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TWO THEORIES OF RESPONSIBILITY FOR PAST EMISSIONS OF CARBON DIOXIDE

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Two theories of responsibility for past emissions of carbon dioxide

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Abstract

We consider the claim that individuals or nations who emitted carbon dioxide in the past should be held responsible for those emissions. We examine two theories of responsibility for past emissions that are often conflated: (i) that emissions in the past by individuals in one nation have wrongfully harmed, or will wrongfully harm, individuals in other nations, and (ii) that individuals or nations who emitted in the past used more than their fair share of the limited ability of the atmosphere to absorb carbon dioxide. These two theories have distinct philosophical bases. A theory of responsibility for harm caused to others is based on conventional theories of corrective justice or efficiency, such as the Polluter Pays Principal. The difficulty with these theories is measuring relative harm. There are few estimates of the harms from the 1°C of temperature change experienced so far from past emissions because it is difficult to distinguish the resulting harms from normal variations in the climate. The second theory, a theory of responsibility for excess use, would require a level of compensation several orders of magnitude larger than a theory based on harm. Responsibility for excess use, however, is more difficult to ground in widely-accepted theories of justice. It is, we argue, a theory of equal ownership of all limited resources which few theories of justice would support.

[†] We thank Brian Leiter for comments and Martha Nussbaum for helpful conversations.

A central question about the ethics of climate change is whether individuals or nations who have emitted greenhouse gases in the past should be held responsible for their pollution. If individuals or nations¹ were held responsible for their past pollution, they would be required to repair the harm that their pollution caused. As a practical matter, developed nations were the first to use fossil fuels. Developed nations accordingly emitted more greenhouse gases in the past than other nations. Thus, theories that hold nations responsible for their past emissions would require developed nations to take on relatively greater commitments to reduce emissions than developing countries.

The argument for holding nations responsible for past emissions has received substantial attention in the literature. For example, Singer (2004, pp. 33–34) stated the idea as follows:

[T]o put it in terms a child could understand, as far as the atmosphere is concerned, the developed countries broke it. If we believe that people should contribute to fixing something in proportion to their responsibility for breaking it, then the developed nations owe it to the rest of the world to fix the problem with the atmosphere.

Shue (1999, p. 534) treats it as a first principle of climate justice:

When a party has in the past taken an unfair advantage of others by imposing costs upon them without their consent, those who have been unilaterally put at a disadvantage are entitled to demand that in the future the offending party shoulder burdens that are unequal at least to the extent of the unfair advantage previously taken, in order to restore equality.

¹ Although many aspects of claims of responsibility for past emissions will be different depending on whether individuals or nations are held responsible (see Posner and Weisbach 2010, pp. 103-106), our claims apply equally to individuals as to nations. Therefore, for ease of reference, we will simply speak of “nations” for the remainder of this article.

Other commentators, including Gardiner (2010), Meyer (2012), Caney (2005), Vanderheiden (2008), Botzen, Gowdy, and van den Bergh (2008) and Neumayer (2000) have endorsed versions of this claim. The question of responsibility has also attracted the attention of physical and social scientists who have developed methods for estimating past emissions and allocating them among nations.²

Imposing responsibility for past emissions presents a number of problems. Among other issues, commentators have sought to address (1) how current generations can be responsible for harms inflicted by previous generations, (2) whether individuals can be responsible for emissions before they could have reasonably known that emissions were harmful, (3) the non-identity problem, and (4) whether responsibility can be imposed collectively.³

We set these important issues aside. Instead, we focus on how the arguments for responsibility for past emissions change based on the particular type of harm identified. That is, we ask what is “broke,” to use Singer’s term, or what are the “costs” imposed without consent, to use Shue’s. We then ask how the answer to this question about harm affects the arguments for responsibility.

Analysts have pointed to two distinct types of harm that arise from past emissions.⁴ The first type of harm is the harm from a changed climate, such as the harm from sea level rise, the loss of agricultural productivity, storms, and droughts, harms which together we call physical harm. The second is the harm of using an unequal portion of the limited ability of the atmosphere to safely absorb

² Bastianoni, Pulselli, and Tiezzi (2004), den Elzen et al. (2005), Fuglestvedt and Kallbekken (2016), Mukherjee (1992), Müller, Höhne, and Ellermann (2009), Tol and Verheyen (2004) Matthews (2015).

³ Pachauri et al. (2010), Garvey (2008), Harris, Vanderheiden (2008), Neumayer (2000), Gardiner (2010), Caney (2005), Meyer and Roser (2010).

