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Political Realism, Feasibility Wedges, and Opportunities for Collective Action on Climate Change

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1. Overview

According to an influential realist argument about what it is politically feasible to do about climate change, regimes are infeasible if they make current citizens of powerful nations worse off, and thus an intuitively unjust global response to the problem of climate change that involves compensating large emitters for reducing emissions is the best we can realistically hope for and is thus the solution that we should actively promote even from an ethical point of view.

The realist conclusion of this kind of argument has been endorsed by a wide range of commentators in philosophy, economics, law, and international affairs such as John Broome, Eric Posner, David Weisbach, Cass Sunstein, and others. For example, Broome argues that the costs of mitigation must be shifted to richer future generations to ensure that no one now is made worse off by climate policy, whereas Posner, Weisbach, and Sunstein suggest that poor nations more vulnerable to climate change must make large transfer payments to rich nations who have less to gain to ensure that the rich nations are made no worse off.

In this chapter I examine the substance of the realist conclusions that these authors reach, and I identify a number of worries that differ depending on whether the implementation involves the kind of intergenerational transfers that Broome has in mind, or the intratemporal transfers that Posner, Weisbach, and Sunstein have in mind.

As a more general point, I also argue that the realist argument is invalid, and that the reason why it fails also points the way toward a more desirable realist response than these commentators endorse. The argument is invalid because it overlooks the fact that what it is in the interest of a nation to do can change depending on the actions of other nations. In particular, even if nations are as invariably self-interested as the realist premise of the argument assumes, other nations can still change what it is in their interest to do via threats, sanctions, and

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other measures, and can therefore make it in their interest to comply with international standards that it would not have been in their interest to comply with in the absence of those measures. As a concrete illustration of how this creates trouble for the argument in the particular case of climate change, I discuss an international climate treaty that requires signatories to impose globally optimal emissions taxes within their territory and empowers compliant nations to impose tariffs and other penalties on non-compliant nations as retaliation for non-compliance, somewhat akin to proposals by Joseph Stiglitz and William Nordhaus. I then offer a positive proposal focused on adding a number of feasibility enhancing features and complementary measures that I call 'feasibility wedges', involving creative diplomacy and political strategy that may be required in order to achieve anything in the direction of optimal policy outcomes. I identify a strategic dynamic that allows a 'meta-architecture for agreement' including intra- and intertemporal transfers to be incorporated into the emerging post-Paris 'bottom-up regime' for climate change, with the goal of incentivizing deeper emissions reductions more in the direction of optimal cooperative policy.

2. The Realist Argument and Efficiency Without Sacrifice

According to many, the primary problem standing in the way of an effective global response to climate change is a problem of political feasibility at the level of nations. The basic problem is that it is simply not in the interest of the current citizens of many nations to make substantial emissions reductions, and so, realistically, we should not expect substantial emissions reductions unless those people are 'bribed' into making them.

This is a large part of a realist explanation why no meaningful action on climate change has been observed despite its dramatic threat to future generations, and why more substantial action will not happen unless something substantial is done to make it in the interest of current people to make such reductions. Realists often also cite the prisoner's dilemma-like nature of the situation, whereby if an individual nation makes large reductions unilaterally without the cooperation of the other nations—or, if even a large but insufficient number of nations join together to make such reductions—they will suffer significant economic losses, and the climate-related outcome will not be importantly different either for their own citizens or for others around the world who are vulnerable to the effects of climate change. This is partly because of the phenomenon of 'leakage', whereby unilateral regulation to reduce emissions in one part of the world could create large incentives for industries there to simply relocate to the unregulated areas of the world and continue emitting in those unregulated areas—thereby increasing the costs to the unilaterally regulating regions, while undermining the realization

of any global benefits due to the leakage, and thereby reducing the value of the already small sliver of the global benefits for regulating nations.[1]

From these premises about our circumstances together with the characteristic view of realism, the *Realist Argument* I will focus on here reaches a conclusion we can call *Efficiency Without Sacrifice*:

> *Realist Feasibility Constraint*: Nations act only in the interests of their current citizens, so a response to climate change is infeasible if it requires a nation to act contrary to the interests of its current citizens.
>
> *Circumstances*: An optimal response to climate change requires substantial emissions reductions from the no policy status quo from many rich nations, and the current citizens of those rich nations would be made much worse off relative to business as usual by such reductions unless they were compensated for making them.
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> Therefore, given the *Realist Feasibility Constraint* and our *Circumstances*, the best feasible response is *Efficiency Without Sacrifice*, which involves reducing emissions to a level that is optimal,[2] while compensating current people, including citizens of rich nations, for the cost of making such reductions, thereby ensuring that no one including the rich has to make any sacrifices, and that the costs are instead borne by those who are more vulnerable to climate damages, because only in this way can substantial emissions reductions become feasible.

This argument has been endorsed by a wide range of commentators in philosophy, economics, law, and international affairs such as John Broome, Eric Posner, David Weisbach, Cass Sunstein, and many others.[3] It depends crucially on the idea that there are transfers ('side payments') between people that are both feasible and yield a pareto improvement over the no policy 'business as usual' status quo.

In what follows I first evaluate the different substantial versions of Efficiency Without Sacrifice that have been offered by these commentators. I suggest that the Realist Argument is invalid because it depends on a mischaracterization of

[1] Rendall (2015), Budolfson (2012), Nordhaus and Boyer (2000), and Böhringer et al. (2012) on leakage.

[2] Following standard usage, the so-called 'optimal' level of emissions is one at which the marginal cost of further reductions equals the marginal benefit from avoiding the damage from further emissions.

