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# Emissions Rights and their Transferability
## *Equity Concerns over Climate Change Mitigation*[1]

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**Abstract.** Existing literature on equity considerations for climate change mitigation has largely focused on fair burden-sharing at an inter-national level without adequate attention to equity concerns at the intra-national level. However, disparities between regions and income groups within nations pose perhaps more equity concerns over climate change mitigation than those between nations. While international equity can be agreed upon via political negotiation among nations, the poor in both developed and developing countries may not be guaranteed their fair allocation of emissions rights because the necessary institutional framework has yet to be established at both international and national levels. This paper distinguishes three parts of emissions rights and discusses their transferability in view of equity concerns. The author suggests that basic necessity emissions rights are not transferable and non-necessity emissions are fully marketable, while individual contributions to state are subject to collective decision-making or political manipulation at the international level. The exact share of each of the three parts is subject to further investigation, but unlimited free trading of emissions rights is likely to result in equity concerns at both inter- and intra-national levels. Further examination in quantitative terms would represent an interesting case study for a better understanding of the issue.

**Key words:** climate change mitigation, emissions rights, inter- and intra-rational equity

## 1. Introduction

Equity is neither the cause of climate change, nor the ultimate objective of climate policies. The real concern is the impact of climate change and policies on equity. Since equity has to be assessed relating to justifiable entitlement by parties and/or individuals involved, rights concerning the use of the atmospheric resources constitute the key to understanding the question. Although all living organisms are entitled to the use of natural resources (see, for example, Taylor, 1986), climate change related discussion on equity has largely focused on the impact on human welfare, in particular the fairness of resource allocation and burden-sharing across nations (e.g. IPCC, 1996; Metz et al., 2001).

The terms "justice" and "fairness" can have different meanings (Albin, 1995), though in most literature, they are normally used synonymsly. In general, the former means distributive justice, in the sense of general standards for allocating collective benefits and burdens among the members of a community at a local,

national, or global level. In other words, "justice must be constitutive of its framework and not simply an attribute of certain participants' plan for life" (Sandel, 1982). The principles of justice exist prior to and independently of any phenomenon to be judged.[3] Fairness consists of individual perceptions of what is reasonable under the circumstances, often in reference to how a principle of justice regarded as pertinent should be applied. Therefore, justice can take priority over fairness in decision-making with respect to equity concerns. Such a difference appears to correspond with the UNFCCC Article 3 notion of "common but differentiated responsibilities".[4] "Common" suggests that the stabilisation of the atmospheric $CO_2$ concentration is in the interest of everybody. It is accepted as just without considering the judgement of the immediate outcome of burdens to individuals. "Differentiated" clearly acknowledges the requirement for a fair division of the costs involved in any actions against global warming, taking into account needs, ability, and responsibilities.

However, equity discussion in both the literature and the climate negotiations has been largely focussed on fairness among nations at the international level. Developing countries collectively have strong political bargaining power in international negotiations to secure their fair share of the atmospheric resources allocated. At this level, equity across nations might at least be agreed upon. The poor in both the rich and the poor countries are, however, largely ignored in the discussion. The cost of climate policies may have a larger impact on the poor in the rich countries, and the benefits negotiated at the international level may not reach the poor in developing countries. Clearly, there is a need to address equity concerns within nations and additional considerations are necessary to protect the poor. It is in this respect that this paper aims to shed some light on the understanding of equity issues regarding emissions rights and their transferability.

The paper is organised as follows. In section 2, an overview is presented on existing discussions concerning equity at the international level, indicating economic implications and fair burden-sharing. In section 3, the importance of equity within nations is addressed, suggesting the need to include intra-national equity concerns in the global framework. Section 4 considers the basis for the allocation and transferability of emissions rights. In section 5, the relevance of the allocation and transferability of emissions rights to international negotiation is examined in light of securing the needs of the poor and seeking efficient allocation of the scarce atmospheric resources. Some concluding remarks are drawn in the last section, suggesting the need for more in-depth studies before any policy framework is established.

