverse as claims for black reparations (made by the descendants of slaves against the heirs of their masters), aboriginal claims and claims aiming at the restitution of Jewish Gold kept in Swiss banks as a result of WWII. We shall devote a few lines to three remarks regarding the possible relevance of our discussion for other transgenerational injustice issues.

A first point relates to the ignorance challenge. There are not many other transgenerational justice issues where the ignorance challenge is being raised. This is probably due to the very fact that, in the case of historical CO₂ emissions, we are dealing with actions being mainly harmful in a delayed manner. If harm were occurring right after the action (even in a geographically remote place), ignorance would be much harder to maintain. So far however, immediate effects of greenhouse gas emissions had remained limited and, hence, largely ignored.

Admittedly, there is another possible version of the ignorance challenge consisting in claiming that, even if they knew that they were *harming* other people, our ancestors did not know that they were *wronging* them. This can be inferred e.g. from the view objecting that

"the global economy has been based on the free disposal of CO₂ emissions".⁴⁹ An analogy would consist in saying that although US slavery adepts knew that they were harming black people, they didn't know it was morally wrong to do so. Barriers to knowledge about wrongness come of course on top of barriers to knowledge of harm. However, in a case like slavery, there don't seem to be any particular barriers to knowledge of harm, nor of wrong, as regarding the latter, what is needed are the mere basics of moral thinking and the ability to listen to the people you enslaved.

The second point is related to the first. As we already mentioned, what seems rather specific to the case of historical emissions is that an action from past US people harms current Bangladeshi people *in a direct way*. This contrasts with most historical injustice situations that require at least four (collective) parties (instead of three in our account here). Take the case of slavery again. The descendants of slaves are not being harmed in a direct way by their ancestors' masters. It is only to the extent that the harm to their ancestors leads in turn to some harm to them that they might claim some compensation to the descendants of their masters. The harm is thus an indirect one. And this is not at all irrelevant. First, it may raise difficulties regarding the causal relation between the harmful action and the consecutive harm to current people.⁵⁰ It is likely to make it more difficult to calculate the size of such harm. And second, the non-identity argument may well be relevant to both cases of direct and indirect harms. It will however be so in a different manner. In the slavery case, our paradigmatic example of indirect harm, the action of the past generation of harmdoers will clearly affect the identity of their victims' children, as slavery was affecting the life of such victims to a large extent.⁵¹ In contrast, in the historical CO₂ emissions case where immediate effects are, if not inexistent, at least very limited, the non-identity problem only arises one generation after the delayed effects have reached a threshold such that people's timing of reproduction will be generally affected by them.

Let us add however that historical emissions do not constitute the only example of a historical injustice issue that can be accounted for with a trilateral model involving direct harms. Another illustration is provided by cases where the victim is still the original one and

⁴⁹ Kverndokk (1995 : 138). Compare this with the "natural debt" approach: Smith, Swisher & Ahuja (1993).

⁵⁰ See the notion of "automatic effect" in Sher (1981: 13) and Thompson (2001: 117-119).

⁵¹ See for an example of use of the non-identity argument in the case of reparations for the consequences of slavery: Kershner (2002)

where it is the wrongdoer who died and has now been replaced with his descendants. This is partly the case in the Jewish Gold case. The victim's survival replaces here the pollutant's lasting effect in making the "past parasite/current victim" connection a direct one.

Current Free-Rider	Current Victim	Current Free-Rider	Current Victim	Current Free-Rider	Current victim = original victim
Past Parasite		Past Parasite	Original Victim	Past Parasite	
1. Historical emissions		2. Standard historical injustice case		3. Surviving victims case	

Table 6: Direct (cases 1 and 3) or indirect (case 2) transgenerational harm

Our third and last point is that while some claims may be based on free riding, others may take a negative form, namely that if the current generation does not act in a certain way, she will *not* be a free-rider. Debt relief provides a fine illustration. One argument often raised in support of third world debt cancellation claims refers to the fact that initial debts were contracted by undemocratic State authorities. They should thus not bind such States' citizens. There is however a related argument that is often being overlooked: any debt contracted by a former legislature and imposed on the next legislature is inherently undemocratic, at least if we take equal right to vote as a core democratic feature. Even the most democratic country is necessarily intergenerationally undemocratic, unless we can show that a package acceptance procedure is being followed (hypothetically, implicitly or explicitly) each time we pass from a legislature to the next.⁵² The idea of state continuity could thus be morally problematic to the extent that it may imply that current citizens be always bound by the decisions taken by their ancestors' representatives, including the debts that the latter have contracted.