[3] For example Posner and Weisbach (2010: 6, 86, and 143); Posner and Sunstein (2008: esp. 1569–1570) (but see also Cass Sunstein, "US Should Act Unilaterally on Climate Change," http://www.bloomberg.com/news/2013-01-23/u-s-should-act-unilaterally-on-climate-change.html); Stewart and Wiener (2003: 102–103); Wiener (2007: 75–76); Broome (2012: 44–47).

the feasible options. Ultimately, this suggests complementary additional components that should be included in order to design the best feasible response to climate change.

3. Posner, Weisbach, and Sunstein's Version of Efficiency Without Sacrifice: Intratemporal Transfers

In this section, I raise some concerns about the substance of Posner, Weisbach, and Sunstein's version of Efficiency Without Sacrifice. On their version of the view, the way to achieve efficiency without sacrifice is for poor nations such as Tuvalu that have relatively more to lose from climate change to make large transfers to rich nations such as the United States so that the current citizens of the rich nations can be made better off vs. the no policy status quo by the combination of those transfers and incurring their share of the costs of a global harmonized carbon tax. This is a striking view about what is the best feasible option for combatting climate change because it is massively unjust.[4] But the idea is that although it is unjust, it is nonetheless better than doing nothing about climate change, and it is as good as we can hope to do, because transfers to rich nations from the poor and vulnerable is the only way of achieving efficient emissions reductions that is a pareto improvement (and thus satisfies the Realist Feasibility Constraint), and it at least makes the poor better off than they would be without efficient reductions.

An important problem with their argument is that economic models suggest that it is impossible to have a pareto improvement in this way if the relevant transfers are supposed to involve simply redistributing national outputs in our lifetime, as Posner, Weisbach, and Sunstein seem to assume. For example, William Nordhaus's multi-region RICE model implies that under optimal policy with a single global harmonized carbon tax all regions of the world have lower economic output than under the no policy status quo until nearly 2100. This means that even before making the transfers that Posner, Weisbach, and Sunstein have in mind, under optimal policy the current citizens of poor nations (along with

[4] These authors do not see this arrangement as involving injustice, but I will set aside that aspect of their argument in what follows. I also set aside for now the important problem of how to realistically ensure universal compliance among nations even given transfer payments, given that many nations would have strategic reason to refuse the offer of a pareto-improving transfer in order to bargain for a much larger payment—as it would be common knowledge that the success of the entire emissions reductions scheme could in such a way be held hostage by one large nation or at least a small coalition of nations. A similar problem is that unless a self-enforcing incentive structure is somehow created, it will be common knowledge that a coalition of nations can always scuttle the agreement at a future date by pulling out perhaps in a similar strategic move to bargain for even larger side payments. I return to this kind of problem near the end of the chapter, where I offer some substantive proposals for dealing with it.

everyone else) still have lower GDP than under business as usual.[5] If we add large transfer payments from these poor nations on top of that, then they would do even worse, and would certainly not be better off within these models than under the no policy status quo.

So, the Posner, Weisbach, and Sunstein view seems based on a basic misunderstanding of the relevant economic facts, since it seems to assume that there is a possible reshuffling between nations of national economic outputs over our lifetime that in conjunction with optimal emissions reductions yields a pareto improvement for citizens of all nations over the no policy status quo. There is simply no such reshuffling that is even remotely possible in models such as RICE that offer mainstream economic analyses of the sort that these authors otherwise cite with approval, because everyone is a net loser in the coming decades under optimal emissions reductions. Again, the key point is that the most basic tradeoff in the mainstream economic models of climate change is that *in all regions* near-term output must be sacrificed in our lifetimes to prevent larger sacrifices of output in the further future. Furthermore, these near-term sacrifices of GDP will be particularly large and painful for developing nations in the near-term if they are accomplished with a global harmonized carbon tax. So, it is mistake to suggest—as many glibly do—that the optimal emissions reductions recommended by economists would amount to nothing more than a small tax on the rich. The reality is that with a harmonized global carbon tax, the tradeoff we face according to mainstream models is to decide how much to sacrifice the wellbeing people in our lifetime—especially how much to sacrifice the desperately poor now who are the poorest people in the whole story—in order to protect more people in the further future.[6]

If one endorses a global harmonized carbon price—as do Posner, Weisbach, and Sunstein (and Broome, discussed later)—then this serious tradeoff looms.[7] However, even with a global harmonized carbon tax there is at least a theoretical way out of the problem that would allow us to protect the current poor while at the same time making optimal emissions reductions. This theoretically possible way out is to make transfers of future economic output from the future to the present (transfers of output across time), rather than merely transfers of economic output across nations within our lifetime as considered above.

However, Posner, Weisbach, and Sunstein's view has no compelling rationale if we endorse these kind of intertemporal transfers as realistic. That is because if we assume intertemporal transfers are sufficiently realistic, then all individual nations would be able to secure a pareto improvement over the no policy status

[5] Nordhaus (2010); Nordhaus's RICE 2010 model is available on his website.
[6] See Anthoff and Tol (2012); Schelling (1995).
[7] For alternatives to a harmonized tax that are superior on both utilitarian and distributive justice grounds, see Chichilnisky and Heal (1994) and Budolfson and Dennig (2020).

quo without receiving transfers from other nations by transferring *within their own nation* from their own future richer citizens to their current comparatively poorer citizens—because even in rich nations the no policy status quo ultimately leads to long-run GDP losses that are larger in present value terms than the current costs of their share of optimal mitigation under a global harmonized carbon tax.[8] This means that if intertemporal transfers are realistic, then there is no longer any good argument from the premises of the realist argument above for the distinctive conclusion of Posner, Weisbach, and Sunstein that the best feasible global climate regime must involve large transfers to rich nations from poor nations; instead, optimal emissions reductions can then be achieved with no sacrifice to current citizens by transfers from future compatriots with no transfers between nations needed.