## 2. Inter-national equity considerations: focusses on economic implications across nations

In the literature, attempts have been made to classify or group equity principles from an international perspective. Based on the taxonomy constructed by Toth

(1999), Banuri et al. (2001) categorise equity principles in accordance with rights, liability, poverty and opportunity. Poverty and opportunity principles are in essence, need and ability-to-pay related requirements, which give more weight to the poor and the disadvantaged. In this sense, climate change is seen as an opportunity for the poor. In a similar manner, Rose et al. (1998) distinguish three different types of principles based on:

- Fairness in allocation: it focuses on the initial allocation of property rights of greenhouse gas emissions, such as the egalitarian, sovereignty, polluter pays, and ability-to-pay principles.
- Consequential fairness: this group of principles looks at the outcome in terms of welfare changes caused by emissions reduction efforts, such as the horizontal, vertical, compensation, and utilitarian principles.
- Procedural fairness: this category recognizes the libertarian, political consensus, and Rawlsian' maximin as guiding principles to the process of emissions allocation.

Evidently, fairness as considered above is assessed against political entity at country level. All the allocation schemes address the distribution of emissions rights to individual states rather than people. The consequences of emissions reductions are also compared across nations as input for international bargaining. Procedural equity is no exception as individuals are not present at international negotiations. Representatives of individual countries may be considered to act on behalf of their fellow countrymen, but this may not be the case as their selection and participation are largely separated from their constituencies. As a result, equity concerns in many cases focus on fair resource distribution and/or burden-sharing among nations.

Table I presents an overview of shares of selected measures over the world total from a selection of countries or group of countries. If the shares are to be the basis for allocation of the atmospheric resources or fair burden-sharing, it is apparent which principle or equity argument a country or group of countries would most likely employ in international negotiations for their own benefit. For the allocation of resources, the developing world would strive for egalitarian or per capita distribution, while the developed world would prefer sovereignty or a grand-fathering principle. For countries like Nigeria, China and India that are characterised by a disproportionately high share of world population in comparison to their share of the global economy and energy consumption, they would certainly argue for allocation of emissions rights on a per capita basis and demand that burden-sharing be derived according to ability-to-pay/polluter-pays-principle. The United States and Russia, on the other hand, would argue in the opposite. Brazil, Japan and Germany are somewhat in between, but their preferences are well demonstrated by the figures in the table. The developed countries do not object to the principle of ability-to-pay, but they also demand active participation and the contribution of the poor developing countries.

The information in Table I is not only for equity concerns, but more importantly

*Table I.* Percentage share of the world total by selected countries/country groups. If these indicators are used as the basis for allocation of the global common resources, their economic implications can vary a great deal.

| Country | Population 1999 | Size of the economy (1999)* | Commercial energy use 1997 (toe) | $CO_2$ emissions (1996 $MtCO_2$) |
|---|---|---|---|---|
| Brazil | 2.8 | 2.5 | 1.8 | 1.2 |
| China | 20.9 | 3.4 | 11.8 | 14.8 |
| Germany | 1.4 | 7.1 | 3.7 | 3.8 |
| India | 16.7 | 1.5 | 4.9 | 4.4 |
| Japan | 2.1 | 14.0 | 5.5 | 5.1 |
| Nigeria | 2.1 | 0.1 | 0.9 | 0.4 |
| Russia | 2.5 | 1.1 | 6.3 | 7.0 |
| USA | 4.6 | 28.6 | 22.9 | 23.4 |
| Developing countries | 85.1 | 21.6 | 50.0 | 52.7 |
| High income | 14.9 | 78.4 | 50.0 | 47.3 |
| World | 100.0 | 100.0 | 100.0 | 100.0 |

* GDP, measured using official exchange rate.
*Source:* World Bank (2000) Development Report 2000/1.

for economic calculations. In the case of any action detrimental to climate change, the cost must be born by certain groups of current society. An understanding of burden-sharing can be of vital inportance in political negotiation. Toth et al. (2001) summarise the numerical results of burden-sharing among geo-political groups under different equity principles, including sovereignty, egalitarian, ability-to-pay, etc. Evidently, beneficiaries under one equity principle could lose under a different one. For instance, Rose et al. (1998) calculate that Southeast Asia would gain 63.3 billion (1990 US$) under egalitarian allocation of emissions rights in contrast to a net loss of 2.1 billion using the sovereignty principle (grandfathering). As the negotiation is undertaken by participating countries, equity could be addressed at the international level among nations or groups of nations.

With strong political bargaining power, the developing world has successfully gained exemption, as stipulated in the Kyoto Protocol, from emissions reduction commitment and resource transfers from the North for energy efficiency in terms of technology and capital, using equity principles related to per capita emissions and income. On the other hand, with strong backup of economic and technological power, the developed nations have also secured flexibility in reaching their emissions reduction targets using arguments related to high economic costs. Among the flexibility mechanisms is emissions trading among nations. Is such an arrangement consistent with intra-national equity? If the Kyoto Protocol results from a political compromise on the basis of economic understanding, equity at the international level can be agreed upon for practical interpretation and implementation. Can this arrangement be extended to equity within nations?