Let us then imagine the following situation. A century ago, country X borrowed from country Y an certain amount money. Country X was then perfectly democratic. However, this country's citizens were quite selfish at that time and used up the whole money in perishable consumption goods. As a result, there is no way in which this money may benefit the current members of country X. However, time for reimbursement has come and the

⁵² This undemocratic nature (at least if we take the core feature of democracy to consist in free elections by an inclusive constituency) also affects constitutional precommitment strategies. See e.g. Holmes (1995: chap. 5)

country Y's government sends one of its officials to get the money and the interests back. Would current citizens of country X be entitled to refuse paying anything back? If it can be shown that they did not benefit from the money at all, and if it can be successfully argued that if any later debt adjustment contracts took place, it was not voluntarily signed in the morally relevant sense, country X's current generation should not pay the money back. Conversely, if they *did* benefit from this money, they would be bound to pay at least part of it back, even if the government that contracted this debt was not theirs.

This is not to say that such an argument would provide us with a definitive case in favour of an unconditional debt cancellation in all such situations where a debt contracted by an earlier generation did not lead to any benefit for the current generation who is now being asked to pay the money back. Extensive thoughts need to be devoted to problems such as how far the succession of adjustment contracts affects the argument, or how extensive are risks of moral hazard or of free-riding by private lenders in case of debt cancellation by public ones.⁵³ Still, it remains that the concept of transgenerational free-riding certainly has real potential in addressing such issues.

Conclusion

While one may believe that policies such as affirmative action would better be justified on distributive justice grounds rather than on reparation-for-historical-injustice grounds, it is a striking feature of public debate that the latter rationale keeps resurfacing again and again. In some sense, it probably results from the layman's view that reparation for harm provides a somehow stronger justification than a mere rejection of arbitrariness. According to such a view, my claim against you because you handicapped me would be stronger than my claim against society because natural lottery made me handicapped. While I don't believe that there is much justification for such a view, it does not follow that we should totally disregard domains of justice that do not directly belong to distributive justice, most notably interactive justice. The latter is of obvious relevance in the climate change context. Sooner or later, current emissions from which we derive various benefits will clearly inflict harm on at least some people. To that extent, many of us should regard themselves as parasites. Admittedly, current emissions should concern us much more than historical emissions. Still, this does not mean that the latter are of no practical and theoretical importance.

⁵³ On the latter issue: Van Gerven & Vandeveld (2001: 11)

Focusing on historical emissions, we have indicated that while being serious challenges, the "ignorance" and the "non-contemporaneity" arguments are not decisive. We can circumvent them through relying on a notion of transgenerational free-riding, while remaining within the ambit of moral individualism. Free-riding allows us to justify obligations to compensate without having neither to consider us morally responsible for our ancestors' actions, nor to judge them guilty of wrongful action. Moral free-riding has been criticised, most notably by Nozick. We have shown however that once it is properly amended, Gauthier's definition of free-riding remains totally defensible. It may even receive two very different interpretations, a distributive and an interactive one. Each of them leads to clearly distinct compensation patterns. This distinction allows to clarify as well the kind of relationship that a "free-riding-based" claim can have with a general distributive view. Contrary to what has been argued, it is not necessarily redundant with a general distributive view. We can thus conclude that a free-riding-based approach of the "historical emissions" issue supports the view according to which some extent of compensation should be required from countries who are now benefiting from past emissions, at other countries' costs. The approach may also be relevant to many other historical injustice issues.

