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Why (most) climate insurance schemes are a bad idea

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Various insurance schemes are increasingly considered as part of a comprehensive set of responses aimed at adapting the world to future climate change. Insurance is believed to provide resources needed to rebuild societies following adverse effects of extreme weather events, and do so in a way that encourages preventive, risk-reducing action. After investigating the idea of climate insurance from a normative standpoint, it is argued that when understood conventionally – i.e. commercially – climate insurance is a highly unattractive idea. There are more defensible models of reactive adaptation that retain aspects of insurance, including, in particular, a model that is more reminiscent of a (global) social insurance model.

Keywords: adaptation; climate change; fairness; insurance; sustainable development

Introduction: insurance as adaptation

Principally, when facing impending harm, three things can be done about it. First, we can see to it that it never happens by addressing the causes of the harm. Second, we can adapt to the situation and do our best to ensure that the potential harm is not actually felt. Finally, we can allow the harm to happen but compensate those who suffer it *ex post*. There is a clear order of desirability here. Other things being equal, it is preferable to make sure that the harmful development never happens. Second best is to adapt to the development and make sure that it is not harmful, or less harmful than it would otherwise have been. Least desirable is to allow the harm to happen and compensate for it afterwards. Prudence and morality seem to converge on this ranking (Baer 2006).

Given this background, it is perhaps not surprising that the United Nations Framework Convention on Climate Change (UNFCCC) process so far has predominantly discussed ways to *mitigate* – address the causes of – climate

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change (Paavola and Adger 2006). However, increasing importance is now being attached to *adaptation* as a response to the changing climate. The consensus is that whatever we do now in terms of mitigation, some climatic changes are unavoidable, and there is every reason to make these changes less harmful by adapting to them. Moreover, it seems likely that any mitigation regime adopted in the foreseeable future will be too ineffective to avoid further dangerous climate change. It would at least be irresponsible to assume that stringent enough emission cuts will take place in the near future.¹ Considerations like these presumably explain why issues related to adaptation in policy circles are now claimed to be of 'equal importance' to those of mitigation.²

In the context of climate change, adaptation can be understood as 'measures which enable [persons] to cope with the ill-effects of climate change' (Caney 2005, p. 752). 'Coping' should here be seen as a matter of degree, ranging from full coping (where no harm at all is caused) to increasingly partial coping (where harm is felt, but not as severely as would otherwise be the case). As indicated above, adaptation paradigmatically comprises *proactive* or *preventive* measures, e.g. improving flood defences, diversifying economic activities, or moving vulnerable settlements. But there may also be forms of *reactive* adaptation (Paavola and Adger 2006).³ Reactively adaptive measures include systematic possibilities to access funding or other resources to rebuild society after already experienced harms, which in turn could be thought of as integral to a sustainable path of development. Reactive measures leave a lot to be desired because, just like pure compensation, they do not prevent the harm from occurring in the first place. There are nevertheless reasons why they are worthy of support. First, although preventive measures are generally preferable, it is unlikely that we will be able to predict all future harm due to climate change. For these unpredictable harms, which are going to be felt, reactive adaptation is clearly better than inaction. Second, we must also consider the possibility that prevention will be insufficient even for harms that *are* predictable. Our line is that the bulk of adaptive measures ought to be preventive, but, in light of the disappointing trend in global climate politics, we would do well to abide by the time-honoured saying that 'you can't beat something with nothing'. Reactive measures are not to be dismissed outright.

Our focus here is on one particular form of reactive adaptation, namely *insurance*. The normative desirability of climate insurance is, we contend, highly doubtful. Yet there is increasing support for climate insurance among policy-makers and academics. Why this is so is an empirical question, and in what follows we will only offer some brief speculations about it. Our main purpose is instead to investigate the idea of climate insurance from a *normative* standpoint. Our main claim is that climate insurance, interpreted in a commercial way, is a poor idea that should be employed only with great hesitation. This, however, does not amount to a wholesale rejection of the concept of insurance in climate change. The concept highlights the need for risk-pooling and risk-reducing action, and, as we will argue, there is a defensible model for reactive climate change adaptation that does retain some

aspects of insurance. However, in the key step of financing premiums, this model adheres more to a logic of fair redistribution and aid rather than insurance.

We begin by offering brief introductions to the general concept of insurance and the idea of climate insurance, before proceeding to argue the normative point that commercial insurance is a bad idea when it comes to climate change, and suggesting instead an alternative model for reactive adaptation.

Insurance

Insurance is the transfer of risk of a loss from one party to another in exchange for a fee, called a premium. It is best understood as trading the possibility of a loss for a guaranteed cost. The size of the premium – monetary or otherwise – is in purely market-based insurance schemes determined by the size of the risk that the insured is insuring against (plus profits). A *risk* is understood as the probability of an outcome times its value. This yields the expected value of an outcome.⁴ The term ‘risk’ implies that the value is negative – when discussing insurance we are dealing with potentially harmful outcomes. Risk is separate from the magnitude of harm as such. A very likely but less harmful outcome can pose a higher risk – carry with it a lower expected value – than a less likely but more harmful outcome. Risk increases, other things being equal, the higher the likelihood and negative value of an outcome.