⁴ Gardiner (2004, p. 580), Gardiner (2011, p. 415), Traxler (2002, pp. 120–121), Pachauri et al. (2010, pp. 181–199).

carbon dioxide and other greenhouse gases, leaving less capacity for other people to use. We call this harm the excess use of the atmosphere.

Our core claim is that the logic, the merits, and the implications of the responsibility argument differ depending on which of these two harms is being addressed. The first type of harm, physical harm, although potentially very grave in the case of climate change, is conventional in that it is like injuries from other types of pollution or from torts more generally. Conventional theories for responsibility, such as theories of corrective justice and the Polluters Pay Principle, apply. The core difficulty, we argue, is that knowing who emitted what is not enough to apply a conventional theory for responsibility. Such a theory requires payments for wrongful harm. This means that a nation must compensate others to the extent its portion of emissions exceed the portion of the harm that it bears. To make this calculation, however, we must know not only who polluted in the past but also who has been or will be harmed by those past emissions. It is not enough to apportion the blame for “breaking” the atmosphere among countries.

The second type of harm, the excess use of the atmosphere, does not generate responsibility through conventional corrective justice theories. A claim of responsibility based on excess use of the atmosphere is an equality claim. It relies on the antecedent theory that all individuals have a right to an equal share of the limited ability of the atmosphere to safely absorb greenhouse gases. The “injury” is the violation of this antecedent right to an equal share of a limited resource. We call the underlying equality claim the Limited Resource Principle.

Arguments about responsibility for past emissions based on the Limited Resource Principle are, we argue, substantially similar to forward-looking arguments that the remaining ability of the atmosphere to absorb greenhouse gases should be divided equally on a per capita basis.⁵ However, the arguments for an equal per capita allocation of emissions rights moving forward are thought

⁵ For a similar observation, see Vanderheiden (2011, p. 25)

to suffer from significant problems.⁶ These problems apply equally, and possibly even more powerfully, to backward-looking theories of responsibility.

Below we discuss each type of harm, focusing first on physical harm and then turning to the harm from the excess use of the limited ability of the atmosphere to absorb greenhouse gases.

1 The Polluter Pays Principle and physical harm

The first type of harm from past emissions is the harm caused by a changed climate. Although more severe, this harm is similar to the harms from pollution more generally, such as the harms from toxins leaked into the water or from noxious gases emitted into the air. It includes the loss of agricultural productivity, sea level rise, increased storm frequency or intensity, changes in rainfall patterns and drought, disease, and species extinction. While for convenience we will call this type of harm simply “physical harm,” it also include harm that is not purely physical, such as the harm from forced changes to lifestyles and the resulting loss of cultures.

One of the most common versions of the view that polluters should be held responsible for the physical harm they cause is the Polluter Pays Principle, or PPP. A typical statement of the PPP is found in the Rio Declaration on the Environment. As adopted there, the PPP holds “[n]ational authorities should endeavor the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution . . .”⁷

The PPP is based on both economic and corrective justice arguments. The economic argument is that making polluters pay for the harm that they cause forces polluters to take all the costs of their actions into account. Without liability for pollution, polluters would be free to dump their waste on others, receiving the

⁶ See, e.g., Caney (2012).

⁷ Principle 16 of United Nations Environment Program (1992).

benefits of their actions without facing the costs. In economic terms, their pollution would be excessive because their private costs would be less than the social costs.

The corrective justice argument begins with the premise that individuals have a right, based in justice, to bodily integrity or to not otherwise be wrongfully harmed. As a result, corrective justice holds that “an individual has a duty to repair the wrongful losses that his conduct causes.”⁸

The focus of much of the literature on responsibility for the physical harm from greenhouse gas emissions has been on determining which emissions count. For example, under some versions of corrective justice, individuals are held responsible only if they knew or should have known that their actions were unduly risky or would lead to harm. In this case, individuals might not be responsible for greenhouse gas emissions from before a cut-off date because before that date, they might not have known their emissions would lead to harm. Other versions of corrective justice might excuse necessary or non-negligent actions like subsistence emissions, or they may follow Shue (1993) and focus on luxury emissions. Under these approaches, emissions below some baseline level would not generate responsibility.

There is, however, a second, equally important and more difficult fact about the world that has to be known before corrective justice can be applied: who has been or will be harmed, and by how much. The PPP and similar theories justify compensation only for the difference between the portion of harm an actor has caused and the portion that it bears. Just knowing who has emitted in the past – who “broke it” – is not sufficient.