## 3. Intra-national equity concerns

Since the focus has been on the Kyoto Protocol after the Second Assessment Report (IPCC, 1996), few analyses have been conducted on the procedural or sequential equity issues within nations, particularly with respect to developing nations.[5] Equity at a national level is a matter of concern, but less important for international negotiations. Domestic reallocation must also be determined after the international distribution is agreed upon. Moreover, equity within one nation is a domestic issue related to sovereignty and therefore sensitive to international intervention. This does not mean that equity within a country is less relevant in climate change.

First of all, equity within one nation is a necessary condition of public support for sound climate policies. For the general public at large, what is more relevant to their own choice is the observance of people around them. If there is a large divide between the poor and rich in income and energy consumption, the poor are unlikely to be persuaded to reduce their consumption without due compensation, just like the North and South camps in international negotiations. In the Second Assessment Report of the IPCC, it is acknowledged that "Unless national equity issues are addressed explicitly, it may be impossible to mobilise public opinion for amelioratory action in both developed and developing countries" (Banuri et al., 1996).

Second, given the existing pattern of inequality in both developed and developing countries (Table II), international equity concern has to be extended to resource allocation and burden-sharing within nations. As noted in Sidiqi (1995), the average per capita consumption of energy by low-income households is often only about 10% of that of the high-income groups in developing countries, a pattern that parallels the 1:10 ratio of per capita energy consumption between the developed and developing world. If different income groups or regions within one country were well represented in the decision-making regime, it could be likely that the interests of the poor would be taken into account in climate change actions in a similar manner to that at the international level. Even so, the poor are still disadvantaged as the rate of participation by the poor is generally low and information is asymmetric. In many cases, the internal bargaining regime may not be functioning. Therefore, the rich would generally be in a better position to monopolise resources and impose burden-sharing schemes. Should this happen, the poor would not be given the amount of resources proportional to the allocation to the nation, as agreed upon at the international level. As a result, the rich would take this opportunity to strengthen their power and the poor would be further disadvantaged.

Thirdly, inequity in the developing world requires particular attention as the income inequality gap in these nations is generally wider than that in the rich countries (see Table II). It might be interesting to note that the poor nations with more unequal income distribution at home are more vocal for equity demand at

*Table II.* Gini Index and distribution of income/consumption in selected developed and developing countries.

| Country | Survey year | Gini index % | % share of income or consumption | |
|---|---|---|---|---|
| | | | Lowest 10% | Highest 10% |
| Brazil | 1996 | 60.0 | 0.9 | 47.6 |
| China | 1998 | 40.3 | 2.4 | 30.4 |
| Germany | 1994 | 30.0 | 3.3 | 23.7 |
| India | 1997 | 37.8 | 3.5 | 33.5 |
| Japan | 1993 | 24.9 | 4.8 | 21.7 |
| Nigeria | 1996/97 | 50.6 | 1.6 | 40.8 |
| Russia | 1998 | 48.7 | 1.7 | 38.7 |
| United States | 1997 | 40.8 | 1.8 | 30.5 |

*Source:* World Bank (2000) Development Report 2000/1.

international negotiations. In many developing countries, the Gini index is higher than 0.4. The figure for Brazil is as high as 0.6, with almost half of the national income going into the pocket of the top 10% of its population. Even the Chinese economy, officially labelled as "socialist", has income inequality comparable to that of the capitalist United States. On the contrary in most developed nations, in particular those of the European Union, national income is more equally distributed among their people. For instance, in Japan, the ratio of income of the highest 10% over the lowest 10% of its population is 4.5, while in Brazil it is 52.9. Moreover, policies and institutions for income redistribution and social security in developing countries have yet to be established or improved, so climate change related costs and benefits in these countries could not be distributed fairly across their population. As a result, the rich minority in the poor world may take this opportunity to further marginalise the poorer section of its population. This outcome is clearly incompatible with equity treatment at international levels and may jeopardize the successful implementation of international agreements as inequality may lead to social instability in these areas.

Fourthly, regional disparities within a nation can be as wide as those among various nations in the world. Figure 1 shows regional disparities among six regions inside China. Per capita GDP in the northwestern provinces is only half of that in eastern ones, but per capita energy consumption is one-fifth higher. Although the income disparity is not as wide as those of waste gaseous emissions and energy consumption, it does not correspond to the other two indicators. If a uniform energy or emissions tax is imposed, the lower income, western part of China would be more heavily burdened than in the eastern part of the country.

