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# In Defence of Historical Accountability for Greenhouse Gas Emissions

**Abstract**

This commentary argues in defence of equal per capita emissions with historical accountability as a general rule for allocating the right to emit greenhouse gases. Historical accountability takes into account historical inequalities in per capita emissions. Implicitly it gives every human being an equal share of the global resource atmosphere, independent of place or time. Three reasons are put forward to argue why historical accountability should be the guiding principle for an international agreement allocating rights of emissions. In addition, as it has been dismissed by many scholars, six arguments are given to refute objections against historical accountability.

**Keywords**: Global warming; Emission rights; Historical accountability; Allocation rules; Kyoto protocol

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> 'The idea that developing countries like India and China must share the blame for heating up the earth and destabilising its climate (...) is an excellent example of *environmental colonialism*.' (Agarwal and Narain, 1991, p. 1).

## 1. Introduction

Allocating rights to greenhouse gas emissions will always be a most contentious issue, no matter what the total reduction rate. Indeed, the more overall reduction takes place, the more contentious will the allocation rule be. Parties to a treaty aiming for reductions of greenhouse gas emissions pay high attention to who has to reduce emissions and by how much, as can be seen from the exhausting negotiations that took place leading to the Kyoto Protocol in late 1997 (United Nations, 1997).

There are many different general rules on how to allocate rights to emit greenhouse gases. The most prominent ones are allocation proportional to emissions in a specified base year or future business-as-usual projected emissions (a rule known as 'grandfathering'), allocation on an equal per capita basis without historical accountability and allocation on an equal per capita basis with historical accountability — or any mixture thereof. The 'grandfathering' rule regards differences in base year or future projected business-as-usual per capita emissions as basically justified, as these differences are prolonged into the future. The second rule regards unequal per capita emissions as unjustified and allocates future emission rights on an equal per capita basis, but disregards historical inequalities of emissions. The third rule is different from the equal per capita rule only in that differences in historical emissions are also taken into account. It holds countries accountable for the amount of greenhouse gas emis-

sions remaining in the atmosphere emanating from a country's historical emissions. It demands that the major emitters of the past also undertake the major emission reductions in the future as the accumulation of greenhouse gases in the atmosphere is mostly their responsibility and the absorptive capacity of nature is equally allocated to all human beings no matter when or where they live. Historical accountability is also known under the name 'natural debt' and has been pioneered by Grübler and Fujii (1991) and Smith (1991).

These allocation rules can be defined formally. Assume, for simplicity of exposition, that a treaty encompassing all countries specified a worldwide emission target for each year $t$ over a future time period of $T$ years ($t$ = 1,...,T). Then the rules can be defined in their most simple form as follows:

$$x_i^t = \frac{x_i^b}{w^b} \cdot w^t$$ (allocation proportional to base year emissions)

$$x_i^t = \frac{Pop_i^b}{Pop_w^b} \cdot w^t$$ (allocation on an equal per capita basis without historical accountability)

where $x_i^t$ is country $i$'s allocation of emissions for each target year $t$, $x_i^b$ are country $i$'s emissions in a specified base year (which might or might not be the current year), $w^b$ are base year world emissions and $w^t$ are world target emissions for the year $t$. $Pop_i^b$ is country i's base year population and $Pop_w^b$ is base year world population.[1]

The same rule, but with historical accountability, is not quite as straightforward to formalise. First of all, we have to explicate what we mean by 'historical accountability'. Define the Historical Emission Debt ($HED_i$) of a country i as follows:

$$HED_i = \sum_{j=s}^{e}\left[ y_i(j) - \frac{Pop_i(j)}{Pop_w(j)} \cdot y_w(j) \right]$$

where $s$ is the start year, e is the end year of accounting (which need not be identical to $b$), $Pop_i(j)$ and $Pop_w(j)$ are defined as above for year $j$, $y_i(j)$ and $y_w(j)$ are country $i$'s and world emissions from year $j$, which are *still remaining in the atmosphere in the end year of accounting*.