To illustrate, it is helpful to consider concrete numbers. Assume that we have identified which past emissions were wrongful under the particular theory of justice being used, and that we have added up the past, present and future harm

⁸ Coleman, Hershovitz, and Mendlow (2015).

from those emissions. The total amount of physical harm caused by these past wrongful emissions is some amount. Arbitrarily designate that amount as \$100.

Let us suppose further, without tying the discussion to data on emissions and without making any claims about the members of each set, that one set of nations, call it N, emitted 70% of the past wrongful emissions and that the rest of the world, call it S, emitted 30%. We can say that of the \$100 of wrongful harm, N caused \$70 and S caused \$30.

This information is not sufficient to determine what, if anything, N owes S. The amount N owes S will depend on who has been harmed and by how much. For example, if S incurs all \$100 of the harm, N would have to pay S 70% of the \$100 harm that S bears, or \$70. If harms were shared equally by N and S, so that each bore \$50 of harm, N would have to make a net payment to S of \$20. N would have wrongfully caused 70% of the \$50 harm that S suffers, so N would owe S \$35. S, however, would have wrongfully caused 30% of the \$50 harm that N suffers, so S would owe N \$15. The net payment by N to S would be \$20.

More dramatically, if N bore 70% of the harm, the PPP would not demand any payments from N to S. The amount N would owe S for wrongful harm and the amount S would owe N would perfectly offset. And if N bore all of the harm, S would owe N \$30 even though N was responsible for most of the past emissions.

This simple example shows that the core claim of responsibility under the PPP and other corrective justice arguments is that some nations polluted disproportionately relative to the harm that they bear, not that those nations polluted by more than their equal shares. To determine responsibility under such theories, then, we need to know (1) who acted wrongfully in the past and to what extent, (2) the size of the harm caused by the wrongful actions, and (3) which nations have been impacted by the harm and to what extent.⁹

⁹ Note that the PPP does not determine the form of compensation. The obligation to correct harm from past actions can be met through any transfer of value. For example, in climate negotiations, it is contemplated that the developed countries – the high past emitters – would take

Substantial effort has been devoted to determining how much each nation wrongfully emitted in different years in the past. Using emissions data and choices about when emissions became wrongful and to which nations particular emissions are properly attributed, scientists have estimated each nation's proportionate responsibility for climate change harm.¹⁰ These efforts, while important, are not sufficient for determining what the PPP or corrective justice demands because they do not provide a measure of harm. Without knowing who has suffered what harm (or will suffer harm due to past emissions), we cannot determine what sort of obligations would follow from a given proportionate responsibility.

Estimating the actual physical harm from wrongful past emissions is a substantial task that would take us well beyond the scope of our discussion. There are, to our knowledge, no estimates of the harm that arises only from wrongful emissions. Instead, the existing literature has focused on the total harm from all emissions, wrongful or not.

From our review of the literature, here is what we know so far. Global mean temperature increases since the pre-industrial baseline have been about 1°C, with greater warming in the north than near the equator or in the south. If we were to stop polluting today, so that the only harm is the harm from past emissions, there would be some additional temperature increases as the climate equilibrates. The estimates vary depending on modeling assumptions, but the IPCC estimates that global mean temperature increase could be about another 0.5°C.¹¹

on greater emissions reductions obligations, transfer green technology to developing countries, or help developing countries adapt to climate change through cash payments.

¹⁰ See, e.g., Bastianoni, Pulselli, and Tiezzi (2004), den Elzen et al. (2005), Larsen and Hertwich (2009), Mukherjee (1992), Müller, Höhne, and Ellermann (2009), Peters (2008), Peters and Hertwich (2007).

¹¹ See Stocker et al. (2013) Chapter 12.5.2. The relevant measure is the so-called "constant composition commitment" which assumes that emissions stop in a chosen year (e.g., the year 2016) and measures the additional warming that will occur after that year.

Estimates of the harm resulting from these temperature increases vary widely. One source of estimates is integrated assessment models, which attempt to incorporate climate change and economics to measure the impact of policy choices. The most prominent of such models, the DICE (Dynamic Integrated Climate-Economy) model, estimates that for the period between 2010 and 2015, the total physical harm from climate change is roughly \$175 billion or about \$35 billion per year. Earlier years would also have harm but this harm is less because the temperature changes were smaller. Another prominent model, the FUND (Framework for Uncertainty, Negotiation and Distribution) model, estimates that temperature increases up to about 2.75°C actually create a global benefit (for example, by increasing growing seasons and reducing the need for heating).¹²

The IPCC has invested significant effort in determining which major weather events and other climatic changes are attributable to anthropogenic climate change.¹³ While these efforts are still in the early stages, the IPCC has concluded that most places in the world are currently experiencing some of the effects of climate change, including glacial melting, heat waves, drought, and changes in storm frequency and intensity. The IPCC, however, makes no attempt to measure the overall size of the harm or impacts.