So, the upshot is that Posner, Weisbach, and Sunstein's version of Efficiency Without Sacrifice seems to face a crippling dilemma: we've just seen that their view that poor nations must make transfer payments to rich nations falls apart if we endorse large intertemporal transfers as realistic, because then rich nations can compensate their current citizens in a way that makes everyone better off than under business as usual, and we previously saw that if we don't endorse large intertemporal transfers as realistic, then their view relies on the idea that optimal global emissions reductions can be conjoined with redistribution of national outputs over our lifetime in a way that leads to a pareto improvement over the no policy status quo—which is not possible according to mainstream analyses.

4. Broome's Version of Efficiency Without Sacrifice: Intergenerational Transfers

The previous section suggests that Posner, Weisbach, and Sunstein's substantive view is not supported by a good argument even if one endorses the basic premises and logic of the Realist Argument. The argument against their view is that either it depends on the assumption that intratemporal pareto-improving transfers are possible within our generation—which is not possible according to mainstream models since everyone in our generation is a loser from optimal emissions reductions—or else if intertemporal transfers are assumed to be feasible, then contrary

[8] Russia and Canada come to mind as possible examples of nations for which this may not be true, although some commentators would probably argue that even those nations would ultimately face losses under no policy that overwhelm the cost of compliance with an optimal global tax. If there are indeed a small number of these 'invulnerable' nations, we can then adopt the Posner, Weisbach, and Sunstein trick of side payments to bribe them into compliance—but because the number of these invulnerable nations is at least small and arguably nonexistent, there is at least no longer any good argument at all from the premises of the realist argument above for the distinctive conclusion that rich nations must in general be paid off by large transfers from poor nations.

to the distinguishing characteristic of their view it would in fact be better and feasible to achieve a pareto improvement without transfers from poor to rich.

In this section I discuss the more promising view of John Broome, who explicitly develops his version of Efficiency Without Sacrifice in terms of transfers across time. Broome's basic idea is that the best feasible outcome can be achieved by intertemporal transfers as described above from the future to the present that ensure that current people are made no worse off than under business as usual even while making optimal emissions reductions.

In more detail, Broome's idea is that the fully welfare optimal climate policy would require something like a cap and trade scheme with permits allocated so as to maximize welfare—and such a welfare optimal distribution of permits would involve distributing them entirely to the world's poorest people, which would imply a massive transfer of wealth from rich to poor, which is why it would violate the Realist Feasibility Constraint. Further, even if we imagine a less redistributional scheme to achieve the same optimal emissions reductions but with permits allocated in a way that bracketed redistributive aims, e.g. allocated to nations in proportion to economic output, current people would still be worse off than in the no policy status quo (again, as implied by the mainstream models mentioned in the previous section), and thus even this policy would violate the Realist Feasibility Constraint. In light of that, Broome's thought is that by using intergenerational transfers, we are able to compensate people now for the cost of making the optimal level of emissions reductions by transfers to them from future people (compatriots?) who will still be net beneficiaries due to their even larger benefit from reduced future climate damages, thereby making the desired level of emissions reductions feasible by the lights of the Realist Feasibility Constraint.[9]

Broome assumes that Efficiency Without Sacrifice is welfare inferior to Efficiency With Sacrifice and also that it is unjust, because he assumes that the former but not the latter would involve rich emitters being bribed to make emissions reductions by others who are not large emitters. Here is Broome:

> Efficiency without sacrifice has the further, serious demerit that it is unjust. . . . Under efficiency without sacrifice emitters are paid to reduce their emissions by the receivers. Receivers in effect bribe emitters not to harm them. This benefits both emitters and receivers, but only relative to the initial unjust state of business as usual. Efficiency without sacrifice perpetuates the injustice.[10]

[9] Note that Broome assumes intergenerational transfers are feasible, which is the assumption that in the previous section we saw is sufficient to undermine the Posner, Sunstein, Weisbach argument that the best feasible outcome consistent with the Realist Feasibility Constraint must involve poor nations compensating rich nations.

[10] Broome (2012: 46).

However, in tension with Broome's claim that Efficiency Without Sacrifice is worse and involves injustice, an initial quibble with Broome is that Efficiency Without Sacrifice could actually be welfare and justice superior to Efficiency With Sacrifice—and could be dramatically superior. To see why, note that Efficiency With Sacrifice assumes that transfers (in effect) happen via permit allocation and the resulting trading, and that these transfers are entirely between contemporaries (crucially, are *intra*temporal). Efficiency Without Sacrifice, in contrast, assumes that transfers are happening from future to the present—and in all mainstream economic models future people will be significantly richer than their contemporaries now. So, if it is really feasible to make those transfers across time in the way that Broome assumes, then the costs of climate change could be shifted to people in the future who are much richer than their counterparts now. There is then at least in principle no reason why the result could not be a large welfare improvement over Efficiency With Sacrifice if the latter must involve transfers between contemporaries, as Broome seems to assume.