The idea behind historical accountability is that countries which have in the past emitted in excess of an equal per capita allocation should have less than their equal per capita allocation of emission rights in the future and vice versa for countries which have in the past emitted less than their equal per capita allocation. In other words, countries with a positive *HED* have to compensate countries with a negative *HED* for their past emissions in excess of their population share up until their *HED* is fully compensated for. (Note that of course the sum of *HED* over all countries is equal to zero.)

There are two further complications, however. First, in addition to an agreement on $s$ and $e$, i.e. the accounting period, agreement is also needed upon the time period over which this compensation takes place. This is because for many countries it would simply be impossible to compensate for their *HED* in one year, as their *HED* might well exceed their total emission permits for that year. Second, if compensation takes place over a range of years rather than in one year, then it also has to be taken into account that a country's *HED* decreases over time as the stock of past emissions in the atmosphere decreases slowly according to a certain decay rate, which depends among other things on the type of greenhouse gas and the concentration of this gas in the atmosphere. Because of decay, countries with a positive *HED* would want this period to be

long and would want compensation to occur in the later part of that time period, whereas countries with a negative *HED* would want a short period and compensation to occur in the early part of that time period. Assume, for simplicity, that countries agreed on *N*, the number of years during which compensation takes place, which need not be identical to *T*. Assume further, somewhat arbitrarily, that they agreed that compensation is required according to the following formula:

$$C_i^n = 1/N \, HED_i^n \quad (n = 1,..., N)$$

where $HED_i^n$ is the *HED* of country *i* still remaining in the atmosphere in year *n*. Then, the rule which allocates emission rights on an equal per capita basis with historical accountability can formally be defined as follows:

$$x_i^t = \frac{Pop_i^b}{Pop_w^b} \cdot w^t - C_i^n$$ (allocation on an equal per capita basis with historical accountability)

'Grandfathering', the first allocation rule, is in the interest of developed or Annex 1 countries. It allows the continuation of their unequal access to the common resource atmosphere. In addition, they are not held accountable for their historical emissions that gave rise to the problem of global warming in the first place.[2] That emission rights should be allocated on an equal per capita basis and that historical differences in emissions should also be accounted for is, on the other hand, the shared view of almost every scholar and policy maker from the developing world (e.g. Agarwal and Narain, 1991; Hyder, 1992; Ghosh, 1993). It is the objective of this commentary to argue in defence of this view. Section 2 lists three reasons in favour of historical accountability. Maybe

more importantly, the commentary also aspires to refute some of the many objections that have been raised against historical accountability in the literature (section 3).

## 2. Three reasons in favour of historical accountability

First, on the most basic level, science is on the side of historical accountability. It is undisputed that global warming is a consequence of the increased concentration of greenhouse gases in the atmosphere which is a function of emissions that *accumulated over time*. It is true that emissions also decay slowly over time, but that does not invalidate the fundamental insight that global warming is not caused by current emissions of any particular year, but by a history of emissions over a long time span. To neglect historical accountability is therefore tantamount to ignoring the physical laws that give rise to the environmental problem of global warming.

Second, historical accountability is buttressed by the polluter-pays-principle which has been embraced by the OECD-countries as long ago as 1974 (OECD, 1974). According to the polluter-pays-principle those who caused the environmental damage in the first instance have to compensate for it. Because global warming is caused by cumulative emissions and the developed countries have contributed much more to cumulated emissions than the developing world, historical accountability ensures that the payment is indeed undertaken by the polluter and not by the victims of pollution.[3] It is expected that global warming will hurt the developing countries relatively more than the developed ones

(IPCC, 1996, p. 218). Ignoring historical accountability would give a retrospective licence to past emitters from developed countries to disadvantage the poorer countries. This would clearly violate Principle 21 of the Declaration of the 1972 United Nations Conference on the Human Environment in Stockholm which postulates that nation-states' 'sovereign right to exploit their own resources' is subject to not causing 'damage to the environment of other states or of areas beyond the limits of national jurisdiction' (Molitor, 1991, p. 83). This principle has been re-iterated in the preamble to the United Nations Framework Convention on Climate Change (United Nations, 1992).