Without diminishing the seriousness of climate change, we suspect from our review of the literature that the total physical harm from anthropogenic climate change to date (not just the harm caused by wrongful emissions) is modest and hard to distinguish from harm due to natural variability in the weather and the climate. Moreover, we suspect that alone, the physical harm is not sufficient to motivate the claim that responsibility for this harm is the first or even a very important principle of climate justice.

To illustrate, use the \$175 billion number from DICE as an estimate of physical harm occurring between the years 2010 and 2015. The estimate of harm

¹² See Figure 1A in Interagency Working Group on the Social Cost of Carbon, United States Government (2010).

¹³ See Intergovernmental Panel on Climate Change (2014), Technical Summary, section A-1.

for the period between 2005 and 2010 is about \$120 billion. Earlier periods, which are not estimated within DICE, would have correspondingly smaller harm because temperature increases were smaller. Let us say that the total physical harm has been \$500 billion. Assume that all of this harm was wrongfully caused.

Of the \$500 billion of wrongful physical harm, we would have to determine the portion that developed countries are responsible for. Use our made-up 70% number just for illustrative purposes.

We would then estimate how the harm is allocated among nations.¹⁴ Suppose for illustration that half of the harm has been experienced by developing nations.

Using these numbers, the developed nations would owe the developing nations \$100 billion.¹⁵ This is the size of the fund to help developing nations that has already been agreed to. It is also less than the cash on hand for many corporations. Of course, the actual numbers will be different. But even if the resulting obligations are greater by an order of magnitude, the numbers would still be relatively modest compared, as we shall see, to those required to correct for the excess use of the atmosphere.

To summarize, our core claim with respect to physical harm is that the determination of the compensation required under a theory of corrective justice entails comparing wrongful past emissions to the portion of harm that each nation bears. Merely knowing which nations have emitted how much in the past is not sufficient. We also must know who is harmed by those emissions, and in what amount. Our review of existing estimates shows that if responsibility for past emissions could be justified under a theory of corrective justice, the amounts owed under such a theory would be modest at best.

¹⁴ The DICE estimates are not broken down by region.

¹⁵ The developed nations would owe developing nations \$175 billion for the harms they wrongfully caused and would have a right to receive \$75 for the wrongful harms they bear, for a net of \$100 billion.

2 The Limited Resource Principle and the harm of excess use

An alternative source of wrongful action and harm is the excess use of the atmosphere's limited ability to safely absorb carbon dioxide. Because of the very long lifespan of carbon dioxide in the atmosphere, when one person or country emits carbon dioxide, they reduce the total remaining capacity of the atmosphere to absorb more. The countries that developed early emitted more carbon dioxide than later-developing countries, both on an absolute basis and per person. As a result, it is claimed, they used more than their fair share of the limited absorption capacity of the atmosphere. They therefore have an obligation to repair that harm, either by emitting a corresponding lower amount in the future or by paying an appropriate amount to those deprived of their share.

The claim can be decomposed into the following parts: (1) all humans have a right, based in justice, to an equal share of the atmosphere's absorption capacity; (2) overuse of the atmosphere by anyone, such as by forcible taking, causes harm to those who are thereby deprived of their own fair usage; and (3) those who so overuse the atmosphere must compensate others for the overuse. We call this the Limited Resource Principle, or the LRP.

Prior work on responsibility for past emissions has frequently relied on the LRP rather than the PPP. For example, Matthews (2015, p. 60) would allocate responsibility for climate change based on the "amount by which national climate contributions have exceeded a hypothetical equal per-capita share over time." Neumayer (2000, p. 186) suggests that "countries which have in the past emitted in excess of an equal per capita allocation should have less than their equal per capita allocation of emission rights in the future and vice versa for countries which have in the past emitted less than their equal per capita allocation." Pickering and Barry (2012, p. 670) similarly describe the origins of responsibility for past emissions in the language of the LRP:

Countries that have emitted more than their fair share of the Earth's capacity to safely absorb emissions have moral responsibilities towards low-emitting countries and those vulnerable to the impacts of climate change.