The good news for Broome is that if his version of Efficiency Without Sacrifice is indeed welfare- and justice superior to Efficiency With Sacrifice, that would only mean that Broome's view was even more important as a focus for climate policy. Broome briefly considers and rejects the possibility that Efficiency Without Sacrifice could be an improvement over Efficiency With Sacrifice in this way, but his analysis ignores the distributional issues that tell most strongly in favor of the possibility that Efficiency Without Sacrifice is superior. In his analysis, Broome quite rightly highlights the fact that if intergenerational transfer is accomplished with, say, a lower savings rate, this will lead to forgone consumption later, and that this *could* lead to welfare losses in the future that are larger than the welfare gains to people now who benefit from the transfer; Broome then goes on to claim that cost–benefit analyses show that it is actually the case that the resulting welfare losses would outweigh the gains. But this is simply a matter of invoking cost–benefit analyses that are inadequate for the question at hand, since they ignore the distributional issues that matter—namely, whether transfers could shift the burden of mitigation entirely away from the poorest among the contemporary poor and even other relatively poor people now onto only the richest of the much richer future people who will exist. Cost-benefit analyses of the sort that Broome invokes completely ignore this distributional issue, and indeed cannot comprehend it since they look at only how an average person does at each time period.

A key mistake that causes Broome to ignore the importance of distributional implications is his assumption that emissions reductions only impose costs on the rich.[11] If this assumption were true, then his argument would go through that

[11] I take leading mainstream analyses to be the results of e.g. DICE, FUND, PAGE, which are the models used in the US social cost of carbon estimates, where PAGE was also used in the Stern Review (Stern 2006), and where DICE and RICE are Nordhaus's models. See Nordhaus (2015) for an overview.

Efficiency Without Sacrifice is worse, since then there would be no cost of mitigation to the very poor. However, this assumption is mistaken. To see where Broome makes this assumption, consider the key passage on these issues in *Climate Matters*:

> The difference between Efficiency Without Sacrifice and Efficiency With Sacrifice is the distribution of resources between people. Since emitters are mainly the current rich, whereas receivers are mainly the poor and future generations, the current rich are better off in Efficiency Without Sacrifice, whereas the poor and future generations are better off in Efficiency With Sacrifice.[12]

The crucial assumption here relevant to the issue of whether Efficiency Without Sacrifice could be better than Efficiency With Sacrifice is the assumption that the current poor would not pay any important part of the cost of emissions reductions—this is crucial to the inference that "the [current] poor . . . are better off in Efficiency With Sacrifice". However, that assumption is simply false according to mainstream economic analyses, where, again, the most important feature of the situation is that both rich *and poor* in our lifetimes suffer losses relative to business as usual if we make large emissions reductions, because a large carbon price retards the entire economy, and that is bad for the current poor, especially the current poor in developing countries. Again, that is the most important feature of our situation according to standard models: as noted above, if we are going to rely on a single global price on emissions, then we have to choose the least bad among seriously regrettable tradeoffs between people now and people in the future, keeping in mind that many people now who will be seriously harmed by carbon prices are desperately poor. That is the essence of the problem according to the economists conducting the standard modeling of climate change costs and benefits, and it is also the essence of the problem according to representatives of many of the world's poor in our actual international climate negotiations. (The fact that representatives of a few nations like Tuvalu have a different view is not an objection to this, and neither is the fact that many philosophers have a different impression.)

The upshot is that Broome's claim is problematic that Efficiency Without Sacrifice is worse than Efficiency With Sacrifice: his argument relies on the assumption that only the rich pay for mitigation, and that is inconsistent with the essence of the climate change problem according to the mainstream economic literature that Broome otherwise quotes with approval.

When distributional considerations are taken into account, I conjecture that Efficiency Without Sacrifice in the form that Broome has in mind would actually lead to a welfare- and justice improvement over Efficiency With Sacrifice—but

[12] Broome (2012: 45).

that is merely a conjecture. Getting to the bottom of this requires figuring out the answer to a very complicated economic question, and one that requires careful economic modeling to answer, and is not something that can be decided on the basis of existing economic modeling that is clearly inadequate for the task, as existing models ignore many of the distributional impacts of both climate damages and mitigation cost.[13]

To see the intuition behind this conjecture, suppose that the distribution of mitigation cost is regressive, where mitigation cost is understood to include all near-term forgone consumption under optimal emissions reductions. If so, then existing cost–benefit analysis models underestimate the welfare loss imposed by emissions reductions paid for by current people (because they implicitly assume that mitigation cost is distributed proportional to consumption), which means that they underestimate the welfare gain that would result from having some future richer people pick up the tab instead as would be the case under Efficiency Without Sacrifice as compared to Efficiency With Sacrifice. Insofar as the intergenerational transfers that Broome has in mind can also be made so that their incidence is progressive among the future people who pick up the tab, then that would be a further welfare-improving dimension that is not taken into account in existing cost–benefit analyses. When I exercise my best judgment about the actual distributional facts, including under Broome's intended intergenerational transfer scheme, I judge that both of the distributional considerations here would add welfare to Efficiency Without Sacrifice over the estimates of standard models—and would add enough welfare to make it a welfare improvement over Efficiency With Sacrifice.

I take it that there is no downside for Broome's view on this particular point, since if what I've conjectured is correct, that would mean that the view has even more desirable properties than has previously been acknowledged, since it might allow for a welfare improvement over even the policy that is welfare optimal assuming no transfers. It would also at least mitigate the worry that Efficiency Without Sacrifice amounts to an *injustice*—and, depending on how the costs and benefits play out, it could entirely remove that worry.[14]

Taking a step back, part of what is going on here is that by assuming the possibility of intergenerational transfers, Broome has moved outside the box of the standard literature on climate economics, which assumes that there can be no transfers except via the instruments of climate policy (i.e. the standard assumption is that the only transfers allowed are the small-scale transfers that happen implicitly via carbon prices, and perhaps also—although this is almost never investigated in the standard welfare economics literature—via permit allocation).

[13] For work that highlights the importance of the distribution of damages and mitigation cost, see Dennig et al. (2015) and Budolfson et al. (2017).

[14] See Broome (2012) on the injustice of efficiency without sacrifice, quoted above.