Bibliography

- Arneson, R.**, 1982. "The Principle of Fairness and Free-Rider Problems", *Ethics*, Vol. 92: 616-633
- Arrhenius, S.**, 1896. "On the Influence of Carbonic Acid in the Air Upon the Temperature of the Ground", *Philosophical Magazine and Journal of Science*, S 15, 41 (251): 237-276.
- Banuri, T., Göran-Mäler, K., Grubb, M., Jacobson, H. & F. Yamin**, 1996. "Equity and Social Considerations" in *Climate Change 1995. Economic and Social Dimensions of Climate Change*, Bruce, J. P., Lee, H. & E. Haites (eds.) (IPCC, WG III), Cambridge: Cambridge U. P., pp. 83-124.
- Barry, B.**, 1989. *Liberty and Justice (Essays in Political Theory 2)*, Oxford: Clarendon Press, 297 p.
- Crawford, E.**, 1996. *Arrhenius: From Ionic Theory to the Greenhouse Effect*, Canton: Science History Publications (Uppsala Studies in History of Science, Vol. 23), 320 p.
- Cullity, G.**, 1995. "Moral Free-riding", *Philosophy and Public Affairs*, vol 24(1): 3-34
- den Elzen, M., Berk, M., Shaeffer, M., Olivier, J., Hendriks, C., & B. Metz**, 1999. *The Brazilian Proposal and other Options for International Burden Sharing: an evaluation of methodological and policy aspects using the FAIR model*, Bilthoven/Utrecht: RIVM report n° 728001011, 125p.
- Dworkin, R.**, 2000. *Sovereign Virtue. The Theory and Practice of Equality*, Cambridge (MA)/ London: Harvard University Press, 511 p.
- Farman, J., Gardiner B. & D. Shankin**, 1985. "Large losses of total ozone in Antarctica reveals seasonally ClOx/NOx interaction", *Nature* 315: 207-210
- Gauthier, D.**, 1986. *Morals by Agreement*, Oxford: Clarendon Press, 367 p.
- Ghosh, P.**, 1993. "Structuring the equity issue in climate change" in *The Climate Change Agenda: An Indian Perspective*, Achanta A.N. (ed.), New Delhi: Tata Energy Research Institute (TERI).
- Gosseries, A.**, 2001. "What do we owe the next generation(s)?", *Loyola of Los Angeles Law Review*, vol. 35(1): 293-354
- , 2003. "Intergenerational Justice", in H. LaFollette (ed.), *The Oxford Handbook of Practical Ethics*, Oxford: Oxford U. P., pp. 459-484.
- Grubb, M.**, 1995. "Seeking fair weather: ethics and the international debate on climate", *71 Int'l Affairs* 3: 463-496.
- Hayes, P. & K. Smith (eds.)**, 1993. *The Global Greenhouse Regime. Who Pays?*, Tokyo/New York/Paris: United Nations University Press, 400 p.
- Holmes, S.**, 1995. *Passions and Constraint. On the Theory of Liberal Democracy*, Chicago/London: The University of Chicago Press, 337 p.
- Houghton, J., Jenkins, G. & J. Ephraums (eds.)**, 1990. *Scientific Assessment of Climate change. Report of Working Group I*, Cambridge: Cambridge University Press, 365 p.
- Houghton, J., Meira Filho L., Callender, B., Harris, N., Kattenberg, A. and K. Maskell (eds.)**, 1995. *Climate Change 2001. The Scientific Basis. Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, Cambridge: Cambridge University Press, 572 p.
- Houghton, J., Ding, Y., Griggs D., Noguer, M., van der Linden, P. and D. Xiaosu (eds.)**, 2001. *Climate Change 2001. The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, Cambridge: Cambridge University Press, 944 p.
- Kershner, S.**, 2002. "The Inheritance-Based Claim to Reparations?", *Legal Theory*, vol. 8: 243-267
- Kutz, Ch.**, 2001. *Complicity. Ethics and Law for a Collective Age*, Cambridge: Cambridge University Press, 344 p.
- Kverndokk, S.**, 1995. "Tradeable CO₂ Emission Permits: Initial Distribution as a Justice Problem", *Environmental Values*, vol. 4(2): 129-148
- Manabe, S. & R. Wetherald**, 1967. "Thermal equilibrium of the atmosphere with a given distribution of relative humidity", *Journal of the Atmospheric Sciences*, vol. 24 (3): 241-259.
- , 1975. "The effects of doubling CO₂ concentration on the climate of a general circulation model", *Journal of the Atmospheric Sciences*, vol. 32 (1), 3-15.
- Molina, M. & F. Rowland**, 1974. "Stratospheric sink for chlorofluoromethanes: chlorine atom catalyzed destruction of ozone", *Nature* 249: 810-812.
- Mulgan, T.**, 2001. *The Demands of Consequentialism*, Oxford: Clarendon Press, 313 p.
- Nozick, R.**, 1974. *Anarchy, State, and Utopia*, Oxford & Cambridge: Blackwell, 367 p.
- Parfit, D.**, 1984. *Reasons and Persons*, Oxford: Clarendon Press, 543 p.
- Rawls, J.**, 1999. *A Theory of Justice. Revised Edition*, Oxford: Oxford University Press, 538 p.

- Schokkaert, E. & J. Eyckmans**, 1998. "Greenhouse Negotiations and the Mirage of Partial Justice", in M. Dore & T. Mount, *Global Environmental Economics. Equity and the Limits to Markets*, Oxford: Blackwell, pp. 193-217
- Sher, G.**, 1981. "Ancient Wrongs and Modern Rights", *Philosophy and Public Affairs*, vol 10(1): 3-17
- Singer, P.**, 2002. *One World. The Ethics of Globalization*, New Haven: Yale University Press, 235 p.
- Smith, K., Swisher, J. & D. Ahuja**, 1993. "Who pays (to solve the problem and how much)?", in Hayes, P. & K. Smith (eds.), 1993. *The Global Greenhouse Regime. Who Pays?*, Tokyo/New York/Paris: United Nations University Press, chap. 4
- Thompson, J.**, 1998. *Historical Obligations*, typescript, Sept. 1998, 27 p.
- , 2001. "Historical Injustice and Reparation: Justifying Claims of Descendants", *Ethics*, vol. 112: 114-135
- Torvanger, A. & O. Godal**, 1999. *A survey of differentiation methods for national greenhouse gas reduction targets* (Report to Nordic Council of Ministers), Oslo: Center for International Climate and Environmental Research, TemaNord 2000: 551/Cicero Report 1999: 5, 39p.
- Tulkens, H.**, 1998. "Cooperation vs. free riding in international environmental affairs: two approaches", chapter 2 (pp. 330-44) in N. Hanley and H. Folmer (eds), *Game Theory and the Environment*, London: Elgar
- Van Gerven, J. & T. Vandeveld**, 2000. "Ethical Aspects of Debt Reduction for the Poorest Countries", *Ethical Perspectives*, Vol. 8(1): 3-17