Third, historical accountability is supported by the principle of equality of opportunity. The natural absorptive capacity of the planet earth that allows for the decay of a certain amount of greenhouse gas emissions truly belongs to nobody and should therefore be equally assigned to everybody in order to give everybody equal opportunity to benefit from emissions. To account for historical emissions ensures equality of opportunity to use the global resource atmosphere, no matter where or when he or she happens to live. To ignore historical accountability would mean to privilege those who lived in the past in the developed countries and to discriminate against those who live in the present or will live in the future developing countries. It is sometimes suggested in the spirit of Locke and Nozick that a long history of emissions might have established the right for developed countries to prolong current emission levels into the future and that such 'squatter's rights' can be derived from a common law doctrine of 'adverse possession' (e.g. Young and Wolf, 1991). Such a suggestion ignores the fact, however, that even Nozick (1974, p. 175) acknowledged that an

appropriation of property rights can only be regarded as just if "the situation of others is not worsened" which is clearly not the case with global warming.

**3. A refutation of some objections against historical accountability**

Let us turn to some objections against historical accountability now and try to refute them. A first objection claims that past generations have been ignorant of the detrimental consequences of emitting greenhouse gases and that the developed countries should therefore not be held accountable for historic emissions (Grubb, 1995, p. 491). While the first warning of global warming dates back to the last century (Arrhenius 1896), it is presumably fair to say that it was not before the mid-1980s that the public and decision makers became aware of the greenhouse effect. Does this therefore imply that emissions before, say, 1985 can be justly ignored? The answer is no. It is an established principle of the legal system of almost every country that ignorance does not exempt one from liability for damage caused in the case of civil law or from punishment in the case of criminal law. But surely, liability and punishment is often lower in case of ignorance than in case of conscious or even deliberate infliction of harm. Does it follow therefore that while historical accountability might be accepted, past emissions should be heavily discounted because of ignorance? Again, the answer is no. Historical accountability does not depend on past generations having deliberately or consciously caused harm to the global commons. It is not about blame or collective moral guilt, as Beckerman and Pasek (1995, p. 410) suggest, not even about awareness of harm caused, but about assigning an equal share of the

beneficent existence of the absorptive capacity of nature to every individual, independent of his or her place in either space or time. The developed countries have exploited this capacity in excess of what an equal per capita allocation would have granted them. Now they must be held accountable for it.

A second objection holds that the present generation of developed countries must not be held accountable for something that was caused not by themselves, but by individuals in the past who are long since dead (Beckerman and Pasek, 1995, p. 410). So even if historical accountability was accepted, this argument would call for limiting it to a period of the last 50 years or so. This objection raises a number of difficult and contentious issues that reach into debates far beyond global warming. For example, most young Germans seem to accept that while none of them can justifiably be blamed for Nazi crimes undertaken half a century ago, as a people they are held accountable for what some of their ancestors did. Similarly, we are currently witnessing the phenomenon that Swiss and other banks as well as German companies cannot uphold their position that they should not compensate for wrongs done by banks and companies in the past that were different from the current ones in all but the name. Their legalistic claim would presumably survive in court, but the political and moral pressure forces them to be accountable whether legally required to do so or not because it is felt that they benefited from the wrongs of the past.