Once we are outside of that box of the standard literature, we can then consider non-climate-instrument-related transfers from rich to poor that are welfare improving, and if we are able to assume such transfers in large measure, then it is easy to describe conjunctions of those transfers with a climate policy achieving optimal emissions reductions that amount to a vast welfare improvement over any climate policy considered in isolation, including the climate policy that is welfare optimal assuming that no such transfers are possible. And the climate policy that is welfare optimal assuming that no such transfers are possible is simply Efficiency With Sacrifice, as described above (if we follow, as Broome does, other standard modeling conventions in describing that view, such as a harmonized global carbon price). So, if we allow large transfers outside the box, we can achieve a large welfare improvement over Efficiency With Sacrifice; and since Broome's Efficiency Without Sacrifice assumes that some large transfers are feasible, it is then easy to see how it *could* be a welfare improvement over Efficiency With Sacrifice.[15]

5. Is Broome's Proposal Feasible? How Realistic Is It?

All of the preceding emphasizes why it is very important whether the intergenerational transfers that Broome has in mind are genuinely *feasible* (in addition to being *theoretically possible*). If they are not feasible, then the entire discussion is irrelevant to what we should actually do assuming the Realist Feasibility Constraint.

I leave it to others to analyze the feasibility of intergenerational transfers. To be honest, I don't really understand in any detail how they are supposed to work in practice. But I look forward to seeing the results, and I am hopeful they could work—it is an important and exciting idea, including because it could improve both the welfare and justice properties of a realistic climate policy, as described in the previous section. In the meantime, in this section I'll focus on a number of further problems that seem to emerge, especially from a realist perspective.

Most importantly, even if some forms of intergenerational transfers are feasible, it is important to wonder what the distributional implications are of the (potentially idiosyncratic) subset of transfers that are feasible in addition to merely theoretically possible. The big worry here is that insofar as intergenerational transfers are feasible, it may be that only regressive transfers are feasible, with the consequence that the non-climate welfare cost of making those transfers could be larger than the climate-related welfare gain from making them. For

[15] Note that in the last section of this chapter, I argue that if we assume that these intergenerational transfers are possible, and if we believe that a political strategy I describe in a later section is feasible, then an even better and more fair response to climate change is feasible.

example, if the only feasible way to make large intergenerational transfers is via a political bargain that somehow bakes in funding cuts to schools, pensions, and investment for the future poor and vulnerable, then this would be a major problem.

If one adopts a realist stance, then presumably one should take this worry particularly seriously, as it seems all-too realistic to imagine a public policy initiative that aspires to be a progressive version of Efficiency Without Sacrifice being hijacked and devolving into a welfare-destroying compromise deal that achieves a carbon tax at the price of cuts in effective entitlement programs. Or more darkly, one can imagine that the bargain that emerges is a fraudulent carbon pricing scheme that only serves to enrich sophisticated investment banks and thus accomplishes no good, but succeeds in harming the economy for non-elites, and is purchased at the price of very large sacrifices of entitlement programs—and also kills millions of poor people in the coming decades through food price spikes and other more indirect ways of killing poor people, and so on.

The positive 'flip side' of this worry is that insofar as progressive intergenerational transfers are indeed possible, then there is an opportunity to promote welfare by analyzing them, and then choosing the form of intergenerational transfers that is welfare optimal.

In light of these important questions, what could happen next, then, is something similar to what is happening in the climate economics modeling community of estimating the effects of combining a carbon tax with (intratemporal) 'revenue recycling' that uses the revenue from a carbon tax in a socially useful way, such as by refunding it in a progressive way or uses it to fund tax reform of distortionary taxes. The point of this modeling exercise is, first, to evaluate how close we can get to a 'double dividend' whereby a carbon tax combined with other structural reforms immediately also yields a net gain for aggregate economic output, and, second, to evaluate what the net distributional effect of such policy combinations would be for different socio-economic groups (e.g. income deciles). The results suggest that we probably cannot get a double dividend, but we can reduce the cost to the economy with such policy combinations (vs. a carbon tax only). Perhaps more importantly for considerations of both wellbeing and feasibility, the results indicate that some of these policy combinations such as equal per capita rebate of the revenues from a carbon tax immediately make something like three quarters of citizens net beneficiaries of the combined policy, including those in all the lowest income deciles.[16]

One question for Broome is why he doesn't also add these *intra*temporal transfers to the overall package of measures he recommends. The view of many of those who are doing and promoting this modeling in policy circles is that these

[16] For an overview of this research, see Metcalf (2018); see also Barron et al. (2018); Sterner (2012); Mathur and Morris (2014); Goulder et al. (2019); Beck et al. (2015).

intratemporal transfer measures are indeed a crucial part of the best way forward. In any event, a similarly rigorous investigation of intergenerational transfers is needed to make Broome's proposal most policy relevant, and to evaluate whether there ultimately really is any tradeoff between feasibility, on the one hand, and welfare and justice on the other.

The preceding indicates that it is crucial to Broome's argument that the intergenerational transfers he has in mind are both feasible and welfare-improving over business as usual, even when their effects outside the box of the climate problem are taken properly into account.

But at this point, putting on a more hardheaded realist hat, we could wonder, darkly, whether in practice those transfers would even be welfare improving over business as usual. Putting on a hardheaded realist hat, notwithstanding everything above, one might not see why we should expect *any complex* climate interventions to be welfare improving *in practice*, even if we agree that their effects would be wonderful *in theory* were we to assume, completely unrealistically, that there would be perfect implementation by perfectly benevolent agents. Many hardheaded realists are apt to have a dark view according to which any complex grand scheme by welfare economists is certain to be hijacked by special interests. So, from that perspective, even if the proposal would result in a large improvement in theory, the actual expected effect of this kind of grand-level, complex policy might be to make things worse than the current trajectory of increasingly enlightened self-interested action by nations (which is better than a no policy business as usual). Given the pervasive phenomenon of *government failure* (on a dark view, this is typically the other horn of the regulation dilemma to *market failure*), it is difficult to understand why this sort of problem is not discussed in this literature. Presumably, any climate policy discussion that purports to be discussing *realist* climate policy must explicitly engage with these darker worries.