The merits of insurance as a way of managing problems can be said to be the following. First, as already mentioned, insurance can involve paying a manageable sum instead of risking an unmanageable cost. Moreover, by pooling resources, insurance schemes can collectively manage to take losses that would overwhelm any individual member of the scheme. Second, by being a way of transferring risk, insurance schemes can limit the need for each individual to take costly individual action. Third, by being paid through premiums, insurance represents a *predictable* cost, which facilitates planning in a way that unexpected costs of risks that fall out badly do not. Fourth, since the premium is risk-based, there is normally an incentive for the insured to take preventive steps to lower her risk, as this will mean less expensive premiums. Thus, insurance provides a clear, self-interested reason to be prudent.

On the negative side, insurance is sometimes charged with leading to *moral hazard* (cf. Arrow 1971, Linnerooth-Bayer and Mechler 2006). Insurance might change the behaviour of the insured in problematic ways. According to *ex ante* moral hazard, the insured will be less concerned about avoiding risky behaviour because her potential losses are at least partially insured. According to *ex post* moral hazard, the insured raises her demands simply because there is now an insurance to cover them.⁵ Other potential problems include *adverse selection* (only those at highest risk buy insurance, thus quickly draining the common pool of resources) and *correlated risks* (simultaneous losses among the insured exhaust the scheme’s ability to cover losses) (Jagers and Stripple 2003, Persson *et al.* 2009, p. 138).

Furthermore, from an ethical perspective, there is always the risk that insurance schemes do not offer *sufficient cover*. The danger is that those most in need of insurance will not be able to afford insurance, precisely because their vulnerability translates into steep premiums. From an insurer's perspective, to insure the most vulnerable is simply a bad deal. Yet it might be precisely the commercially 'uninsurable' that the global community has the greatest obligation to insure. This problem is illustrated with particular vividness by climate change and the prospects of insuring some of the least developed countries (LDCs). We return to this below.

Climate insurance

In an indirect sense there is already ample insurance against the adverse effects of climate change since the private insurance industry provides insurance against some of the effects of climate- and weather-related disasters via conventional property, health and life insurances. The overall penetration of such insurance is low, however, in particular in the developing world. From 1980 to 2004, the global cost of weather-related natural disasters was US\$1.4 trillion, of which only about one-fourth was insured (Mills 2005, p. 1041). When policy-makers and theorists speak of 'climate insurance', they tend to think of something other than the uncoordinated insurance behaviour by firms and individuals in insurance markets. Climate change is expected to put unprecedented pressure on the private insurance industry (Jagers and Stripple 2003), and it is questionable whether anything resembling sufficient coverage can be achieved simply by relying on that individuals insure themselves. The idea of climate insurance therefore tends to involve governments as insurance-purchasers. Mills (2009, p. 326) argues that precisely because the initial reaction of the insurance industry to climate change has been 'limiting availability, tightening terms and raising prices... governments will have to assume more climate risks if the private sector recedes'.

The idea that insurance devices may play a significant part in a future climate change regime is given increasing attention (Mace 2006, Linnerooth-Bayer and Vári 2006, Persson *et al.* 2009) and insurers and reinsurers have for quite some time thought about how to tackle climate change, often within the context of the UNFCCC process.⁶ The UNFCCC itself makes some mention of insurance as an adaptation device. Article 4.8 states that parties are to give full consideration to actions that are necessary to meet the specific needs of developing parties that arise as a result of climate change and mentions insurance among the actions that are to be considered. The reference to insurance is due to The Alliance of Small Island States, which in 1991 proposed the creation of an international insurance device to compensate damages from sea level rise (Linnerooth-Bayer and Mechler 2006). The Kyoto Protocol also mentions insurance; Article 3.14 calls for the consideration of insurance as a climate change response.

The real breakthrough for the idea of insurance as a viable form of adaptation, however, was arguably the Bali Action Plan of 2007. The Bali Plan gave adaptation greater priority in general. Moreover, it placed more emphasis on insurance as a mechanism of adaptation. There is reason to think that a future comprehensive climate change architecture – if we may talk of such a thing in the wake of post-Copenhagen scepticism – will include some form of insurance mechanism. According to Persson *et al.* (2009, p. 137) there are in principle two reasons for this:

First, the [insurance] tool could conceivably help developing countries deal with emerging financial risks associated with climate change, and hence support adaptation. Secondly, there are significant barriers that are likely to prevent the development of a purely private sector climate insurance market that would provide, for instance, disaster support for developing country governments.