For illustration, let us consider one example. Within one country, the rich may gain control over all the emissions rights allocated by the international agreement. If the government officials were irresponsible or corrupt, all the emissions

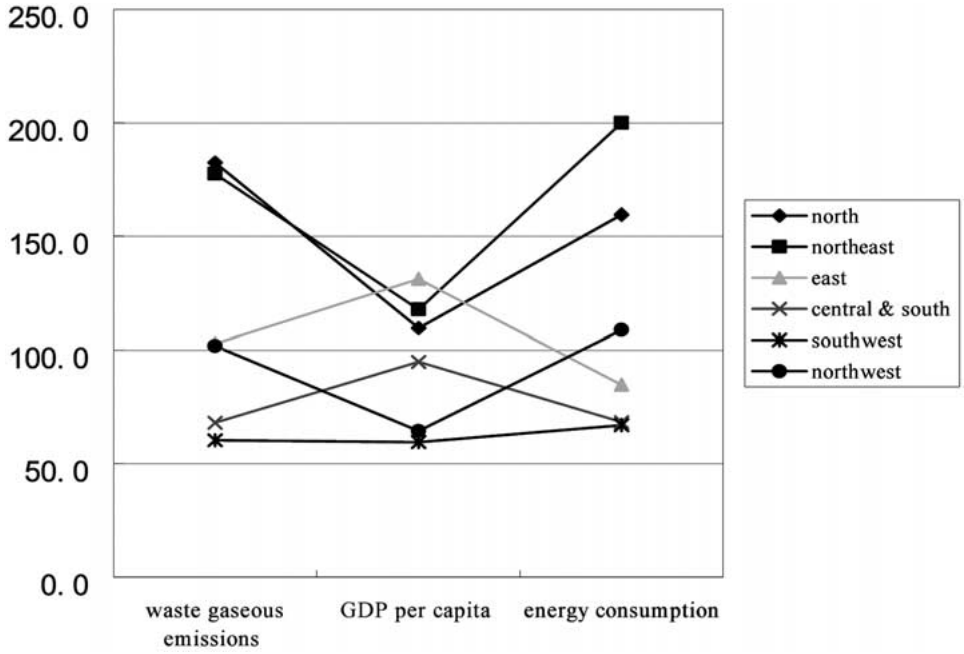


*Figure 1.* Regional disparities of income, energy consumption and waste gaseous emissions from industrial combustion among north, northeast, east, central and south, southwest and northwest parts of China in 1998. (*Note:* (1) calculation is based on China Statistical Yearbook 1999; (2) the comparison is made in per capita terms with the national average as 100.)

rights might be sold on the international market for the financial gain of a few, leaving no prospect for use by others or for the future. This is an extreme case but could happen in some developing countries. In a developed nation, it is also possible for the poor to be deprived of their emissions rights through higher energy prices that they cannot afford for necessary energy consumption in the market. For instance, the poor may not be given the emissions rights for their own usage. Instead, emissions rights are incorporated into higher energy prices. If the poor find the price too high, they may be unable to obtain the necessary energy for heating or even cooking.

In summary, inadequate attention to intra-national equity in the literature and climate change policy-making process causes concern about the effectiveness and successful implementation of climate policies agreed upon at the international level. The framework and mechanisms for international equity are already in place but those for intra-national equity concerns are largely absent. International arrangements for equity considerations such as technology and monetary transfers may actually exacerbate income inequality in the recipient country, as the poor may be excluded from implementation. In the following section, discussion will take place on the basis and framework for equity and efficiency in climate change policy-making.

## 4. Emissions rights and their transferability

If human beings are equally entitled to the use of atmospheric resources, an equal share can be allocated to individuals on a per capita basis in terms of divisible emissions rights. It should be useful, however, to distinguish three types of rights since the nature of such rights can differ greatly. One is associated with basic necessity rights, such as the right to vote or to live, which are independent of any market transactions. For these types of rights, economic implications do not normally carry any legal weight in decision-making on their allocation or re-allocation. In a democratic society, voting rights are not transferable by law. The amount of statistical value of life does not suggest that one could take the life of somebody if that amount was compensated for.[6] For these types of rights, there is no price attached. The second type of rights may be partially tradable. Examples include land and regulated products. Only property rights in the case of land acquisition, for example, are traded, but not the collective, or more correctly, political sovereignty rights of the resource. Among the regulated goods are drugs and weaponry. There is a price for each item of partially exchangeable goods, but political sovereignty or regulation authority is with the state, not the market. The third type is related to ordinary consumer/capital goods. Once one pays, he gains ownership. Once one sells, he receives monetary compensation but he also gives up his rights to the goods.