With perhaps something like these darker considerations in mind, some economists see virtue in a simple transparent policy: perhaps the best current contender is a carbon tax with all revenues rebated on an equal per capita basis, of the sort that is currently the focus of many modeling exercises noted above. We might say that this is an example of a maximally realistic policy portfolio that includes *intra* temporal transfers and aims at optimal policy: it allows us to combine an optimal carbon price with 'outside the standard box' transfers in a way that may be both feasible and not-easily-subject-to-capture, and along both of those dimensions appears to do about as well as we can hope if we are going to add intratemporal transfers to climate policy.

A key practical question for a view like Broome's is whether there is a similarly realistic *inter* generational transfer policy to add to this—i.e. something as simple and as transparent, that could avoid being perverted by special interests while accomplishing the intended intertemporal transfer. If (and perhaps only if) there

is, then realists should enthusiastically endorse it as central to the maximally realistic policy portfolio that aims at an optimal policy response to climate change.

6. Why the Realist Argument for Efficiency Without Sacrifice Is Invalid

In the preceding discussion, I accepted the Realist Argument on its own terms, and directly evaluated the substance of the conclusions that it is taken to support. But now it is time to take a step back and note that there is a fundamental problem with Realist Argument: it is invalid, and the nature of its invalidity points the way towards what seems to be a more ethical response than *Efficiency Without Sacrifice* that is consistent with both the *Realist Feasibility Constraint* and the premise about our Circumstances. Here again is the *Realist Argument*:

> *Realist Feasibility Constraint*: Nations act only in the interests of their current citizens, so a response to climate change is infeasible if it requires a nation to act contrary to the interests of its current citizens.
>
> *Circumstances*: An optimal response to climate change requires substantial emissions reductions from the no policy status quo from many rich nations, and the current citizens of those rich nations would be made much worse off relative to business as usual by such reductions unless they were compensated for making them.
>
> Therefore, given the *Realist Feasibility Constraint* and our *Circumstances*, the best feasible response is *Efficiency Without Sacrifice*, which involves reducing emissions to a level that is optimal, while compensating current people, including citizens of rich nations, for the cost of making such reductions, thereby ensuring that no one including the rich has to make any sacrifices, and that the costs are instead borne by those who are vulnerable to climate damages, because only in this way can substantial emissions reductions become feasible.

The argument is invalid because it overlooks the fact that what it is in the interest of a nation to do can change depending on the actions of other nations—in particular, even if nations are as self-interested as the *Realist Feasibility Constraint* assumes, other nations can change what it is in their interest to do via threats, sanctions, and other measures, and can therefore make it in their interest to comply with international standards that it would not have been in their interest to comply with in the absence of those measures.

As a simple illustration of how this creates trouble for the argument, imagine an international climate treaty that requires signatories to impose globally optimal emissions taxes within their territory and empowers compliant nations

to impose tariffs and other penalties on non-compliant nations as retaliation for non-compliance. Given the existence of such a treaty, even if high-emitting nations would be made worse off than business as usual by compliance, they might be made even worse off by non-compliance if there are many signatories to the treaty the collective sanctions of which make the penalties for non-compliance larger than the costs of compliance. If that is the case, then the *Realist Feasibility Constraint* entails that high-emitting nations would comply and reduce emissions even though doing so would make them worse off relative to business as usual.[17] Because this is consistent with the truth of *Circumstances*, this shows, first, that the conclusion that *Efficiency Without Sacrifice* is the best feasible option does not obviously follow from the *Realist Feasibility Constraint* and *Circumstances*, and, second, that that conclusion is false if there is any response analogous to the simplistic example just described that is both feasible and ethically superior to *Efficiency Without Sacrifice*.

Of course, in the real world the simplistic response just described is arguably not feasible. That is because if sanctions are threatened in the simplistic way just described, it is common knowledge that they are likely to be met with a retaliatory trade sanctions and/or non-trade measures that would make the costs of following through on them unacceptably high, thereby preventing the threat of such sanctions from being credible in the first place, thereby preventing such a response from getting off the ground. This is arguably the problem with simple proposals involving trade sanctions from commentators such as Joseph Stiglitz and William Nordhaus.

7. Feasibility Wedges and a Meta-Architecture for Global Agreement

Nonetheless, despite the problems with the simple proposals involving trade sanctions, there are a number of feasibility enhancing measures that enable the creation of a feasible analogous regime that could realistically succeed in changing what it is in the interest of nations to do over time, ultimately making it in the interest of rich nations to reduce emissions even beyond the point at which they are made worse off than the business as usual status quo. Although none of these 'feasibility wedges' are individually sufficient to guarantee the success of such an ethically superior treaty, in conjunction they may make the prospect

[17] Such a structure is implicit in the proposal of Stiglitz (2008), and Nordhaus (2015). Nordhaus provides an empirically informed model of how tariff sanctions, if they could be credibly threatened and if they would have no further effects outside the modeled interactions, could change what carbon price it is in the interest of nations to impose.

of success sufficiently high to make such a response a better bet for humanity.[18] In what follows, I sketch some examples of such a response that incorporates a number of feasibility enhancing features both in its meta-architecture and strategy. The goal is to show how these measures can make progressive intergenerational transfers more feasible, which is important for the best and most fair response to climate change we can realistically hope for.