In other words, because climate change presents risks, and because people in the developing world are unable to afford private insurance to manage those risks, the idea is that there is a need to introduce some form of public insurance mechanism through which parties can live up to their special responsibility to assist the least developed countries. Put shortly, if the developed world is to discharge their duties towards the world's poor, then it is required, among other things, that they assist in facilitating insurance against the adverse effects of climate change. In addition to this (quite optimistic) reason why climate insurance is likely to become a reality, there are also the general benefits of insurance. As Gurenko (2006, p. 602) notes, to pool resources in a risk-sharing and risk-transferring system simply makes sense in the face of a risky future, because 'for a fixed premium payment, countries can cap the amount of fiscal loss caused by natural disasters in the future'. Moreover, insurance provides clear incentives to manage risk; something that at times have been thought to be lacking when it comes to pure development aid (Hoeppe and Gurenko 2006).

Exactly how climate insurance is to be designed and implemented remains very unclear. Many believe that it will build on public-private solutions where insurance against adverse effects of climate change largely falls under insurance against extreme weather events (see e.g. Linnerooth-Bayer *et al.* 2009). This in itself makes sense because we cannot say, for any extreme weather event, whether it was caused by human greenhouse gas (GHG) emissions or by non-anthropogenic factors (Vanderheiden 2008, p. xii).⁷ For the purposes of this paper we understand *climate insurance* as insurance against certain extreme weather events (droughts, floods, hurricanes, etc.) and related phenomena (sea-level rise, desertification, crop failure, etc.) in which parties buy the right to some level of compensation if they are hit by a certain such event. As will become apparent, in this paper we assume that the insuring parties are *states*.

Behind this bare-boned account of climate insurance is a range of contentious issues. Let us only briefly reflect upon some of them. First, we may wonder what it is that states are *insuring against*. Climate insurance is

often perceived as insurance against certain extreme weather *events* (cf. MCII 2008), yet it is strictly speaking not the events but their *effects* that are of interest. Thus, it seems in principle correct that two hurricanes of equal intensity should not result in the same payout if they cause different amounts of harm. An alternative, effect-centred approach is to focus on the actual costs caused by climate change-related events. Various proposals have been suggested, e.g. that a certain percentage of future costs for natural disaster should be associated with climate change and that this percentage in turn determines the amount of compensation paid out to the insured party (see Burton *et al.* 2006, Linnerooth-Bayer *et al.* 2009). Working out trigger criteria of climate insurance payouts is complicated and takes us beyond the scope of this paper. We will simply assume that the right to compensation is tied to some objective trigger condition, for example a certain level of precipitation in a certain region during a specified time-span.

Second, it is often maintained that *vulnerability* should determine the size of premiums, but what is the appropriate meaning of that concept? It is usually held that two regions that differ in terms of the resilience of their infrastructure or financial capacity are not equally vulnerable even if they are equally likely to be hit by an extreme weather event. An oft-touted illustration is that the Caribbean Islands and Florida, in being differently able to cope, cannot plausibly be seen as equally vulnerable even though they are roughly as prone to be hit by hurricanes (Paavola and Adger 2006, p. 605).⁸ Yet this in turn might presuppose a human-related as opposed to a material account of costs. In one straightforward sense Florida *is* more vulnerable than, say, Haiti – there are more material assets to damage in Florida.

Third, from a political point of view it is especially interesting to think about who gets to construct and administer the insurance system, and with what legitimacy. Since our focus is on normative aspects of climate insurance as such, we disregard these kinds of issues in the remainder of the paper.

Fair burden-sharing and climate change

There is by now a sizeable literature on the ethical issues of climate change.⁹ The starting assumptions in this literature are usually that we have weighty moral obligations to engage in various actions to mitigate or adapt to climate change, and that these actions are costly to the ones who undertake them. Thus, the core question of what is known as ‘climate justice’ belongs in the field of distributive justice: How should the costs of mitigating and/or adapting to climate change be distributed among relevant agents? This question obviously piggybacks on an account of the size of the total climate burden; an account that in turn piggybacks on more fundamental questions concerning how we calculate the atmospheric cap of GHGs and what distributive entitlements various agents have.

Looming over these questions is also the extremely difficult *level of analysis* problem, which concerns what kind of agents count as relevant duty bearers.