But would it not be utterly wrong to directly compare war atrocities and genocide to the emission of greenhouse gases? Yes, of course. However, the very last point made above brings us back to the issue of global warming. The fundamental counter-argument against not being held accountable for emis-

sions undertaken by past generations is that the current developed countries readily accept the benefits from past emissions in the form of their high standard of living and should therefore not be exempted from being held accountable for the detrimental side-effects with which their living standards were achieved.[4] There can be no doubt that the development of the 'Northern' countries was eased, if not made feasible in the first place, by having had the possibility of burning large amounts of fossil fuel with the consequence of an accumulation of carbon dioxide in the atmosphere, the major greenhouse gas with a long atmospheric residence time. Janssen et al. (1992) have found a significant relationship between GNP per capita and the relative contribution to the carbon dioxide concentration rise by fossil fuel combustion per capita in a regression analysis over 11 world regions. The relative regional contribution to the carbon dioxide concentration explains two thirds of the variations in GNP per capita in 1990 (R square 0.67).

A third objection against (full) historical accountability holds that some of the benefits of past emissions are not confined to the emitting countries. Grubb et al. (1992, p. 316), for example, argue that past emissions enabled the development of public goods such as modern medicine or better technologies that have also raised living standards in developing countries and make it easier for later developing countries to gain the same living standards with less emissions. In principle, this argument is correct, but it is difficult to quantify the exact share of emissions that can be attributed to the provision of these kinds of public goods. My guess is that most scholars would agree that the vast bulk of emissions generated benefits to the developed countries themselves and not to

the world as a whole. Maybe therefore historical emissions should be slightly discounted, but the argument does not invalidate historical accountability as such.

A fourth objection is based on practical reasons. Because of boundary changes, so the argument put forward by Grubb et al. (1992, p. 316), it will be difficult to attribute past emissions to current nation-states. The break-up of the Soviet Union as well as the creation of new nations in the process of decolonization are often invoked as examples. The question is whether these boundary changes really pose that much of a problem, however. For firstly, the boundaries of many of the major emitters in the past, like Northern America, (Western) Europe, Japan, Australia and New Zealand, have been relatively stable over time, at least much more stable than the boundaries of countries in the developing world. Second, where boundary changes have occurred as in the case of the former Soviet Union there is no reason why a new nation-state should not be held accountable for emissions that were undertaken on the territory within its current boundaries. If such detailed statistical data on fossil fuel consumption and chlorofluorocarbon (CFC) emissions cannot be traced back directly, then one can take population share or GNP share as a proxy. Thirdly, if one feels uneasy about the implications of boundary changes in the last century then one might want to restrict historical accountability to some time in this century. This might also be a good idea given that the reliability of historical emission data in general decreases for periods longer back in time.

A fifth objection is again based on practical reasons. Because historical accountability would mean that either the developed countries sooner or later

have to drastically cut back their greenhouse gas emissions or have to buy substantial amounts of permits in the case of a tradable emission permit system from the developing countries, an equal per capita allocation rule with historical accountability in its pure version would require massive economic costs for developed countries. Rose et al. (1998) provide some figures on the differences in costs for developed countries following from different allocation rules.[5] For a global gross emission reduction of 16.5% by 2020, Rose et al. compute a present cost to Annex 1 countries of 119.2 billion of 1990 US dollar if emission permits are 'grandfathered'. If the same emission reduction is achieved with emission permits allocated on an equal per capita basis, Annex 1 countries face costs of 913.6 billion of 1990 US dollar, most of which result from buying emission permits from developing countries. Rose et al. (1998) do not compute costs to Annex 1 countries for the equal per capita allocation rule with historical accountability, but costs would of course be even higher.

Barrett (1992, p. 106), for example, therefore dismisses equal per capita allocation with historical accountability as being politically non-viable: there will be rather no global agreement on global warming whatsoever than one that allocates permits on an equal per capita basis and holds countries accountable for historic emissions. On this objection it has to be said that a right principle is not refuted by the mere fact of not currently being politically feasible. While it makes sense for developing countries not to insist on a strict application of equal per capita emission rights with historical accountability now, they would be ill advised to give up their insistence on this allocation rule coming into effect some time not too far into the future. In the meantime they might accept

partly or fully another allocation rule if they have the clear commitment from developed countries that eventually they would give in towards an equal sharing of the global commons.