So, imagine a well-chosen climate treaty architecture that illustrates a feasibility wedge at the level of its basic structure by combining three individually familiar components: first, a cap and trade scheme among signatories to the treaty, where the cap decreases each year along a path that is insensitive to the number of signatories to the treaty; second, an undemanding initial cap that ensures that when the treaty initially enters into force, no nation has to make costly emissions reductions in the short run; third, a right granted to compliant signatory nations to impose a duty on imports from non-compliant nations.[19] Ideally, the magnitude of this duty would be large, as could be feasible if one imagines the WTO appellate body faced with the actual choice of deciding whether a reasonable regime of this kind with a large duty was permissible under, say, Article XX of the GATT (which can be read as a catch-all exemption for any tariff that is inherently reasonable given the values that a nation endorses if it doesn't otherwise discriminate between particular nations for any of the familiar more technical reasons). In that scenario, the appellate body would be under enormous pressure to decide that it was indeed permissible. This would be for many reasons, including that deciding otherwise could threaten the long-term survival of the WTO in its current form and the careers of the bureaucrats on the appellate body.[20]

If well-designed, an initial set of nations would initially join such a treaty for a variety of reasons: in many cases, because the treaty would not require emissions reductions early on, but would only require reductions gradually later as the cap decreased and the largest emitters joined the treaty, at which point the cost to early signatories would in some cases tend to be offset by payments from

[18] My notion of feasibility wedges is inspired to some extent by the notion of stabilization wedges in Pacala and Socolow (2004).

[19] Because my goal in this chapter is merely to identify some feasibility-enhancing mechanisms by which various emissions reductions architectures could realistically be implemented in as ethical a way as is practically possible given the constraint of feasibility, I wish to remain agnostic on the question of what specific metrics, cost–benefit analysis, and architecture ought to be used. Depending on those factors, such a treaty would also include an allocation scheme for emissions permits, any number of which would be consistent with the suggestions in this chapter. Such a treaty might also include a mechanism to redistribute to developing nations some of the duties collected, in order to secure the universal compliance of developing nations and to offset the more ethically significant costs of the treaty to developing nations.

[20] The literature on the practicalities of WTO permissibility seems to completely ignore this sort of 'extra-legal' consideration, which from a realist perspective might be the most important consideration of all in making a judgment of feasibility.

later-joining nations in exchange for emissions permits, and in other cases those later costs would not be relevant to the short-run political calculations of politicians in democratic nations making the initial decision whether to join; in other cases, because it might be to the advantage of some initial signatories to have the power to impose unreciprocated duties on some imports from initial non-signatories; and in other cases, for the sort of complex reasons that have led many regions such as the EU, Australia, British Columbia, California, and others to independently enact such policies.

As a result, the initial set of signatories might be comparable to the set of nations that ratified the Kyoto Protocol. From this starting point, the idea is that the sanctions imposed by that initial critical mass of nations would set in motion a chain reaction that would make it in the interest of an increasing number of nations to join over time. Such a chain reaction would be driven by the fact that for each nation that joined the treaty, the cost would increase for each remaining nation that had not joined, because each additional cooperating nation means an additional nation imposing duties on imports from non-cooperating nations. In addition, as more nations joined the treaty and the cap decreased over time, the cap and trade scheme would become increasingly effective, thereby increasing the emissions differential between signatories and non-signatories, thereby increasing the magnitude of each individual duty imposed.

The idea is that over several decades, more and more nations would gradually join, until eventually the costs of not joining would be so high that even the most recalcitrant nations would ultimately find it in their interest to join rather than continue to hold out.

Of even greater importance, once nations joined such a treaty, it would never be in their interest to pull out, at least if the treaty is successfully designed with the self-enforcing structure imagined above, because given that structure the costs of pulling out always outweigh the costs of staying in after the point at which it is initially in a particular nation's interest to join. This could help to solve the most serious problem for climate treaties, which is the problem of securing not merely initial ratification of the treaty, but long-run compliance—a problem that is notably not fully solved by the Posner, Weisbach, and Sunstein view, given the strategic incentives that would always exist under that proposal to defect in order to negotiate a better side payment.[21]

Of course, the realistic worry remains that strategic retaliatory measures by hostile powerful nations could scuttle even this sort of more sophisticated proposal. With that in mind, such a treaty should be introduced under only the most

[21] For real-world examples and game-theoretic analysis of international environmental treaties that have a structure analogous to the *cascade to universal self-enforcement* structure described here, see Barrett (2003: ch. 9). A treaty is self-enforcing in the relevant sense relative to a set of nations if and only if it is both individually and collectively rational to maintain agreement to the treaty from the point of view of all of those nations.

favorable conditions that can be realistically expected in order to further raise its probability of success. Toward that end, additional feasibility wedges can be identified that represent the most favorable conditions that can realistically be expected, which represent an especially important place for contributions from (among other) climate negotiators and actual practitioners of international negotiation and political strategy. As a few examples of additional feasibility wedges to enhance the probability of getting such a 'meta-architecture' in place, consider:

(1) The treaty could be introduced early in the term of a US President who supports the treaty, enabling him or her to sign the treaty and publicly endorse its permissibility under all international laws and treaties, and to use his or her power and influence to ensure that international court decisions establish as *precedent* that the treaty is permissible. This could help *institutionalize* the permissibility of the treaty in a way that cannot be reversed by anything short of dramatic (and hence unlikely) power politics. The US President could do all of this unilaterally even if the US Senate is initially disposed to reject the treaty unanimously, and even if powerful nations such as China oppose the treaty.

(2) The treaty could be designed so that upon introduction, it is quickly ratified by a substantial proportion of developed nations, as well as a substantial proportion of developing nations, thus enhancing its perceived legitimacy and, more generally, further institutionalizing it.

(3) The treaty could be only one part of a policy portfolio that also includes all emissions reduction measures that are in the interest of individual nations to impose unilaterally, such as technical regulations to realize negative net cost emissions reductions, health co-benefits, subsidies for research and development, and perhaps even geoengineering. This will reduce the magnitude of the costs that must be imposed by the treaty in order for the overall policy portfolio to be effective, thereby reducing incentive for hostile nations to invest in strategic retaliatory measures to scuttle the treaty.

(4) The cascade to self-enforcing structure described here is also consistent with other complementary incentive schemes to encourage compliance. For example, one promising addition would be for duties from all nations to be held by a single global administrator until the end of each year, at which point each nation's proceeds would be disbursed only if that nation complied with the treaty's provisions in the previous year; duties could then be subtracted from the accounts of non-compliant signatory nations based on their degree of non-compliance, with the proceeds distributed to compliant signatories. Other ideas might include a bonus for initial signatories, and many others.

(5) The treaty could be designed so that upon introduction, it tends to require only emissions reductions that nations would find feasible even without the treaty. For example, consider the 'tax and dividend' approach described several

sections above that conjoins a carbon tax with an intragenerational transfer equal to equal per capita refund of all of the proceeds of the carbon tax. Perhaps such a policy is not generally feasible if it involves the carbon tax level that would be globally optimal; nonetheless, for some n% of the optimal tax level, it could be feasible. The treaty could be designed for that upon introduction, it requires on average only a carbon price equal to n% of the globally optimal level, for whatever the largest n is such that n tends to be feasible even without such a treaty. Then, sympathetic nations (or national leaders) could feasibly enact the n% tax and dividend policy, and then sell compliance with the treaty as in the self-interest of their nation, on the grounds that joining the treaty would be an improvement over a situation in which they are making the same emissions reductions but are not members of the treaty (which would be true only in the short run, but perhaps their audience tends to perceive only with the short run, in which case joining the treaty would be in their perceived self-interest even if not in their long-run self-interest).

The preceding are intended merely as initial examples of feasibility wedges that can be added to the meta-architecture for a global agreement described here in order to make an ethical collective action more feasible. For example, a treaty with the basic structure described above makes it easier to satisfy conditions (1) and (2), because the structure of such a treaty makes it likely that it would actually be effective, which means that nations will recognize that the costs of the treaty are likely to be non-futile, including any political costs to leaders who support the treaty—which are already mitigated by the fact that the treaty shifts the costs of emissions reductions into the future, beyond the short-term time horizon of most political leaders. This increases the likelihood that (1) will be satisfied relative to any particular US President, and increases the likelihood of (2) being satisfied for the various reasons described above. In this context, it is worth noting that even the transparently flawed and ineffective Kyoto Protocol was ratified by an impressive set of nations and signed by US President Bill Clinton. As a result, it is realistic to think that a US President might well be willing to expend the political capital necessary to satisfy condition (1) relative to a treaty far superior to Kyoto, such as the sort of treaty aimed at here involving a cascade to universal self-enforcement that would also predictably involve satisfaction of (2).[22]

[22] For example, if (1) is satisfied by a supportive US President and (2) is satisfied by an initial coalition that includes roughly the nations that ratified Kyoto, then it is arguably unrealistic to think that other nations hostile to the treaty would have the power and influence to convince international courts to rule against both the US administration and that coalition regarding the permissibility of the treaty under WTO rules, which together with the resulting institutionalized legitimacy of the treaty would substantially reduce the probability that subsequent retaliatory measures could scuttle the treaty.

By recognizing this emerging strategic dynamic and leveraging it as fully as possible, including by using the tools of feasibility wedges and intra- and inter-temporal transfers described above, we might hope to move things in the right direction as quickly as possible even within the constraints of realism.

With the preceding outline in hand, a climate treaty that exploits the feasibility wedges above and the particular cascade to universal self-enforcement design structure outlined above, together with additional tools such as intra- and inter-generational transfers is a promising route to an ethically superior climate treaty that is feasible even in light of the *Realist Feasibility Constraint* and *Circumstances*. The challenge of crafting such a treaty is then a more well-defined engineering problem that can be addressed by experts on the relevant legal issues, economic mechanisms, dispositions of nations, and political strategy. The primary constraint on such a treaty is that it must predictably lead to universal ratification and compliance in the long run via the cascade of economic incentives described above. Subject to that constraint, the treaty should be designed to distribute the costs of emissions reductions as fairly as possible, which will include much more fair distributions than would be available if there were a genuine feasibility constraint that current citizens of rich nations can be made no worse off than under the no policy status quo. If this engineering project succeeds, it will result in a treaty-based response that is a far more ethical bet for humanity than the response intended under *Efficiency Without Sacrifice* and other contemporary 'realist' proposals.

Of course, even when all of the pieces of the puzzle above are combined, there is no way of establishing that this kind of more ethical response would ultimately succeed with anything near 100% certainty—but as noted above, there are analogous and perhaps more serious doubts about the success of other realist proposals including even the best versions of *Efficiency Without Sacrifice*. But in general, it would be surprising if the best feasible way forward was *obviously* feasible. Instead, we should expect the best feasible way forward to appear infeasible to many, as did the best feasible way forward at the height of US–Soviet tensions, and at many other points in world history after which a better solution than seemed feasible at the outset emerged from a combination of skilled diplomacy, good fortune, and bold leadership—and hopefully a desire for the most ethical feasible solution to this challenge.

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