It is generally agreed that the duties to take climate action ultimately stem from the moral concern that is owed individuals, but what is less clear is where these duties are to be located. There is an uneasy convention in parts of the literature that says that the primary duty bearers are *states* or *countries*. We will subscribe to this convention here, but it should be noted that our commitment to this state-based approach is – using a phrase from Page (2008, p. 568) – more ‘methodological’ than anything else. It does not presuppose a particular view on collective or national responsibility beyond the claim that states have a moral obligation to accept climate burdens. This obligation may in turn be thought of as aggregating from the behaviour of individuals in the state.¹⁰

Unlike the case of mitigation, the distributive questions of which mainly concern obligations to cut down on GHG emissions, when we discuss adaptation we also need a clear account of the ‘output’ side of the issue. The issue of fair climate change adaptation raises two principal questions: first, how the resources that are required to engage in adequate adaptation are to be raised; and second, how these resources are to be allocated (Jagers and Duus-Otterström 2008).¹¹ We may refer to the first question as the *burden-sharing* question and the second as the *benefit-distribution* question. Let us relate these questions to the issue of insurance. Insurance represents a particular kind of answer to the benefit-distribution question. Resources are simply to flow to those who are actually hit by events that they are insured against. There are more questions on the allocation side, including, as we have seen, the design of trigger criteria. But climate insurance raises more pressing questions when it comes to burden-sharing.

We believe that a fair scheme of sharing the burdens of adaptation is sensitive to both the *contributory* responsibility that comes from emitting more than one’s share and how *able* one is to assist. In other words, a fair burden-sharing scheme will reflect a combination of what is known as the ‘polluter pays principle’ and the ‘ability to pay principle’.¹² The general idea is that the more an agent has contributed to the problem by polluting, the weightier its duty to accept burdens associated with it. But one’s duty to assist also depends simply on one’s *ability* to assist – and this duty becomes weightier the more able one is. In practice, of course, this suggests that climate burdens should predominantly be shouldered by high-polluting and wealthy states.

Saying that burden-sharing ought to reflect both ability and responsibility leaves a host of problems unsolved. In particular, it remains to be worked out exactly how these two factors should be weighed against each other, as we can easily imagine poor polluters as well as wealthy non-polluters.¹³ For the purposes of this paper this problem does not concern us.¹⁴ The important thing to note here is instead that even if we set up highly uncontroversial principles of burden-sharing, the idea of climate insurance, when understood commercially, does a poor job of living up to them. Suppose, leaving details to be specified for a different context, that a responsibility and ability-sensitive view of climate justice is correct. We argue that such a view entails at least the following four propositions about justice in adaptation:

- (1) The wealthier an agent, other things being equal, the greater its duty to accept burdens of adaptation.
- (2) The more contributory responsibility an agent has for climate change, other things being equal, the greater its duty to accept burdens of adaptation.

These two propositions simply express the moral relevance of responsibility and ability. Responsibility and ability, however, differ somewhat in terms of their normative logic – one admits a threshold whereas the other does not:

- (3) There is a threshold of ability below which one is exempted from burdens of adaptation.
- (4) There is no threshold of contributory responsibility below which one is exempted from burdens of adaptation.

Proposition 4 follows from the notion that ability in itself grounds duties to assist. Thus, even non-polluters may have a duty to help others adapt if they are wealthy. Proposition 3 is more controversial, if we think of a country reducing its own climate vulnerability as a kind of adaptation burden, since it might then seem to offer the poor a license to be imprudent and reckless.¹⁵ Our point, however, is merely that whereas it is desirable if the poor take various steps to reduce or at least not increase their vulnerability – e.g. by being more restrictive and vulnerability-conscious in their planning of infrastructure – the excess ability of the wealthy means that it is more reasonable that they accept the other adaptive burdens (at least the monetary ones).

Propositions (1)–(4) have clear implications for our world and the international injustice that plagues it. They imply that a substantial redistribution of resources from the developed to the developing world is in order. Indeed, this goes beyond the distinction between mere net-payers and net-beneficiaries that may hide behind the UNFCCC's fluffy principle of 'common but differentiated responsibility'. There are many countries, such as the LDCs, that arguably have no responsibility to accept any burden whatsoever, primarily because of their poverty but also because they cannot be said to have contributed to the problem by polluting. These countries should have their adaptive needs covered by the wealthy and polluting countries. In our opinion, any climate policy that is to be considered fair would have to agree with this conclusion.

Why commercial climate insurance schemes are a bad idea

As we have seen, it is unclear what is intended by saying that an 'insurance model' may serve as the basis for reactive adaptation. The most natural way of understanding climate insurance is perhaps to think of it as merely the climate analogue to commercial insurance in other areas. On such an understanding, an insurance model in climate change is simply the idea of letting governments purchase insurance against extreme weather events from private insurers.

That such a commercial insurance model would fail miserably to live up to the normative requirements of fair burden sharing is apparent. It might nevertheless be instructive to see just how badly the model would perform since doing so gives us a clearer view of on what points an insurance system would have to be altered to be fair, or at least fairer.

In purely market-based insurance systems, premiums are set according to risk. The riskier one's prospects, the costlier one's insurance. Moreover, since the insurers in these systems are private parties, the premiums will always cover expected costs in excess. A rational insurer, out to make a profit, will not accept insurance that is expected to bring about a loss.¹⁶ These characteristics make commercial insurance markets exceptionally unappealing when it comes to climate change. One of the signifying things about climate change is its doubly unfair nature. The low-emitting and poor parts of the world also tend to be the most vulnerable, partly because of their poverty but also for idiosyncratic geographical reasons. Climate change compounds already existing injustices by affecting worst the regions that are already struggling economically and socially and therefore have difficulties adapting to a more variable climate (see e.g. Shue 1999, Paavola *et al.* 2006, Page 2006).

A market-based insurance scheme would only exacerbate this unfortunate situation, in particular if it were to become the dominant adaptation mechanism. The most vulnerable would face comparatively high premiums, which they presumably could not afford. Indeed, some regions may well be 'uninsurable', representing deals a rational private sector insurer would never take on. This is because some countries are very likely to suffer from climate change in predictable ways.¹⁷ For example, we can predict with considerable confidence that low-lying countries such as Bangladesh and some Pacific island states will be severely affected by rising sea levels. These countries can be seen as the equivalent of a 55-year old man with a congenital propensity for heart disease who – fat and flustered – applies for life insurance. It is going to be very costly.

Meanwhile, since the developed countries appear unlikely to be as badly affected by climate change and are more able to cover their adaptive needs by themselves, they have few incentives to be part of a common insurance pool. If they do choose to take part, their premiums will be comparatively low. This means that the insurance scheme might have too little funding to cover damages as they are felt in the developing world. Resource redistribution from the developed to the developing countries would then be too scant to be fair. The unfairness is only exacerbated by the fact that the developed countries have largely caused the problem in the first place, and continue to drive it, by using a greater share of the atmosphere's absorptive capacity than they are entitled to (cf. Singer 2002, Vanderheiden 2008).

Speaking the language of Propositions (1)–(4) above, we could say that a commercial insurance model simply fails to capture the spirit of justice from which they are derived. The model replaces ability and responsibility as a basis for distributive justice with a kind of *vulnerable pays principle*, according to

which resources flow into the insurance pool in proportion to one's risk. This is a far cry from the substantial redistribution from wealthy polluters to the worst off that the standard principles of climate justice recommend. Most would agree that this makes commercial climate insurance ethically unacceptable. Commercial climate insurance also fails to respect the principle that some countries should accept no burdens of adaptation at all, requiring all who are part of the insurance pool to contribute to it by paying premiums (although, as we shall see, universal payment is considered one of the merits of climate insurance).

A commercial model would thus fail for several reasons. It would leave those most in need of insurance uninsured and would not allow enough resources to flow from the developed to the developing and least developed countries. More specifically, it would not adhere to the normative demand that burden-sharing should reflect a balance of ability and responsibility, preferring instead to let each actor insure against its own losses based on the risks it faces.¹⁸

A different take on insurance: the case of the 10 Farmers

There is thus a strong case for saying that a commercial climate insurance model would be manifestly unfair. The natural question now is: is there a reason at all to think that insurance might play a justified part in some future climate architecture? We argue that there is – but only as long as we understand 'insurance' quite differently from how it is normally understood.

We suggest that there is a variant of an insurance model that could play a perfectly justified role in a set of responses to climate change. In order to illustrate what we have in mind, consider the example of the *10 Farmers*:

Ten Farmers. In an area are 10 farmers. Each farmer has a number of sheep upon which he depends for his livelihood. In the area is also a wolf that occasionally strikes one of the sheep. Each farmer runs a roughly equal risk of having his livestock attacked. Unable to hunt for the wolf, the farmers meet to discuss potential adaptive solutions to their common problem. During the meeting two proposals emerge. One farmer, Adam, suggests a preventive solution. The farmers should help each other build very high fences around the pastures, he argues, as the wolf would then be unable to strike the sheep. Another farmer, Bob, instead suggests a reactive solution. Arguing that it would be too costly to build a fence for each farmer, his proposal is that they should pool their risks and resources. Bob envisions a system where if one farmer loses a sheep, all 10 farmers unite in splitting the cost of buying the unlucky farmer a new sheep.

Something similar to Bob's scheme could provide a fair way for states to insure each other against climate impacts. We have in mind a system where governments come together to pool risk and resources in a way similar to the farmers, pledging to compensate the unlucky for the climate harm they experience. This is a mutually advantageous system that enables all to cope, as it were, with the 'wolf' even though they cannot prevent its attacks.

It should be borne in mind that such a system of coping is in many ways inferior to a system of mitigation (shoot the wolf) or prevention (build fences). Yet there are nevertheless many merits to it. Sometimes it could be too costly for each country to build the climate equivalent of a wolf fence; sometimes it could perhaps be simply irrational to do so because a reactive insurance system could get the same results in terms of human wellbeing but at lower costs. Furthermore, in the case of climate change, society will never be able to completely predict where and when harm will occur. Under such circumstances, an equivalent to Bob's scheme is clearly desirable. In our view, it represents a perfectly respectable way of sharing risks and co-funding the costs of rebuilding society. Call this the *risk-sharing* property of the scheme.

The next question is whether the scheme can also include the *risk-reducing* property, which is often held to be the great virtue of insurance. It seems that it can easily be made to encourage risk-prevention. For example, as in Bob's proposal, the unlucky agent could co-fund the payout. One could also imagine that parties to the scheme can lower the amount they have to pay into the common pool through various forms of vulnerability-reducing action. The parties would then have a self-interested reason to reduce their risks.

The risk-sharing and risk-reducing properties serve to make this type of scheme an attractive solution to some common problems. An international climate institution in which governments insure each other in this manner would be most welcome. Having said that, we must also note just how different the international situation regarding climate change is from the imagined case of *10 Farmers*. In climate change we are not dealing with a situation where each party is equally likely to being attacked. Furthermore, each loss is not equally severely felt. Instead, we have a situation where some 'farmers' can easily cover their own needs whereas others cannot, and where it would be irrational for the former to share their risks with the latter. In fact, in the case of climate change, the well-off have to subsidise the premiums of the poor or else the poor will arguably not be insured at all. The upshot is that, unlike Bob's proposal in *10 Farmers*, climate insurance would not be of *mutual* advantage.

We have already noted that climate insurance comes with a significant risk of leaving the most vulnerable uninsured. As Vanderheiden (2008, p. xiii) worries:

A purely self-interested national strategy for coping with the increasing risk of environmental harm would be for those less vulnerable to climate-related damage to refuse to pool risk with those who are most vulnerable – a strategy similar to the cherry-picking of the healthiest persons by health insurance schemes – since this would minimize expected losses.

No respectable conception of climate justice could tolerate this outcome. What makes it particularly odious is that the least vulnerable are also the ones who are responsible for having created the need for insurance in the first place – allegorically speaking, in climate change some of the 'farmers' are responsible for having let loose the wolf. In the spirit of fair burden-sharing we would say

that the only ethically defensible situation is one where wealthy polluters agree to pool risks with the most vulnerable. In effect, this means that while payouts should be insurance based, distributed among the insured to the extent they suffer the specified events, the wealthy polluters should subsidise the premiums of the poor. Such a system would have the *merits* of insurance without making participation in the system dependent on paying risk-based premiums. It is unlikely that this corresponds with what we normally think of as ‘insurance’, however, since the usual understanding of that term is indeed that premiums are risk-based. The system is perhaps most reminiscent of *social insurance*, by which we mean a system of risk pooling that is combined with redistribution. In such a system, the input side is not based on risk and vulnerability but rather on ability and responsibility. Applied on the climate change issue, this could be captured by a system in which every state pays according to ability (and where adjustments could be made for vulnerability-reducing measures taken within the vulnerable countries and the level of pollution among polluting countries) and where the payouts from the system are tied to suffering events (which could also be adjusted for one’s ability to handle the costs on one’s own).

Of course, the idea of social insurance-type systems being a good way of managing common risks is not new. There is a venerable body of work within political theory that in many ways resembles Bob’s proposal, most famous of which perhaps is Dworkin’s ‘equality of resources’ view. Dworkin argues that justice requires that we set up institutions that compensate individuals who suffer misfortune up to the level of protection that an average member of society would have purchased behind a modified veil of ignorance. This hypothetical insurance market, Dworkin (2002, pp. 73–109, 331–347) argues, tracks the requirements of egalitarian justice and can be approximated via a progressive tax system. Many actual states’ social policies resemble such a position, one example being the Scandinavian welfare states, where each individual primarily contributes according to capacity and receive according to how their lives are evolving. The key thing to note, however, is that the system seems to presuppose a prior sense of solidarity. The veil of ignorance is a thought experiment. Actual agents are not unaware of whether they stand to be likely winners or losers of a social insurance system – this holds particularly true for the prospects of states in climate change. Because a social insurance system seems to presuppose a sense of solidarity between states, it is naturally far less likely to occur. In particular this is so given the absence of a global political authority that could coercively enforce duties to take part in the scheme.¹⁹ We offer our final thoughts precisely on the question of *feasibility* and the role of insurance.

Conclusion

If the only ethically defensible form of insurance is one in which the poor get their premiums subsidised, is there any reason to think of this as *insurance*? Why not simply call it by what seems to be its traditional name, namely *aid*?

What we are dealing with, if something resembling a social insurance system becomes a reality in climate change management, is in fact substantial redistribution flowing from wealthy polluters to the poor. It makes sense to characterise this as aid (or possibly compensation) regardless of whether payouts are framed as insurance payouts and regardless of whether inclusion in the system is dependent on taking risk-reducing action. Taking risk-reducing action is not unique to insurance either; aid too could be distributed on the condition that risk-reducing actions must be taken. Neither must aid be associated with supererogatory action. Aid might well be an entitlement of those who need it.

Yet employing the idea of insurance can nevertheless be justified since there might be clear politico-strategic incentives to employ the *term* insurance. 'Insurance' namely carries a certain kind of dignity that requests for 'aid' often lack. While 'insurance' connotes rational parties that set up a system of mutual compensation where each pitches in, 'aid' can connote inadequacy, weakness, vulnerability and arbitrariness. We suspect that one reason why the term 'insurance' is in vogue in climate circles is in this way mainly semantic, not substantive.²⁰ Insurance might comparatively speaking be an easier sell to the main generic burden carriers, i.e. the developed countries that are especially exposed to demands for adaptation due to their significant historical responsibility and great wealth.

More substantially, thinking about climate change adaptation in terms of insurance might focus our attention on the need for risk-sharing and risk-reducing action. It might above all be a useful metaphor for thinking about the issue.²¹ This does not rule out that something resembling a (global) social insurance model would be a huge improvement of the current situation. Yet such a model seems far removed from what is usually intended by 'climate insurance'. The most distinctively insurance-like aspect of the social insurance scheme sketched above is that it pools resources so that the parties can help finance each others' costs, if and when they occur. But this in itself is far removed from a conventional understanding of insurance as buying protection for a premium, the size of which is wholly determined by risk. This remains something an ethically defensible adaptation scheme could not include.

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Notes

1. Note that there is little reason to believe that states will find it easier to engage in adaptation than mitigation. Indeed, adaptation might present even more difficult problems of moral motivation (Jagers and Duus-Otterström 2008).

2. The phrase 'equal importance' is used in the Bali Action Plan of 2007. See Persson *et al.* (2009).
3. Paavola and Adger (2006) also mention inaction as a form of adaptation. We will not consider inaction as adaptation here.
4. For a concise description of expected utility theory, see McCarty and Meirowitz (2007, pp. 27–38).
5. A typical example of *ex post* moral hazard is an individual who demands higher levels of health just because she has a health insurance, i.e. seeking treatment she would not demand in the absence of insurance.
6. At the second meeting of the parties in Geneva (COP 2) to the UNFCCC, an insurance seminar took place among six insurance and re-insurance companies in a launch pad set up by the United Nations Environment Program (UNEP). The meeting resulted in the 'Insurance Industry Initiative'. In less than a year this initiative was developed into a 'Statement of Environmental Commitment by the Insurance Industry', which was signed by 60 insurance companies and presented at COP 3 in Kyoto in 1997 (Salt *et al.* 1998). This position was, at the time, interpreted as a strong call for action – certainly stronger than was then being envisaged by governments to limit CO₂ reductions. Today, there are several insurance initiatives increasingly collaborating in different climate change issues, e.g. the 'Global insurance industry statement on adapting to climate change in developing countries', which argues that the industry can contribute with, for example, expertise in risk management, design of risk reduction and risk transfer activities, prioritising adaptation measures, incentivising loss reduction and developing new insurance products and instruments (Climatewise 2010). These instruments usually imply that the capital market rather than the reinsurance market should absorb the risks. The method of turning a financial risk into a marketable security is called securitisation, and the product is termed insurance-linked securities (ILS), i.e. 'catastrophe bonds' (Cunningham 2007). Although a rather handy way for the (re)insurance industry to hand over their risks into a different market, the degree to which poor countries would be able to sell their climate change-related risks on the capital market is, however, disputable (Jagers *et al.* 2005).
7. As one reviewer notes, however, the fact that harm caused by many extreme weather events can be thought of as anthropogenic raises interesting questions about insurance. Insurance companies often recover costs by collecting from culpable parties. It might be envisioned, analogously, that polluting countries have to buy the climate-equivalent of liability insurance, in effect requiring them to pay into a fund that then disperses its resources among insured and non-culpable countries. In the key step of financing, however, this mode of thinking resembles something other than what we here intend by a climate insurance model. We will return to this below.
8. For the concept of vulnerability, see also Adger (2006).
9. For an excellent collection of papers, see Gardiner *et al.* (2010). Gardiner (2004) offers an (increasingly outdated) overview of the field.
10. In addition to 'intragenerational' problems, climate change inevitably also poses problems of *intergenerational* nature. We will not address this aspect of the issue. Page (2006) offers a valuable treatment.
11. For further work on the ethics of adaptation, see e.g. Baer (2006), Paavola and Adger (2006) and Grasso (2009).
12. For these principles, and the so-called 'beneficiary pays principle', see Page (2008). When it comes to our general outlook, our debt to Caney (2005, 2010) is undeniable. We believe that ability, understood as relative wealth, and the contributory responsibility that comes from polluting are both morally relevant to climate duties. Polluting agents take an unfair share of the atmosphere's

absorptive capacity and cause harm. It is only fair that they take on costs associated with their unjust actions, provided that they can do so without being pushed below some minimum standard of wellbeing. Agents who are able to pay, moreover, can have a positive duty to assist even in the absence of causal ties simply in virtue of being able to assist (cf. Singer 1972, Shue 1999). Though responsibility and wealth are of independent moral weight, in practice they of course overlap. It is difficult to imagine the emergence of a wealthy country whose wealth is not largely dependent on once having polluted heavily. If we believe that historical emissions matter to current duties, then ability will often be derivatively grounding of a duty to accept burdens. A consequence of saying that historical pollution matters for one's duties, moreover, is that it might not do to cite one's current low emissions as a reason to escape climate duties if one has a long history of causing the problem. So, if we restrict ourselves to states, a future green state cannot escape climate duties if it has a polluting past. On some versions of climate justice this might mean that one has a duty to lower one's emissions even though one is now *under* one's fair share, thereby compensating one's past overuse of the commons by a period of underuse. Historical responsibility is a very tricky idea, however, both in terms of substance and implementation (Caney 2006). It is arguably a good idea to disregard, say, pre-1990 emissions.

13. Throughout, we talk about responsibility and wealth in per capita terms. There are already many countries that on aggregate are heavy emitters even though they are per capita quite low-emitting. For example, at an aggregated level China in 2007 passed the United States as the world's largest annual emitter of CO₂ (Vidal and Adam 2007), yet its per capita emissions are still relatively low.
14. The 'Responsibility and Capacity Indicator' (RCI) of Greenhouse Development Rights represents one prominent way of weighing responsibility and ability, although this indicator is only a way of calculating a country's *share* of the global burden, and must thus piggyback on some independent account of *how large the global burden ought to be*. One merit of the RCI is that it derives national aggregates from the responsibility and capacity (or lack thereof) of the *individuals* who live in the countries. It thereby breaks the analytically problematic distinction between burden-carrying Annex I countries and exempted non-Annex I countries. For a good introduction and defence of RCI, see Baer *et al.* (2008).
15. In one sense, however, the principle is trivial: if one *cannot* assist, it follows that one *ought not to*.
16. As Gardiner (2006) argues, the covering of expected costs in excess means that commercial insurance is, strictly speaking, always a bad bet for risk-neutral agents.
17. As argued by Dow *et al.* (2006), we have no way of predicting future effects with pinpoint accuracy, yet the broad patterns are reasonably clear.
18. Given these failures, it is not surprising that a number of suggestions or models exist regarding how one could devise better forms of climate insurance (see Linnerooth-Bayer and Mechler 2006, Linnerooth-Bayer *et al.* 2009 and Mills 2009 for broader reviews). The most significant and plausible suggestion of an insurance model is the one recently advanced by the Munich Climate Insurance Initiative (MCII) (MCII 2008, Linnerooth-Bayer *et al.* 2009). Considered by its proponents as one part in a more comprehensive set of responses to climate change, the MCII model rests on the idea that some premiums should be covered by Annex-I countries. Moreover, although the MCII model depends on commercial markets to cover some climate risks, it recognises that there is an obligation of wealthy polluters to provide the conditions that enable markets to function. The merits of the proposal are several. For example, it recognises that slow-onset and high-probability climate impacts, such as sea-level rise, are poorly suited for insurance. It also recognises that some poor countries cannot reasonably be expected to pay

for insurance for some climate risks and that those risks should be insured by the Annex-I group free of charge, via a special fund they refer to as the 'Climate Change Pool' (Linnerooth-Bayer *et al.* 2009, pp. 394–395). For all the merits of the MCII model, however, climate insurance still seems to be a normatively problematic idea. For example, while the model will finance some insurance free of charge, it also suggests that other insurance costs should be borne by the insured, with net-payers just offering the technology and information needed to facilitate private markets to function (MCII 2008, p. 21f). The difference between the free insurance and the one that the insured pays for remains unexplained. The suspicion is that it has to do with whether the cost *can* be borne by the insured, the normative weight of which is questionable.

19. It should be noted that the lack of a global political authority disqualifies the system as one of social insurance on some accounts. De Donder and Hindriks (2003) define social insurance partly by it being *mandatory*. Yet because of the lack of a global authority, at least for the foreseeable future, the system of insurance we have in mind here would have to be *voluntary*.
20. It is telling that the members of the Alliance of Small Island States, who first introduced the term 'insurance' in the climate debate, in fact were not asking for insurance. Instead they were asking for aid, or possibly compensation. Perhaps they feared that they would come off as asking for a free lunch. Perhaps they believed that using the label 'insurance' would improve their chances at the negotiations. But this does not change the fact that in asking for funds to cover losses associated with the near-certainty of sea-level rise, they were certainly not asking for insurance proper.
21. Thanks to Ed Page for suggesting this.

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