A sixth objection claims that *historical* accountability is almost irrelevant because it is closely correlated with *current* emissions. Grübler and Fujii (1991, p. 1406) compute that the developed world is responsible for 85.9% of the contribution in the increase in atmospheric concentration of carbon dioxide since 1800, but also for 73.6% of current carbon dioxide emissions in 1987, while their population share is only approximately 21% (Bos et al. 1994). The reason why the developing countries should insist on historical accountability nevertheless and not just on an equal per capita rule without historical accountability, is twofold: first, the difference between historically accumulated and current carbon dioxide emissions of developed countries is likely to increase in the future. This is because current emissions of developing countries are likely to increase faster than developed countries' ones and because of the time lag until this translates into significantly lower cumulated emissions for developed countries. The second reason is that methane, the second most important greenhouse gas after carbon dioxide, has a relatively low estimated atmospheric residence time of about 10 years (Smith 1995, p. 24). Because developing countries emit relatively more methane than carbon dioxide than the developed countries do and because of the low residence time of methane, the gap between historical and current emissions will widen if the 'comprehensive' approach is taken. Eventually therefore the difference between historical and current emissions will matter.

## 4. Conclusion

Where is the international community of nation-states standing with respect to historical accountability? The preamble to the United Nations Framework Convention on Climate Change acknowledges that 'the largest share of historical and current global emissions of greenhouse gases has originated in developed countries' and Art. 3 speaks of 'common but differentiated responsibilities' for climate protection (United Nations, 1992). The Kyoto Protocol demands emission restrictions only from developed countries (on average Annex 1 countries have to reduce their 1990 emissions by 5.2 per cent until the period 2008-2012), whereas developing countries can increase their emissions without restriction. One could therefore interpret this Protocol as a first step away from historical and current inequalities in emissions. On the other hand, neither the Framework Convention nor the Kyoto Protocol include any commitment of developed countries to eventually accept an allocation rule based on equal per capita emissions, let alone accept accountability for historically unequal emissions. It is therefore far from certain that the developed countries are willing to abandon inequalities in greenhouse gas emissions in their favour.

Presumably at no time in the future will the rights to greenhouse gas emissions ever be allocated strictly on an equal per capita basis with historical accountability. There will always be a political compromise. This will be acceptable to developing countries as long as the basic validity of the allocation rule is accepted. A strict application of the rule would also suffer from the fact that it is difficult to estimate the relative contribution of a country to the build-up of

greenhouse gases in the atmosphere with full confidence. This is because of the difficulties in getting reliable estimates of historical data and because the removal of greenhouse gases from the atmosphere is a complex process and is (up to a certain threshold) a positive function of gross emissions: the higher emissions, the higher is also the removal (IPCC, 1996, p. 93f.).

Right now it is not in the interest of the developed countries to accept the basic validity of equal per capita allocation with historical accountability and the developing countries do not have the bargaining strength to enforce it. But things can change over time. The biggest bargaining power of developing countries — especially of big ones like China, India, Brazil and Indonesia — is their ability to obstruct. As their current emissions and populations grow faster than the ones in developed countries, any comprehensive treaty in the early next century will be futile without the cooperation of these countries. By that time it might become the interest of the developed world to accept the basic validity of equal per capita allocation with historical accountability in order to strengthen the incentives for the major developing countries to join a truly global agreement. The sooner the developed countries realise this, the better. If this commentary could contribute even the least bit to speed up the process of acceptance, it would have fully achieved its objective.

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ENDNOTES

[1] If instead of a base year, future projected business-as-usual emissions or populations are the reference points, the formulas have to be slightly modified.

[2] Annex 1 countries comprise the OECD-countries and the economies in transition in Eastern Europe and the Russian Federation. Annex 1 and developed countries is used interchangeably here.

[3] Payment would take place via the buying of emission permits from developing countries, for example.

[4] Again this argument does not depend on morally blaming past generations in developed countries for their emissions.

[5] The reader should take these as rough figures only. In estimating these costs, much depends on the modelling approach and the underlying assumption.