The compensable harm in each of these accounts is the harm of excess use, not the physical harm from a changed climate.¹⁶

2.1 The Limited Resource Principle as an equality principle

The basis for the LRP is different than the basis for the PPP. The PPP is based on a notion of wrongful injury, such as a violation of the right to bodily integrity, or the wrongful harm to privately-owned property. The LRP is based on the notion that justice demands that the atmosphere's limited ability to absorb carbon dioxide be shared equally by all humans. Excess use of the atmosphere is a wrongful taking because it forcibly takes what justice properly allocates to someone else. The basis for the LRP is thus an antecedent theory of justice that requires the equal allocation of the atmosphere.¹⁷ That is, claims of responsibility based on the LRP are, by their terms, based on equality rather than on the sorts of injuries or harm that support the PPP.

The difference in the implications of the two theories is enormous. Recall that our crude, back of the envelop estimate of the size of the obligations under the PPP was on the order of \$100 billion in total transfers from those who have polluted excessively to those who have been harmed. Compare that to the payments due under the LRP.

Obligations under the LRP are equal to the value of a nation's excess emissions over its equal per capita share of emissions. Of course, what an "equal per capita share of emissions" means is up for debate. Equal per capita shares could be computed by equalizing emissions among individuals living in each year, each generation, in all generations up to the present, or in some subset of future generations. What counts as relevant emissions could also vary. We could seek to equalize only luxury emissions, or weigh past emissions based on the

¹⁶ Others recognize the LRP as a distinct principle, but assume that the compensation obligations under the LRP are substantially similar to those under the PPP. See, e.g., Gardiner (2011, p. 415); Traxler (2002, pp. 120–121).

¹⁷ See, e.g., Singer (2004, p. 35).

social benefit created. Regardless, we would follow the same pattern in calculating the required payments.

Assume for illustration that we choose to equalize per capita emissions on a yearly basis, and to treat all emissions equally. For each year, we must calculate the difference between each nation's emissions and its per capita allowance. Under the foregoing assumptions, the per capita allowance would be the amount of emissions the nation would have if all individuals living in that year were allocated an equal share of the atmosphere used in that year. It is the global average per capita emissions multiplied by that nation's population. We then multiply this difference by a carbon price to determine that nation's compensation obligation for that year. The total obligation is the sum of all past years' obligations. The amounts owed for each year would have been due in that year, however, so before taking the sum, we must compute the future value of each past year's obligation using a correctly determined discount rate.¹⁸

To get a sense of the amounts at stake, assume that the carbon price in 2015 is \$37/ton, which is the price used by the United States government for making climate change policy.¹⁹ The earliest data we have on emissions is for the year 1850 and the most recent year is 2014, so use the time period from 1850 until 2014.²⁰

¹⁸ Note here that the lower the discount rate, the lower the obligations under the LRP. Over long periods the choice of a below-market discount rate can produce obligations that are only fractions of the amounts that would be due under a market rate.

¹⁹ <https://www3.epa.gov/climatechange/EPAactivities/economics/scc.html>.

²⁰ One complication is that carbon prices should vary with time. Under the standard economic methodology for pricing a limited resource, Hotelling prices, the price should go up over time with the discount rate. If the discount rate used to determine future values and the rate used to determine Hotelling prices are the same, the two effects perfectly offset. We can, therefore, simply assume a constant carbon price and take the future value of obligations from prior years. We use the data from den Elzen et al. (2013), available for download at <http://www.pbl.nl/en/publications/countries-contributions-to-climate-change>.

Using the procedure outlined above, we estimate that the United States would owe just under \$13.1 trillion (that's \$13,100,000,000,000). To get a sense of the magnitude, the United States currently gives about \$20 billion in foreign aid each year, so it would have to agree to pay more than 650 years of foreign aid to satisfy its obligations for past emissions. Looked at differently, the obligation would just about double the US national debt held by the public (which is, as we write, \$13.6 trillion). The EU would owe \$4.5 trillion. Russia would owe \$3.6 trillion. Brazil and Indonesia would each owe \$1.7 trillion because of their massive deforestation.

On the recipient side, India would have a right to receive \$11.4 trillion. Its current GDP is \$1.9 trillion, so it would receive a payment equal to six times its annual output. China would have a right to receive \$10.5 trillion, which is about 1.5 times its current GDP. The continent of Africa, other than South Africa and Nigeria, would, as a whole, receive \$2.4 trillion.

The total payments add up to almost \$23 trillion which is more than 200 times the transfers that would be due under our estimates for the PPP. Using the LRP as a basis for climate obligations would, under any estimate, result in massive payments. If responsibility for past emissions is a first principle of climate justice in the sense that it is of first order importance to the design of climate policy, the theory has to be based on the LRP, not the PPP. Therefore, we turn to an examination of the LRP.