The attractiveness of the exchangeability regarding different types of rights, apart from any political considerations, lies in its cost-saving potential for compliance with emissions reduction targets (see Table III). Because of the substantial differences in marginal abatement costs among countries, emissions trading could lead to an overall reduction in cost. However, this does not seem to be sufficient to justify the full exchangeability of all categories of emissions rights. The difficulty in reaching an agreement under the Kyoto Protocol proves how seriously the parties look at emissions rights and the assigned amounts. As a matter of fact, the flexibility mechanisms in the Kyoto Protocol imply a distinction of the nature and exchangeability of emissions rights among them. Emissions trading among Annex B countries treats emissions rights as an ordinary exchangeable good within the market. Under joint implementation, some political complications are involved that require political entities for approval and verification, while the implementation of the Clean Development Mechanism demands an official approval and certification for the acquisition of certified emissions reductions, without actually giving up corresponding emissions rights in the host countries. The message or decision in the Kyoto Protocol is that the emissions rights are exchangeable but subject to certain requirements.

It might be a matter of judgement to which category emissions rights concerning atmospheric resources will go. If it was a basic necessity right, everybody would be born with it and it would not be transferable. This might be true, as every human being born on earth would need the atmospheric resources for his/her survival

*Table III.* Marginal Abatement Costs from modelling exercises (in 1990 US$/tC; 2010 Kyoto target).

| Model[7] | No Trading | | | | Annex I trading | Global trading |
|---|---|---|---|---|---|---|
| | US | OECD-E | Japan | CANZ | | |
| AIM | 153 | 198 | 234 | 147 | 65 | 38 |
| G-Cubed | 76 | 227 | 97 | 157 | 53 | 20 |
| MERGE3 | 264 | 218 | 500 | 250 | 135 | 86 |
| MIT-EPPA | 193 | 276 | 501 | 247 | 76 | |
| MS-MRT | 236 | 179 | 402 | 213 | 77 | 27 |
| SGM | 188 | 407 | 357 | 201 | 84 | 22 |
| WorldScan | 85 | 20 | 122 | 46 | 20 | 5 |

*Notes:*

1. Four regions under a no trading case are the USA, OECD Europe (OECD-E), Japan, Canada, Australia, and New Zealand (CANZ).
2. Model names: AIM: Asian-Pacific Integrated Model (Japan); MERGE: Model for Evaluating the Regional and Global Effects of GHG reduction policies (US); SGM: Scenario Generator Model (IIASA); MS-MRT: Multi-Sector Multi-Region Trade model (US); G-Cubed: Global General Equilibrium Growth Model (Australia); MIT-EPPA: Massachusetts Institute of Technology Emissions Prediction and Policy Analysis (US); WorldScan: World Scenario Analysis (Netherlands).

*Source:* Table 8.7 of chapter 8 of the IPCC TAR (Metz et al., 2001).

in the form of consumption of certain amounts of energy and emission of certain amounts of greenhouse gases (GHGs). Any overuse or abuse of such rights is wrong and should be corrected at any expense. However, some wrong doing may be accidental while at other times it may be intentional. A car accident results in casualties. If it was intentional, that constitutes a crime. However, if it was a genuine accident, the loss of life might be settled with compensation. Clearly, historical and current high levels of GHG emissions by the rich North are not the result of any intention to cause global warming. Therefore, compensation should be acceptable. In the meantime, it should be noted that such compensation could not be arranged before hand and it is not for the sake of economic benefit to anyone. On the other hand, the wrong doing by the rich North should not provide an excuse for the poor South to do the same in the future. The poor in the South do not have the right to abuse the atmospheric resources as scientific knowledge is there, and therefore the abuse should be judged as intentional.

If emissions rights are in the second category, they are exchangeable but subject to collective or political restrictions. As defined in this paper, sovereignty rights are part of individual rights as a contribution to a community or political entity, such as a state for use and decision-making collectively or politically. This means that there are two types of sovereignty rights: commercial and political. Political control over sovereignty rights on emissions might result in restricting the sale

of such rights to non-citizens, selling such rights to another state for political or economic reasons, or keeping them under state or individual ownership similar to land rights. In this sense, sovereignty rights on emissions are very similar to state control over the use of land. The commercial component would suggest that emissions rights could also be completely sold on the market as an ordinary good, as in history, land was sold for money between countries.

Like many other natural resources, the rights to the use of atmospheric resources can also be regarded as a free capital/consumer good. In this case, no restriction would be imposed on its trading. Emissions rights would have a price equal to their marginal benefit to the buyers or users. In this way, efficient reallocation of such emissions rights would be possible no matter what the initial allocation is. As shown in Table III, the marginal cost in Japan is generally the highest in the modelling results, and marginal costs in OECD countries are higher than non-OECD countries. Market exchange of emissions rights between countries or users with different marginal costs could reduce overall costs of emissions reductions. The major equity concern for this type of unlimited trading is, however, the possible accumulation and concentration of emissions rights by those who can afford them.

It is possible under free trading that the poor would ultimately be deprived of their rights even though they were allocated the same amount as the rich in the beginning. To prevent this from happening, emissions rights may be separated into different categories. Basic necessity rights are associated with the satisfaction of basic needs of individuals. They should not be transferable and should not be manipulated by political processes. They should be assessed and allocated independent of any economic considerations. No market transaction on this part of emissions rights should be allowed. The assessment of such needs would include the energy requirements for cooking, food, clothing, and essential heating in harsh winter conditions. Any consumption that exceeds the basic needs may be considered non-essential. If a resource is available, higher or even a luxurious living standard does not constitute a crime or wrong doing. In theory, everybody should be entitled to enjoy some luxury if resources are available. However, as this part of resource use is not a necessity for survival, it should be exchangeable in the market for efficiency.

## 5. Relevance of allocation and transferability of emissions rights in climate policy making and international negotiations

The global atmosphere is a common and scarce resource. Equity concerns related to climate change or its mitigation do not provide any justification for redistribution of global income, but there is the problem of allocation of the scarce natural resource that was once free and considered unlimited. In international negotiations and national climate policy-making, the allocation of emissions rights is an important equity issue but their reallocation after initial distribution conveys

even more important implications for equity at both national and international levels.

In international negotiations, the notion of fairness across nations can be misleading as the focus is largely on economic impact on individual countries. This is because the ultimate objective of equity principles concerns the welfare of individual human beings rather than a country as a political entity. After comparing a variety of initial allocation schemes, Mueller (2001) demonstrates that equal per capita distribution appears to be based on a one-man-one-vote system. Under the existing institutional framework, it is unlikely that a one-country-one-vote system will be changed, but the stakes of the poor in each country should also be taken into account in international negotiation and agreement so that everyone on earth is affected.

One basic issue in climate change equity concern is: to what extent government representatives are authorised to negotiate emissions rights? As specified in this paper, emissions rights are comprised of distinct legal components for the use of atmospheric resources. Only the contributions by individuals to the state as collective or political sovereignty part of emissions rights are at the disposal of the government for political or economic manipulation at international negotiations. If the government takes control of the part that should be allocated to the market, inefficiency would result in welfare losses. The basic necessity part of emissions rights should not be taken away from the individuals. There appears to be a tendency for the state as the political entity to squeeze and take over both the market and basic necessity parts of emissions rights.

Another policy issue concerning equity is transferability of emissions rights. There is no doubt that the non-essential part of emissions rights allocated to individuals is exchangeable. This part of emissions may actually be left to the market without being distributed specifically to individual human beings. Collective emissions rights can also be exchangeable should the concerned government consider the trade beneficial to the state. However, care should be taken in the transfer of this part as regional disparities within one country may complicate the issue. Energy intensive industries may be concentrated in one part of the country requiring more emissions rights for normal production (see Figure 1 for example).

A third issue relates to the possible excess "emissions rights" allocated to the poor in accordance with per capita criterion. While the current emissions by people in the developing world are much lower than the world average, the basic necessity part may not be fully consumed due to low levels of living standards. The calculation of basic necessity emissions is based on the demand for a decent standard of life. People in poverty do not require that amount of emissions. This part, in principle, is not transferable but the poor may wish to trade part of it to alleviate for poverty. In particular, the policy relevance here is that an increase in energy efficiency may reduce emissions while improving living conditions. But this increase in efficiency can also take place through the exchange of emissions rights for technology or capital. This suggests that the basic necessity

emissions rights might be used for the welfare improvement of the poor. In the short run, both the rich and the poor would benefit from emissions trading. However, in the long run, the development goals of the developing countries should not be restricted to subsistence level and should offer the opportunity for a decent life. Given the above consideration, the basic necessity part of emissions rights should not be permanently taken away because of trading within the policy framework.

Table IV summarises the policy implications of allocation and transferability of emissions rights. The exact share of each part of emissions rights is subject to assessment by the scientific and policy-making communities and industries. In the case of basic necessity emissions, the purpose is recognition of consumption of energy for a decent living standard. Equity consideration would reject the idea of emissions trading, but the well coordinated transfer of emissions rights would help those in developed countries to lower their costs for reducing their emissions. Collective rights can be transferable but the policy framework brings in political and economic interests of the parties concerned into the equation. The non-essential part of emissions rights constitutes the third category and should be fully transferable in the market place.

While the consideration of transferability of emissions rights might be largely related to equity principles, the policy framework is mainly connected to the practical fairness of burden-sharing. For long term stability and sustainability, the acknowledgement of individual emissions rights may help discourage the wrong and encourage the right. Furthermore, recognition of individual emissions rights does not prevent the principle of burden-sharing from functioning. We may first assess and quantify the emissions rights of individuals, and then establish a policy framework for cost minimising while adhering to equity principles. The widely cited egalitarian approach of contraction and convergence, as proposed by the Global Commons Institute (1997), may be considered one of the components of the possible policy frameworks aimed at the correction of wrong doing in a fair burden-sharing manner, by allowing a transitional period for the contraction of emissions from the North and convergence from the South to the equal per capita entitlement.[8] In this way, intra-national equity concerns can be established within the policy framework at both international and national levels.

## 6. Conclusions

The equity argument in the context of global climate change may be, in practice, a demand for unequal treatment in accordance with the interests of individual nations or political entities. The thought processes appear to be heavily biased to and driven by self-interest. The nations that request for per capita allocation of emissions rights for the sake of equity are those in many cases with a record of the most unequal income distribution and a lack of social security and basic human rights. Political compromise on equity considerations across nations,

*Table IV.* Emissions rights and their transferability.

| Nature of emissions rights | Assessment | Transferability | Policy framework |
|---|---|---|---|
| Basic necessity emissions rights for individuals. | Basic needs for survival with respect to food, cooking, clothing, shelter, essential heating and air conditioning in extreme conditions. | Correction of overuse/abuse of rights in the North; no repetition of wrong doing by the South; No trading of such rights; cost-effective correction and avoidance of wrong doing in an affordable manner. | Transfer of part of the unused rights from the South to the North during a transitional period in exchange for technology and financial resources. |
| Individual rights but collectively managed in the name of state sovereignty and/or under state regulation. | Claim of state sovereignty over part or all of the entitlements from a political, economic or strategic perspective by political entities. | Exchangeability subject to political negotiation for both strategic and economic considerations of the political entity (state). Market may be created under political arrangement and supervision. | Creation of bubbles and alliances for international trading for mutual political and /or economic interest. |
| Non-basic necessity emissions of individuals or groups of individuals. | Similar to any other consumer goods, in particular, luxurious consumer goods. | Fully exchangeable, efficiency through market reallocation of entitlements. | Free market operations under "Market justice". |

however, does not guarantee that the poor in both the developed and developing countries would benefit from international equity agreements. Clearly, the debate on international equity has yet to be extended to an intra-national level. The poor in both the rich and poor countries should receive priority consideration in addressing equity concerns.

Not all the emissions rights are transferable or exchangeable. If emissions are associated with basic necessity consumption, no money-for-right trade should be allowed. However, these types of emissions constitute only part of the emissions rights if allocated on a per capita basis. Part of the individual emissions rights may be subject to state sovereignty or regulation for collective or political purposes. These emissions rights are transferable but subject to political intervention by the state. In addition to necessity and collective rights, part of the emissions rights can be linked to non-essential or luxurious consumption. Free trade should be allowed and efficient allocation should be possible after their initial allocation. While the second category of emissions rights is subject to political maneuver, the third type is likely to lead to the concentration of entitlement through the market. In either case, the equity principle could be undermined.

An important issue remains unsolved: the proportion of emissions rights for basic necessity, collective/state control, and non-essential/luxurious consumption. Current negotiation and discussion on equity as shown in the Kyoto process tend to concentrate on the second part while ignoring or squeezing the first and third parts. Unlimited free trading of emissions rights is likely to result in their concentration in the rich parts of the world while depriving the opportunities of the poor in the South. Similarly, too large a share allocated to the basic necessity part would lead to the waste of scarce resources. There may be some objective quantification of the basic necessity part, but the exact share for each of these three parts may be more complex. Further examination in quantitative terms would represent an interesting case for study in order to gain a better understanding of the issue.

## Notes

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2. Technical Support Unit of Working Group III on Mitigation of Climate Change, c/o RIVM, Bilthoven, The Netherlands; currently with the Institute of World Economics and Politics, the Chinese Academy of Social Sciences, Beijing, China. Email: panjiahua@hotmail.com.
3. Rawls (1971) considers that "Justice is the first virtue of social institutions, as truth is of systems of thoughts" (cited in Munasinghe, 2000).
4. In the UNFCCC (United Nations Framework Convention on Climate Change), the phrasing of equity consideration (on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities as given in Article 3) seems to separate the basis of equity and "common and differentiated responsibilities". However, in the literature, the

"common but differentiated responsibilities and respective capabilities" is often considered as an explanation of the basis of equity.

5. See, for example, Banuri et al. (2001) and Toth et al. (2001). However, there are a few exceptions. One such example is the paper by Rayner and Malone (2000), which makes the link between climate change and intragenerational equity at a national level. But their analysis focuses on the poverty issues, viewing the poor as disadvantaged. In another paper, Agarwal and Narain (2000) take a different view considering that the poor could help save the world in case of climate change.
6. However, the statistical value of life can be collectively estimated for policy analysis, such as the benefit of pollution control. See Hourcade et al. (2001).
7. The names of the models are abbreviations or acronyms. For details, see Chapters 2 on emissions scenarios and 8 on regional costs and benefits of climate change mitigation of the IPCC Third Assessment Report on Mitigation of Climate Change (Metz et al., 2001).
8. In a strict sense, the acknowledgement of the higher or overused atmospheric resources by the North is more closely related to the acquired rather than the born entitlement, as there is no indication that the poor South was subsidizing the rich North for their correction of wrong doing. However, this may still be considered at least as "partial justice" (see Schokkaert and Eyckmans, 1999).

## References

Agarwal, A. and S. Narain (2000), 'How Poor Nations can Help to Save the World', in M. Munasinghe and R. Swart (eds.), *Climate Change and its Linkages with Development, Equity, and Sustainability*. Proceedings of the IPCC Expert Meeting held in Colombo, Sri Lanka, 27–29 April 1999. LIFE/RIVM/World Bank, pp. 191–214.

Albin, C. (1995), 'Rethinking Justice and Fairness: The Case of Acid Rain Emission Reduction', *International Affairs* **21**(2), 119–143.

Banuri, T., K. Goran-Maler, M. Grubb, H. K. Jacobson, and F. Yamin (1996), 'Equity and Social Considerations', in James P. Bruce, Horsang Lee and Erik F. Haites (eds.), *Climate Change 1995: Economic and Social Dimensions of Climate Change*. Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press, pp. 83–124.

Banuri, T., J. Weyant, G. Akumu, A. Najam, L-P. Rosa, S. Rayner, W. Sachs, R. Sharma and G. Yohe (2001), 'Setting the Stage: Climate Change and Sustainable Development', in B. Metz, O. Davidson, R. Swart and J. Pan (eds.), *Climate Change 2001: Mitigation*. Cambridge: Cambridge University Press.

Global Commons Institute (1997), *Contraction and Convergence: A Global Solution to a Global Problem*. July. London, UK: Global Commons Institute.

Houghton, J., Y. Ding and D. Griggs (eds.) (2001), *Climate Change 2001: The Scientific Basis*. Cambridge: Cambridge University Press.

Hourcade, J.-C., P. Shukla, L. Cifuentes, D. Davis, B. Fisher, A. Golub, O. Hohmeyer, A. Krupnick, S. Kverndokk, R. Loulou, R. Richels, E. Fortin, H. Seginovic and K. Yamaji (2001), 'Global, Regional and National Costs and Ancillary Benefits of Mitigation', in B. Metz, O. Davidson, R. Swart and J. Pan (eds.), *Climate Change 2001: Mitigation*. Cambridge: Cambridge University Press.

IPCC (Intergovernmental Panel on Climate Change), 1996. Climate Change 1995: economic and social dimensions of climate change. Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

IPCC (2000), *Special Report on Emissions Scenarios*. Cambridge: Cambridge University Press.

Metz, B., O. Davidson, R. Swart and J. Pan (eds.) (2001), *Climate Change 2001: Mitigation*. