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Consumption-Based Emissions Accounting: the Normative Debate

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Abstract

The normative debate surrounding consumption-based emissions accounting, conceived of as a method for constructing national emissions inventories, is investigated. The focus is to examine whether such accounting would be more just than the current method of production-based accounting. It is argued that there is no good reason to think that consumption-based accounting would be less just, and some reason to think that it would be more just. The consequences of this for the overall question of whether to adopt consumption-based accounting are also investigated.

Keywords: Climate change; Climate mitigation; Consumption-Based Accounting; Justice; Production-Based Accounting.

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Introduction

The choice of accounting method for greenhouse gas (GHG) emissions is of central importance to climate policy. The method currently used is *production-based* (PB) accounting. UNFCCC instructs countries to submit annual inventories over 'greenhouse gas emissions and removals taking place within national territory and offshore areas over which the country has jurisdiction' (IPCC 2006, p. 1.4). However, in recent years, the competing idea of *consumption-based* (CB) accounting has attracted increasing attention. The idea behind this accounting method is simple: to count emissions where goods and services are consumed as opposed to where they are produced. For national emissions inventories, this means counting emissions from all domestic final consumption, imported or not, but subtracting emissions embodied in exports. The OECD, in a recent report, offers the following illustrative example:

> A wooden table is bought by a final consumer in France. It was transported by a German logistics company from Poland, where it was assembled from screws (produced in China) and wooden planks (produced in Lithuania). China provides the tools to cut the timber from Finland into wooden planks. The tools were manufactured from metal, which was produced in the UK using iron ore from Australia and machinery from Germany (Wiebe and Yamano 2016, p. 6).

PB accounting here registers the emissions from the manufacture and transport of the table in the respective countries: the screws in China, the machinery in Germany, and so on. CB

accounting, however, puts the emissions entirely on France's books.[3] It is common to include three types of emissions in CB accounting: emissions from energy used in households, emissions arising from production used for domestic final demand, and emissions arising from imports used either for domestic final demand or for inputs in production of domestic final demand (Munksgaard and Pedersen 2001, p. 330).

CB accounting can play several different roles. One is to illustrate the ecological footprint of individual and collective consumption. CB accounting is entirely uncontroversial if it is only used to reveal this kind of information. For example, it might be useful for combatting climate complacency in countries whose production-based emissions have declined. The more significant and controversial role for CB accounting, however, is that of an alternative method for constructing national greenhouse gas emissions inventories, which is what we focus on here. We are interested in the normative case for and against switching to a consumption-based method for constructing national emissions inventories.

Adopting CB accounting in that capacity would be consequential. As noted by the latest IPCC assessment report, total emissions among Annex B countries (industrialized countries and economies in transition) from 1990–2010 decreased by eight percent when counted in the production-based way, but increased by five percent when counted in the consumption-based way (IPCC 2014, pp. 373–374). Similarly, the OECD reports that from 2000-2011, CB accounting would have shifted emissions in the order of two gigatons of CO_2 annually from non-OECD countries to OECD countries (Wiebe and Yamano 2016). A switch to CB accounting would thus significantly alter both the baseline and stringency of national

[3] There are different methods for CB accounting. One favored by many researchers is multi-regional input-output analysis, or MRIO (see, e.g., Peters 2008, IPCC 2014, p. 373). The differences between the methods are due to technical details that do not matter much for the normative discussion.

mitigation commitments. While the difference between the two accounting methods has decreased in recent years, largely because of developments in China (Pan *et al.* 2017), there is no reason to suppose it will disappear or become trivial in the foreseeable future.

According to its supporters, there are two central attractions of CB accounting: It would be more environmentally effective and more just than PB accounting. It would be more effective because it would put more emissions on the national books of countries that tend to have more stringent climate mitigation commitments, which in turn would mean greater reductions (or smaller increases) in global emissions compared to the present system. And in placing a greater burden on developed countries, it would also be more distributively just. No longer could developed countries escape responsibility for emissions that have been 'offshored' to other countries because of the global division of labor.

The claim that CB accounting would have beneficial environmental effects has been the subject of extensive discussion. We instead focus on the much less investigated claim that CB accounting would be more distributively just. More specifically, we offer a systematic discussion of the arguments for and against moving to a system of CB accounting, from the perspective of just burden sharing in the context of climate policy.

We argue that none of the standard principles of climatic burden sharing gives us convincing reason to think that CB accounting would be less just than PB accounting. Indeed, even if we assume that countries' climate burdens should be sensitive to the level of their own emissions and hold that the Polluter Pays Principle supplies the right approach to climatic burden sharing, we lack convincing reason to prefer PB accounting to CB accounting. The Ability to Pay principle, meanwhile, suggests that CB accounting would be more just under the current circumstances. What the Beneficiary Pays Principle says is more

unclear, but this principle probably also implies that CB accounting would be more just under the current circumstances.

These results have interesting implications for the wider normative question of whether a move to CB accounting would be justified. For those attracted to a pollution-sensitive approach to climatic burden sharing, the fact that PB accounting is no more just than CB accounting means that the question of whether to switch to the latter method is largely settled by the expected mitigation effects of doing so. Thus, it should be decided primarily on empirical grounds.

Matters are more complicated if we believe, perhaps on the back of the Ability to Pay Principle, that CB accounting would be more just than PB accounting because if the expected mitigation effects of switching to CB accounting are worse than maintaining the status quo, then we must resolve the difficult problem of weighing burden-sharing justice and environmental effectiveness. We argue that there is no straightforward solution to this problem, but note that it can be mitigated by entertaining other forms of justice than burden-sharing justice.

One natural objection to the fruitfulness of our inquiry is worth addressing from the outset. It could be objected that investigating the normative case for CB accounting is unimportant since a switch to CB accounting is politically infeasible anyway. While arguments from infeasibility are not normative arguments proper – the claim that someone is unwilling to do *X* typically does not show that *X* should not be done – they do raise questions about the relevance of investigating a particular issue, so let us explain upfront why we think that a switch to CB accounting is worth discussing.[4] Part of the answer is that the question is

[4] For the difficulty of using political feasibility in normative arguments, see Caney (2014, pp. 128–131).

simply interesting, quite irrespective of considerations of political feasibility, but it is also because it is not obvious that CB accounting is politically unthinkable. Some argue that CB accounting is politically infeasible since it would please neither developed countries (who would be attributed with more emissions) nor developing countries (whose export sectors would be the target of outside pressure and regulation) (Afionis *et al.* 2017, pp. 8–9). Others, however, argue that CB accounting represents a politically tractable compromise between developed and developing countries, serving to lessen the blow of a global climate mitigation regime for the latter (Davis and Caldeira 2010, Grasso and Roberts 2014, Grasso 2016). In addition, it looks quite likely that states could enact *unilateral* policies that draw on a similar logic as CB accounting, such as border carbon adjustments (Böhringer *et al.* 2012, Roser and Tomlinson 2014, Lininger 2015). For example, states may impose tariffs on imports based on carbon content and exempt exports to unregulated economies from carbon taxes. Such policies could effectively imitate CB accounting, and to evaluate them, we need to consider the kind of issues and arguments we investigate. In short, it is conceivable that CB accounting could be adopted as a new global standard, and even if this does not occur, its underlying logic can still crop up in national or regional climate policies.

Taking Stock of the Effectiveness Debate

Before we address the question of CB accounting and justice, we provide a brief overview of the discussion about whether such accounting would be more environmentally effective, that is, more likely to lead to reductions in global emissions. This question has generated an intricate debate, and while we are by no means best placed to adjudicate it (we are political theorists, not economists), understanding it is essential for understanding the overall normative case for and against CB accounting.

Among its defenders, the overriding attraction of CB accounting is that it promises to solve the problem of *carbon leakage*. Carbon leakage occurs when emissions that were previously subject to stringent climate regulation move to a territory where they are less regulated or entirely unregulated (Babiker 2005).[5] This was a major concern in discussions surrounding the Kyoto Protocol, but because the level of climate ambition varies between countries, it is still relevant under the Paris architecture. In counting emissions at the point of final consumption, CB accounting solves the problem that emissions may escape stringent regulation simply by moving to another country. As long as the emissions go into goods consumed within a country, they would be subject to the climate regulation of that country regardless of their geographical origin (Peters and Hertwich 2006, p. 384, 2008a, p. 1406, 2008b, p. 55, Afionis *et al.* 2017, p. 3).

Proponents hold that CB accounting would also lead to several positive effects on how countries discharge their climate responsibility. Some argue that it would incentivize a greening of countries' export sectors (Caro *et al.* 2014, p. 641, Peters and Hertwich 2008b), which in turn would necessitate a transfer of green technology from developed to developing countries (Afionis *et al.* 2017, p. 4). Others argue that CB accounting could lead to more cost-effective mitigation (Steininger *et al.* 2014). Whereas PB accounting gives countries a reason to care specifically about their own territorial emissions, CB accounting does not. This in turn opens up more avenues for indirect mitigation (Duus-Otterström and Jagers 2012), allowing mitigation to occur where it gives the most 'bang for the buck.'

[5] *Strong* carbon leakage occurs when emissions move *because of* variation in climate policy. *Weak* carbon leakage occurs when emissions move for other reasons (Peters and Hertwich 2008a). Weak carbon leakage is widespread, but the evidence for strong carbon leakage is contested (Afionis *et al.* 2017). Supporters of CB accounting mostly focus on the so-called relocation channel of carbon leakage (Steininger *et al* 2016).

Skeptics doubt that CB accounting would have the kind of positive environmental effects that optimists envision. First, several scholars argue that the choice of accounting method would not matter if we had a comprehensive climate regime enforcing a global price on GHG emissions. Any method of accounting would then be equally environmentally and cost effective since 'markets pass on the incentives fully to all other agents in the supply chain, both upstream and downstream' (Steininger *et al.* 2016, p. 37, cf. Steckel *et al.* 2010). However, skeptics argue that even in the absence of a comprehensive climate regime, it is not clear that CB accounting would ramp up the global mitigation effort. Whether this occurs crucially depends on whether it would shift more emissions to countries with more stringent mitigation targets. More generally, as noted by Jakob *et al.* (2014), a reduction in emissions from a country's imports does not preclude that the same, or more, emissions are released somewhere else.

In addition to this, skeptics argue that CB accounting is inherently more complicated and unreliable than PB accounting. CB accounting requires production-based emissions data *plus* data over imports and exports. In practice, this means relying on more models and assumptions, which in turn introduces greater uncertainty (Peters 2008, pp. 14, 19, Peters and Hertwich 2008b, p. 60).

Let us offer a few general remarks about the debate over the environmental effectiveness of CB accounting. First, there seems to be agreement that CB accounting is indeed more complex than PB accounting. However, scholars disagree about how great a problem this is, with some stressing that the relevant data is either in place or could be generated without much difficulty (Peters and Hertwich 2006, Grasso and Roberts 2014) and others arguing that the additional difficulties are prohibitive at least in the short term (Afionis *et al.* 2017).

Second, since CB accounting is yet to be put into use, economists have to rely on models, and modelling the effects of a switch to CB accounting is of course very difficult. Claims about what CB accounting would or would not lead to should therefore be treated with a healthy dose of skepticism. It should be noted that economists have mostly studied unilateral adoption of CB accounting (Steininger *et al.* 2012, Lininger 2015). The effects of a global adoption of CB accounting have been much less investigated (Afionis *et al.* 2017, p. 15).

Third, even those who argue that CB accounting would have positive effects universally recognize that it is not a magic bullet. The environmental effects of CB accounting depend on a complex set of parameters, such as market effects and the surrounding climate policy architecture (Lininger 2015, Steininger *et al.* 2014). Thus, CB accounting will only translate into a reduction in total emissions if certain further conditions obtain. Moreover, if efforts to *switch over* to CB accounting are a recipe for political deadlock, then CB accounting could hamper the global mitigation effort even if the environmental effects of a widely adopted and endorsed system of CB accounting would be positive.

The conclusion is that the expected environmental effects of switching to CB accounting are simply unclear. While positive environmental effects are highly important for the normative question of whether a move to CB accounting would be justified, at this point we do not know whether such effects would obtain.

We will return to the role of environmental effects when we formulate a more general conclusion as to whether a move to CB accounting would be justified. However, positive environmental effects do not exhaust the potential reasons to prefer CB accounting. As noted

above, many also argue that such accounting would be preferable because it would be more just. We now turn to that question.

Arguments from Burden-Sharing Justice

It is common to claim that CB accounting is a more just way of allocating emissions to countries (Peters and Hertwich 2008b, p. 55, Davis and Caldeira 2010, p. 5691, Grasso and Roberts 2014, p. 544). However, this claim rarely moves beyond quick assertions in the literature. Here, we systematically address justice-based arguments for and against CB accounting. Our focus is on *burden-sharing justice*, that is, the just distribution of costs or efforts to address climate change. We argue that while some accounts favor CB accounting, none give us strong reason to reject it.

It is crucial to note that the claim that CB accounting is more (or less) just than PB accounting assumes that *greater attribution of emissions means greater climate responsibility*. Unless the climate responsibility a country is assigned were sensitive to its level of emissions, there would simply be nothing to say about the choice of accounting method from the perspective of burden-sharing justice. However, it is natural to assume that being attributed more (less) emissions means being ascribed greater (lesser) climate responsibility as it affects the baseline and stringency of mitigation targets. For example, Sweden's commitment to reduce GHG emissions by 40 percent by 2020, and to be carbon neutral by 2050, would be more challenging under a system of CB accounting simply because it would put more emissions on Sweden's books. Unless otherwise specified, in what follows, we will assume that climate responsibilities are sensitive to emissions in the sense that if a country is ascribed more emissions, the burdens it is expected to shoulder thereby tend to increase. Note that we need not endorse that assumption on normative grounds. The

point is simply that the choice of accounting method is relevant whenever countries' emissions are relevant for the climate burdens that they, rightly or wrongly, are assigned.

Since the choice of accounting method is concerned with whose books emissions are attributed to, a natural place to start is with the Polluter Pays Principle. Given its central role in discussions about climate justice, this is also where we focus the brunt of our analytical attention. However, because most believe that Polluter Pays should be supplemented by other principles, we will also investigate the merits of a switch to CB accounting from the perspectives of the Ability to Pay Principle and the Beneficiary Pays Principle.

The Polluter Pays Principle

Most climate ethicists agree that the distribution of climate burdens should be sensitive to countries' contribution to climate change (Caney 2010, Page 2011). This is the message of the Polluter Pays Principle (PPP), according to which countries should shoulder a share of the global climate burden proportional to their share of GHG emissions.[6] The most natural argument against CB accounting is that it clashes with this principle; since it would absolve export-heavy countries from a large share of their emissions, it would fail to make polluters 'pay.' As one critic puts it, CB accounting is inappropriate because 'producers are principally, logically and obviously responsible for emissions from production' (Liu 2015, p. 5).

[6] Different accounts of PPP may index 'share of emissions' to different time-periods, but a dominant version states that countries should shoulder a share of the global climate burden that is proportional to their share of post-1990 emissions. We will here leave out important questions such as whether 'polluters' should ultimately be understood as individuals, how to handle emissions of dead polluters, etc. For instructive discussions, see Caney (2010), Page (2011) and Roser and Seidel (2017, pp. 118–129).

On closer inspection, however, it is far from self-evident that PPP condemns CB accounting. Consuming goods and services that embody emissions is one interpretation of what it means to be a 'polluter.' PB accounting is arguably closer to an ordinary-language understanding of 'pollution' according to which a 'polluter' is someone who *releases* pollution. But ordinary language does not provide a reliable guide in these matters. Consider a hypothetical case in which a cruel dictator orders his fearful subjects to burn down a forest. If the subjects comply, they would be polluters in the ordinary sense of the word. Yet, since they only complied out of fear, it seems that the dictator is the real polluter. Thus, as this example suggests, the relevant question for PPP is who is *responsible for* emissions.

Causal Responsibility for Emissions

Responsibility for emissions can be construed in several ways, but any plausible account must include an element of causation (Steininger *et al.* 2014, p. 77). Yet, it is not as straightforward as it may seem to move from an ideal according to which those who cause a problem should pay to the conclusion that CB accounting is inappropriate. Philosophers argue that there are two distinct concepts of causation: causation as dependence and causation as production (Hall 2004). The former thinks of causation in terms of whether a factor is necessary for an outcome: *X* causes *Y* if and only if *Y* would not have happened in the absence of *X*. Causation as production, on the other hand, defines causation in terms of contributing to an actual outcome. On this view, *X* is a cause of *Y* if *X* played a role in the actual occurrence of *Y*, irrespective of whether *Y* would have occurred even in the absence of *X*. Now the problem is, as Roser and Tomlinson note, that producers and consumers are not distinguishable on either view. The consumers' demand and the producers' willingness to meet this demand are both necessary for emissions to occur and inputs to the actual causal

sequence. We therefore cannot say that one party causes emissions while the other does not. Instead, they are *jointly* causally responsible (Roser and Tomlinson 2014, p. 238).

Against this, it could be argued that only the actions of producers are necessary to produce emissions. After all, consumers' demand for goods can go unsatisfied, whereas producers emit regardless of whether what they produce ends up being consumed. Although true, this does nothing to change the point that consumers and producers are jointly causally responsible for emissions that occur for the sake of goods that *do* end up being consumed. Whenever goods are consumed, it no longer matters that producers are more causally fundamental in the sense just indicated.

Another response is that while consumers and producers are jointly causally responsible, perhaps one party is *more* responsible than the other. After all, it does not follow from the fact that consumers and producers are jointly causally responsible that they are *equally* so, and as long as producers are more responsible for emissions than consumers, we can mount the argument that CB accounting is inappropriate.

Conceiving of causal responsibility as a matter of degree is a tricky philosophical issue that has received increasing attention in recent years (Kaiserman 2018). Lewis (2000) suggests that degrees of causal contribution can be understood in terms of how sensitive one event is to the influence of another event. As Tadros (2018, pp. 415–418) explains, Lewis' view is that the magnitude of the causal contribution that one event makes to another depends on the range of alterations that could be made to the first event without that affecting the second event. This view provides a way in which we could assess whether producers have more 'causal power' than consumers or vice versa. For example, if a minor change in the actions of producers would substantially change the amount of emissions, but it would take much more for consumers to change the amount of emissions, then we could conclude that

producers have more causal power – contribute more to the overall level of emissions – than consumers.

Whether such a difference in causal power exists is difficult to settle. It seems plausible that the effect of minor changes in consumer and producer behavior varies between types of products and services, and it is therefore hard to draw general conclusions about whether consumers or producers are more causally responsible for emissions. Investigating what difference in causal power, if any, exists between consumers and producers is a neglected topic and a promising avenue for future research. Here, however, we stick to the conclusion that consumers and producers are jointly causally responsible for emissions as this is sufficient to cast doubt on the claim that CB accounting would absolve polluters. If future research were to demonstrate that producers are more causally responsible for emissions than consumers, this conclusion would have to be adjusted, but it would not change fundamentally.

Agent-Responsibility for Emissions

Perhaps we can make better progress by appealing to a thicker understanding of responsibility than mere causation, for instance, in the sense that one party is more in *control* of its contribution to the causal sequence than the other. Following Roser and Tomlison (2014), one option is to use what Peter Vallentyne refers to as *agent-responsibility* as the relevant standard. Vallentyne argues that an actor is 'agent-responsible for a choice or outcome to the extent that it suitably reflects the exercise of her agency' (Vallentyne 2008, p. 55, cf. Scanlon 1999, pp. 248–249). This notion is narrower than causal responsibility in that mere causal contribution is not sufficient to establish responsibility – the outcome must be knowingly brought about with at least some degree of voluntariness. Yet, unlike moral

responsibility, it does not refer exclusively to outcomes for which an agent is praise- or blameworthy.[7]

If we adopt agent-responsibility as the relevant standard, it could be argued that PB accounting is appropriate. Because countries can regulate how goods and services are produced on their own territory, they have good control over the emissions involved in their production. By contrast, they have limited opportunities to regulate how imported goods and services are produced. This means that PB accounting, unlike its consumption-based counterpart, holds countries responsible for emissions that 'reflect the exercise of their agency.'

The most powerful way of fleshing out this argument draws on jurisdictional control, that is, the power to control emissions through legislation and regulation (Peters 2008, p. 20, Liu 2015, p. 4). When a factory relocates from country *A* to country *B*, it also comes under the laws and regulations of *B*. Country *B*'s laws and regulations are, however, something *B*'s government has the exclusive right and ability to control. Given this, it could be argued that it would be unfair to hold *A* responsible for the factory's emissions. Even though *A* might import goods produced by the factory, unlike the government of *B*, it lacks the ability to govern the factory (Brülde and Duus-Otterström 2015).

While this argument has initial plausibility, it has several problems. First, note that the crucial question is not whether there is an asymmetry between *A* and *B* in their ability to govern factories in *B*, but whether there is an asymmetry between a country's capacities to

[7] For moral responsibility, see Miller (2007, pp. 100-102). Understanding responsibility for emissions as a question of moral responsibility means asking who is to blame for the emissions. We focus on the wider concept of agent responsibility not because we think that GHG emissions cannot be blameworthy but because attributing blame does not add anything that is not captured by the quest for attributing control over emissions.

control *its own* production and *its own* consumption. Since countries seem perfectly able to control their own consumption through, for example, product standards, consumer information campaigns, and tariffs, it is unclear that this kind of asymmetry exists (cf. Kondo *et al*. 1998). It is consequently also unclear that countries are less agent-responsible for the emissions associated with their consumption.

A second problem is that, at least in standard cases, both producers and consumers seem agent-responsible in that they 'knowingly and avoidably play their part in the global economic structure that ultimately leads to emissions' (Roser and Tomlinson 2014, p. 237). If developing countries actively seek to enhance their role of exporter in the global economy, it is not plausible to describe their role as one for which they are less agent-responsible. Only if international companies were able to force their factories on unwilling developing countries would it be safe to conclude that the latter are not agent-responsible. But that is surely not accurate as a general description.

It should be noted, however, that insofar as international trade relations *are* involuntary, there is a sound case for saying that consumers are more agent-responsible than producers. If an exporting country has no real choice but to produce emission-intensive goods and services for international trade, say, because it could not satisfy the basic needs of its population otherwise, then we should conclude that the importing countries are more responsible for its emissions. In effect, the importing countries would then take advantage of a hard choice facing the exporting country. But, again, it is not clear that actual trade relations have this

strongly exploitative character, at least not in general. Hence, exploitation can at most offer a defense of CB accounting in individual cases.[8]

Brute Luck as an Argument for Consumption-Based Accounting

A related argument for CB accounting is that such accounting avoids penalizing countries for having a pollution-intensive resource base (cf. Peters and Hertwich 2006, p. 384). Drawing on the prevalent idea that brute luck exonerates (Dworkin 2000), this argument maintains that the extent to which countries rely on fossil fuels is to a substantial degree a matter of luck. Some countries just happen to have more pollution-intensive resource bases than others, and since it is difficult to change one's resource base, it is unfair to hold countries responsible for emissions on the production side.

This argument may seem hopeless as countries always have at least some choice over what they produce (and export) regardless of their resource base. Hence, just as emissions arising from consumption cannot be described as all down to choice, emissions arising from production cannot be described as all down to brute luck. But the argument only relies on the weaker claim that consumption tracks choice *more closely* than production. The examples that best support this claim are the natural resources that countries happen to have in virtue of sheer geographical luck. For example, one explanation of Sweden's comparatively modest territorial emissions is that it has several large rivers in remote areas, allowing for extensive hydropower. Other countries may lack such resources, making their reliance on fossil fuels more understandable.

[8] For the argument that CB accounting tracks agent-responsibility better when the exporter is very poor, see Roser and Tomlinson (2014). For exploitation, see Valdman (2008). For coercion in an international context, see Valentini (2011).

Differential brute luck should indeed play a role in climate policy (Caney 2012). However, there are caveats around using it in a defense of CB accounting. For one thing, CB accounting would not absolve countries that need to burn coal or oil to meet their own energy demand. For another thing, CB accounting creates an incentive for other countries not to import goods and services from countries with an emission-intensive resource base. Hence, it is far from obvious that countries with bad geographical luck would be less disadvantaged under a system of CB accounting than under a system of PB accounting.

In sum, the idea that polluters should pay does not speak against CB accounting unless one presupposes that polluting is uniquely tied to producing emissions. On the other hand, none of the standard ways of fleshing out responsibility straightforwardly suggests that it would be more just to assign such responsibility to consumers either.[9] Thus, we conclude that the Polluter Pays Principle neither supports nor condemns CB accounting.

The Ability to Pay Principle

Some argue that the burdens of climate policy should be shared based on the so-called Ability to Pay Principle (APP). According to this principle, ascriptions of retrospective responsibility are irrelevant for burden sharing. Countries should simply shoulder climate burdens in proportion to their ability to do so (Roser and Seidel 2017, pp. 140–149). This is often taken

[9] Partly for this reason, some have explored *shared responsibility* models in which emissions or costs are split between producers and consumers (Lenzen *et al.* 2007). For reasons of space, we cannot explore this intriguing idea here.

to mean that countries should pay in proportion to their GDP. Thus understood, climate justice is when the rich pay, and the richest pay most.[10]

Taken by itself, APP has no implications whatsoever for the choice of accounting method. It is simply uninterested in how emissions are attributed to countries. However, we can evaluate what the principle would say when, as is currently the case, greater emissions tend to entail greater burdens. Under such circumstances, the principle would say that we have strong reason to prefer CB accounting to PB accounting, as CB accounting would shift climate burdens from poorer to richer countries (Davis and Caldeira 2010, Wiebe and Yamano 2016), which is what APP cares about.

How robust is this argument? It is clear that CB accounting would not burden richer countries more if, counterfactually, poorer countries were the net-importers of emissions. However, such a world is very unlikely, at least in the short to medium term. The international pattern of traded emissions is deeply intertwined with the global division of labor (Grasso and Roberts 2014). APP therefore recommends CB accounting for the foreseeable future.

The Beneficiary Pays Principle

Some suggest that climatic burdens should be assigned to countries based on the so-called Beneficiary Pays Principle (BPP), according to which '[a]gents can come to possess obligations to lessen or rectify the effects of wrongdoing perpetrated by other agents through

[10] In a different version, the principle defines 'ability to pay' in terms of the welfare costs of shouldering burdens as opposed to absolute ability (Miller 2007). The Ability to Pay Principle is usually considered as a supplement to the Polluter Pays Principle (Caney 2010). Here, however, we treat it as a freestanding principle.

benefiting, involuntarily, from the wrongdoing in question' (Butt 2014, p. 338).[11] In the case of climate change, the message of the BPP is that the costs of combating climate change should be borne (at least in part) by those who have benefited from emission-generating activities, in proportion to their benefiting (Page 2012).

Like APP, taken by itself, this principle does not have any implications for the choice of accounting method. Since BPP is concerned with benefits the emissions have created, whether the emitters are producers or consumers is irrelevant. However, against the background of current practice where greater emissions tend to entail greater burdens, a switch to CB accounting might appear to align rather well with what BPP prescribes. CB accounting would generally shift burdens from developing to developed countries, and it is often argued that developed countries have benefited most from the processes and practices that created climate change (Shue 1999, Füssel 2010).

Interestingly, however, whether BPP supports CB accounting depends on how we weigh present versus historical benefits. On a historical perspective, there is little doubt that the developed countries have drawn the largest benefits from emission-generating processes. If we instead look to the present, developing countries might derive the largest benefits. Given that more developed countries have access to, or could develop, production technologies that enable less emission-intensive production, using emission-intensive technology is arguably less beneficial for them than for developing countries. Hence, if we compare the status quo to a counterfactual situation where emission-intensive technology is

[11] BPP is typically considered a complement to the Polluter Pays Principle, e.g., by being sensitive to historical emissions while avoiding the problem of 'disappearing perpetrators' (Caney 2010, Page 2011). For further discussion, see Page (2012), Roser and Seidel (2017, pp. 130–139).

not available, developing countries might now benefit more from the status quo. It is therefore not clear that BPP supports a shift to CB accounting.

On the other hand, it might be argued that developed countries benefit from being able to import cheap (but pollution-intensive) goods from developing countries. Thus, they benefit indirectly from pollution-intensive production in developing countries. Whether BPP provides support for CB accounting (from the perspective of present beneficiaries) may thus depend on the relative size of the benefits that developing countries derive from emission-intensive production and the benefits that developed countries derive from importing cheap goods.[12] Determining the size of these benefits with precision is enormously difficult as it relies, among other things, on counterfactual assumptions about what the world would be like without emission-intensive production technology and international trade.[13] However, given that, historically, developed countries have gained the largest benefits from emissions, whereas the present situation is more ambiguous, we conclude that BPP provides at least initial support for a switch to CB accounting.

Summary

Whether CB accounting would be more just than PB accounting depends on one's standard of justice. When considered as a principle of justice, the Polluter Pays Principle gives us no reason either to endorse or reject CB accounting. The Ability to Pay Principle, on the other hand, does give us reason to endorse CB accounting, at least under current circumstances. What the Beneficiary Pays Principle says depends on how historical and present benefits are

[12] For some exploration of this difficult issue, see Ferng (2003) and Marques *et al.* (2012).

[13] For the difficulty of setting the baseline for BPP, see Goodin (2013, p. 485) and Lippert-Rasmussen (2017, pp. 85–86).

weighed and on whether the benefits from importing goods and services are greater than the benefits from burning fossil fuels.

Remarks on Weighing Burden-Sharing Justice and Effectiveness

The case for CB accounting depends on a number of empirical and normative propositions about which there is disagreement, chief of which are the expected effects of CB accounting for the global mitigation effort. It seems clear, however, that effectiveness and burden-sharing justice are the two main normative values. When we consider whether a switch to CB accounting would be justified, the important questions are whether doing so would distribute climate burdens more justly and (in leading to greater emissions reductions or smaller emissions increases) prevent climate-related harm. Any comprehensive normative analysis of CB accounting thus has to grapple with the question of how potential conflicts between these values should be handled.

When a normative question involves more than one value, we are dealing with the problem of pluralism. How should potential conflicts between burden-sharing justice and effectiveness be handled? Should we, as John Rawls (1999) famously argued, say that justice takes lexical priority over effectiveness, or should we rather say that the two values must be weighed against each other? Such questions are common in normative analysis and are very difficult to answer. Interestingly, however, insofar as we subscribe the popular idea that it is just that polluters pay for their pollution, our analysis reveals that we can largely circumvent these questions here. This is because there are no strong arguments for saying that CB accounting would be more unjust than PB accounting in this regard. In the absence of arguments showing that CB accounting would be more unjust, we can cut the question of justice out of the equation and focus on the question of whether a switch to CB accounting

would have beneficial effects. The battle for CB accounting will then be won or lost on effectiveness grounds.

Whether a switch to CB accounting would have beneficial environmental effects is, as we have seen, unclear. However, uncertainty about the effects of CB accounting does not make a decisive difference from a normative perspective. When we are unsure as to what would happen if we switched to CB accounting, we should focus on the *expected* effects of doing so. If there is a chance that CB accounting would lead to more mitigation than PB accounting, and little reason to think it would lead to less mitigation, then it could be worth trying even if, ultimately, its effects turn out to be negative. Such decision-making rules are standard fare in normative analysis (see, e.g., Roser and Seidel 2017, pp. 75–88). It is worth noting in this context that we should not only focus on the effects of CB accounting once it is up and running. Even if these effects are very positive, they might not be worth the costs of switching. If the world does not have time to change something as fundamental as the accounting system, as some critics argue, CB accounting could in principle be better, yet not worth pursuing.

So much for the idea that CB accounting is no less just than PB accounting. Matters are more complicated if we believe (say, on the back of the Ability to Pay Principle) that CB accounting is *more* just than PB accounting. Since CB accounting then has non-instrumental value, we are necessarily dealing with pluralism and have to consider potential conflicts between justice and effectiveness. Suppose the expected environmental effects of switching to CB accounting are, as some skeptics suggest, *worse* than the expected environmental effects of maintaining the status quo. Is the fact that CB accounting would be more distributively just enough to outweigh these effects?

If we give burden-sharing justice lexical priority over effectiveness, the answer is clearly 'yes.' However, it is implausible that any improvement from the standpoint of burden-sharing justice should trump any number of negative consequences. Thus, we are left with the question of how justice and effectiveness should be weighed. This question cannot be answered in the abstract. We must know exactly how much worse the expected effects of CB accounting are as well as how much more just it would be from a burden-sharing standpoint. And even when we know this, different people will attach different weights to the two values. Those who give great weight to justice will tolerate more negative effects than those who give it more marginal weight.

Some may worry that a tension between burden-sharing justice and effectiveness cannot be resolved. Since burden-sharing justice and environmental effectiveness are such different values, they are simply *incomparable*, meaning that we can never say whether a gain in one value is sufficient to outweigh a loss in the other. All we could say is that CB accounting might be better from one perspective but not the other.[14] It is important to note, however, that just distribution is not all there is to justice. We have discussed burden-sharing justice, which is a species of so-called 'duty-bearer justice', but justice also comes in the form of 'entitlement-bearer justice,' which focuses on what protection or compensation people are owed as a matter of justice. On this view, drawing a clear distinction between justice and effectiveness is misguided. If people will die or be otherwise harmed by unmitigated climate change, they will have suffered an injustice insofar as they are entitled to be protected from such effects. Therefore, if switching to CB accounting would on balance have negative effects for the climate, to do so would contribute to an injustice in its own right.

[14] For an instructive discussion of incomparability, see Chang (2014).

In expanding the concept of justice beyond justice among duty bearers, we have an additional reason to focus on the effectiveness of CB accounting, for the justice of this way of accounting would then partly depend on whether its expected effects are positive. It also means that justice, construed to encompass both a duty-bearer and an entitlement-bearer perspective, can serve as the common measure in virtue of which we can weigh the distributive and preventive effects of CB accounting against each other.[15]

Conclusion

The accounting method is secondary in importance to whether emissions are priced correctly. If there were a global price on carbon, the incentives to reduce emissions would arguably be the same on either method of accounting, and the distributive effects would disappear since producers could pass on the costs of their emissions to consumers by increasing prices. In the absence of a global price of carbon, however, the choice of accounting method might be significant. We have investigated normative arguments for and against CB accounting, focusing on whether this way of counting emissions would distribute the climate burden more justly than the predominant production-based system. We have argued that, from the perspective of the influential Polluter Pays Principle, there is no good reason to think it would be less just, but that the Ability to Pay and Beneficiary Pays Principles provide some reasons to think it would be more just. We have also argued that whether witching to CB accounting would be a good idea is largely a matter of the expected environmental effects of doing so.

[15] The distinction between duty-bearer justice and entitlement-bearer justice is developed in Caney (2009). See also Caney (2014) for a related distinction between justice as burden sharing and justice as harm avoidance.

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