2.2 Equality: going forward versus going back

As noted, the theory underlying corrective justice as informed by the LRP is that individuals have a right, based in justice, to an equal share of the ability of the atmosphere to absorb carbon dioxide. This, however, is the same theory that is used to support arguments that individuals should be given equal per capita rights to the atmosphere on a forward-looking basis.²¹ Both are based on a claim that all individuals have an equal right to a share of the atmosphere. The difference is that when used to determine responsibility, the LRP is about correcting unequal past

²¹ See, e.g., Singer (2004); Shue (1999, pp. 531–545); Vanderheiden (2008).

use of the atmosphere while claims for equal per capita emissions rights are usually about future use. Past use raises some additional concerns not raised by future use, such as how current generations might be held responsible for the negligence of earlier generations, or whether responsibility can be imposed collectively, but it is otherwise the same.

We can, therefore, consider the merits of the LRP by analyzing the arguments that have been considered for the equal per capita allocation of emissions rights. Caney (2012) provides a relatively recent and comprehensive account of the arguments for and against equal per capita emissions rights. Below, we focus on two issues: (i) whether the LRP can be limited to just the atmosphere, and (ii) whether the LRP is supported by an attractive theory of justice.

We consider the former at length because there is a strong intuition that allocating the atmosphere equally is required by justice but that same intuition is not widely held for other valuable resources, such as land, water, minerals, or oil. We consider the latter because a careful justification is necessary if the LRP is to be used as a basis for climate policy.

2.2.1 Not limited to the atmosphere

Some people think the atmosphere must be divided equally among all humans but do not make the same claim about all valuable resources.²² The question is: why? If the atmosphere is to be equally owned by all humans as a matter of justice, why shouldn't all other resources? That is, why shouldn't climate justice be considered simply one piece of a general theory of justice? This idea, called Integrationism in the environmental context, is traceable to Beckerman and Pasek (1995), and has been considered in Caney (2012), Schelling (2000), and Bell (2013) among other places.

The Integrationist arguments apply equally to backward-looking arguments based on the LRP as to forward-looking distributive justice arguments. To demonstrate, consider again the LRP as formulated above, but this time with

²² See Vanderheiden (2008, p. 103).

brackets inserted: (1) all humans have a right, based in justice, to an equal share of [the atmosphere's absorption capacity]; (2) overuse of [the atmosphere] by anyone, such as by forcible taking, causes harm to those who are thereby deprived of their own fair usage; and (3) those who so overuse [the atmosphere] must compensate others for the overuse.

Now replace the text in the brackets with the name of any limited resource. Those who have used more than their fair share of water, oil, natural gas, land, or any other limited resource have deprived others of their own fair usage of that resource, and thus, must compensate them via the exact same reasoning. Unless there is some reason to distinguish the capacity of the atmosphere to absorb carbon dioxide from any other unequally-distributed limited resource, the LRP would require any nation that is well-off with respect to a particular resource to compensate the other nations for the inequality.

Distinguishing the atmosphere so as to justify applying the LRP only to climate inequalities is difficult, if not impossible. Doing so requires a substantive principle of equality that applies to the atmosphere but not to other unequally-distributed resources.²³

The first substantive principle that comes to mind is that of physical or territorial possession. A principle giving the right to nations or individuals to exploit the limited resources found on or under their land, or international norms or laws recognizing the right of nations or individuals to exploit resources found within their territory would limit the application of the LRP to the exploitation of resources not so found – e.g., the atmosphere.²⁴ Neither the principle nor the norms do the necessary justificatory work on their own, however. What is needed is an explanation of why physical or territorial possession of resources makes such possession just, particularly because, historically, many territories were taken by force.

²³ See Sen (1980).

²⁴ See Gardiner and Weisbach (2016, p. 120).

The best justification relies on the notion of territorial rights established through legacy. The idea is that although territorial acquisitions may have been made unjustly, unjust acquisitions become just over time because the injustice of the acquisition does not pass to the next generation of inhabitants. The principle of legacy has been heavily criticized, however, and even if it was accepted, would simply justify exploitation of territorial resources in previously-acquired territories in contrast to the current generation's exploitation of the atmosphere.²⁵ It would preclude a substantial portion of the corrective justice claims because they concern atmospheric misuses in previous generations.

The second substantive principle that might distinguish the atmosphere from other limited resources is based on John Locke's argument for private property.²⁶ The argument is that a claim to private property – and the concomitant right to exploitation – is just if and only if, at the time one claims it, two conditions hold: (1) the amount claimed is not more than the claimant can reasonably put to use, and (2) nobody is worse off after the amount is claimed.²⁷ Because emissions by an individual or nation deprive others of the opportunity to make those emissions, someone is always worse off when the atmosphere is claimed, so no one ever has a just claim to the atmosphere, and so emission inequalities should be corrected.²⁸

The key problem with using Locke's argument for private property is that it is impossible to distinguish the atmosphere from other limited resources under Locke's theory. The second condition never holds for claims to the atmosphere because any such claims necessarily deprive others of the opportunity to use some portion of the atmosphere. This necessary deprivation, however, is based on the fact that the atmosphere is a limited resource. So by the exact same reasoning, the

²⁵ For criticisms of the principle of legacy, see, e.g., Gardiner (2011); Pachauri et al. (2010); Shue (2005).

²⁶ See, e.g., Raymond (2003, p. 53).

²⁷ See, e.g., Bovens (2011, p. 128).

²⁸ Pachauri et al. (2010, pp. 187–188).

second condition never holds in the context of water, oil, arable land, or any other limited resource. As a result, possession through use of *any* of these limited resources is unjustified, and, therefore, the theory does not distinguish the atmosphere from any other limited resource.

Alternatively, we might look for our substantive principle of equality in the principles for climate justice that originate in theories of distributive justice. These substantive principles generally defend the equalization of resources necessary to securing some basic standard of human life. The necessary resources proposed by climate justice theorists are variously those that (a) enable societies to “meet the criteria of decency” Bernstein (2015, p. 131), (b) are either necessary to meeting subsistence needs or are those without which, people “miss out radically in all aspects of life” Bovens (2011, pp. 141–142), (c) play a role in the “socioeconomic life of humankind” Hayward (2007, p. 446), (d) show “respect for persons” Gardiner and Weisbach (2016, p. 107), or (e) ensure “that everybody obtains an equal access to some basic human right” Beckerman and Pasek (1995, p. 409).

Any of these substantive principles for climate justice could plausibly ground an obligation to equalize the use of the atmosphere. All of these substantive principles, however, fail to distinguish the atmosphere from other limited resources necessary to securing some basic standard of human life.²⁹

The best case for distinguishing the atmosphere from other limited resources seems to be pragmatic: although it is desirable to allocate all resources equally, we cannot do so because most resources are already claimed. But we are in the process of dividing up the atmosphere. Because it is both desirable and possible to allocate the atmosphere equally, we should do so. This is a justification based on feasibility. The extent that feasibility constraints should limit theories of climate justice is the subject of debate.³⁰ Nevertheless, under almost any view in which

²⁹ Bell makes a similar point in Bell (2013, p. 201).

³⁰ Compare the analysis in Posner and Weisbach (2010) to that in Baer (2012); Caney (2014); Nelson (2011); and Sachs (2014).

feasibility matters, we would still have to abandon the LRP as applied only to the atmosphere. As the numbers calculated above indicate, the size of the transfers required under the LRP would be so vast as to be infeasible.

We are left with the following theory of corrective justice under the LRP: (1) all humans have a right, based in justice, to an equal share of all, or all valuable, limited resources; (2) overuse by anyone, such as by forcible taking, causes harm to those who are thereby deprived of their own fair usage; and (3) those who so overuse a limited resource must compensate others for the overuse. In short, the LRP requires an equal distribution of all limited resources.³¹

2.2.2 Is the LRP supported by an attractive theory of justice?

The final question we address is whether the LRP is supported by an attractive theory of justice. We offer two initial comments here, without attempting a full exploration of the issue.

First, the LRP is not supported by the most widely accepted theories of justice. The LRP is a fully cosmopolitan theory, so it requires a theory of justice that creates strong obligations across nations. The PPP is a much weaker claim in this respect because under the PPP, actions by individuals in one nation have caused actual, physical harm to individuals in other nations. Even theories of justice that impose fairly limited obligations to people in other nations would likely support compensation for this type of harm. The LRP, which is about equal sharing of resources, requires much stronger international obligations. Many analysts, such as Rawls (2001) and Nagel (2005) might well support compensation under the PPP but not under the LRP.

The LRP is also a theory of equality, and as noted by Sen (1980), any theory of justice that requires equality must specify “equality of what.” Utilitarians seek to equalize utility or well-being. John Rawls focuses on shares of primary goods. Amartya Sen and Martha Nussbaum require equal access to items on a list of

³¹ A similar, though more briefly-reasoned argument was put forth in Beckerman and Pasek (1995, p. 409).

basic capabilities. Richard Arneson, Gerald Cohen, Ronald Dworkin and Thomas Nagel, among others, require equality of fortune. None of these theorists defend equality of limited resources alone (leaving aside the equally important question of whether they would require equality across nations).

The only theories of justice we know of that seem to equalize limited resources specifically were put forward in Steiner (1999), Pogge (2002, pp. 196–215), and Beitz (1979).

Steiner argues for a “right to an equal portion of the aggregate global value of territorial sites” Steiner (1999, p. 175), where the value of a territorial site is “the difference between the aggregate market value of all its contents and the aggregate market value of those of its contents that constitute improvements made to it by human activity” Steiner (1999, pp. 189–90). However, as Hayward points out in Hayward (2006, p. 366), by equalizing the difference between the unimproved and improved values of a territorial site, Steiner is making land value rather than limited resources the surrogate of justice.

In Pogge (2001, p. 60), Pogge argues for a Global Resource Dividend from the idea that “the global poor own an inalienable stake in all limited natural resources.” However, the Global Resource Dividend is simply one modification Pogge proposes to help alleviate the bigger injustice: global poverty. It is not a justified, moral imperative to equalize limited resources and only limited resources.³²

Finally, Beitz (1979) argues that the initial distribution of limited resources, which he calls natural resources, was morally arbitrary, and that behind an international veil of ignorance, people would agree to distribute them equally.

³² See specifically Pogge (2001, p. 60) (“The GRD proposal is meant to show that there are feasible alternative ways of organising our global economic order that the choice among these alternatives makes a substantial difference to how much severe poverty there is world-wide and that there are weighty moral reasons to make this choice so as to minimise such poverty.”).

It appears from Beitz (2005) however, that Beitz intended his argument for the equality of natural resources to be a backup position in case one rejects his argument for a fully cosmopolitan approach to justice. His cosmopolitan approach to justice goes well beyond the distribution of natural resources. The argument for equality of natural resources was based on an assumption that states are self-sufficient, an argument that he believes (and in fact is) false. As Beitz (p. 420), notes, “once that premise has been rejected, it turns out that the requirements of global justice are more encompassing than those arising only from a consideration of the arbitrariness of resource endowments – indeed, on a fully cosmopolitan view there is no separate question about natural resources.”

This leads us to our second comment, which is that the reason theories of justice do not endorse the LRP or similar principles is that the ownership of limited resources (or natural resources, following Beitz (1979)) is not the object of justice. The object of justice is some measure of human flourishing, such as capability, dignity, opportunity, or well-being.

At best, the ownership of limited resources is a surrogate of human flourishing: we might want to move toward equality of resource ownership in hopes that doing so might produce the sort of equality we care about. The problem with using limited resources as a surrogate, however, is that it is not a very good one. People in nations with vast limited resources often are not well off (by whatever metric the particular theory of justice uses), and people in nations without limited resources often are.³³ More importantly, even if ownership of limited resources were a good surrogate – or we were to find an even better surrogate – it is not clear why we should use a surrogate rather than looking to whatever the underlying measure of flourishing is that is used to justify the theory.

Moving forward without the use of surrogates, then, our objective is to design policies that are best able to bring about the measure of flourishing that constitutes a just state. These policies may include a climate policy, but need not. For example, if a just state is one where well-being is maximized, we may want

³³ For a similar observation, see Hayward (2006, p. 280).

policies that provide those who are badly off with money, access to clean water and medicines, or technologies rather than a climate treaty designed to equalize past or future emissions. That is once we remove the climate blinders, (Posner and Weisbach (2010, p. 73)), there are any number of policies that must be considered.

3 Concluding Remarks

One of the key issues in climate change policy-making is how to deal fairly with nations who have contributed disproportionately to the harms of climate change. Our main claim is that the arguments for responsibility for these harms differ substantively based on whether the harm considered is the physical harm from climate change or the excess use of a limited resource.

If the harm considered is the physical harm from climate change, we need to know not only who polluted in the past, but also who has been harmed by those past emissions, and in what amount. It is not enough for climate treaties to apportion responsibility among past emitters, without quantifying the amount of physical harm caused. Our back of the envelop estimates are that once we consider the level of harm caused by past emissions and its distribution, that the amount of compensation required under this theory is modest.

If the harm considered is the excess use of a limited resource, the compensation due could potentially be immense, but the corrective justice argument collapses into an equality claim and is therefore subject to the same criticisms leveled against forward-looking distributive justice theories. If nations are to be held responsible for the prior unequal uses of the atmosphere but not for the prior unequal uses of any other limited resource, a theory of equality must be put forth that justifies why the atmosphere is, to put it simply, special.

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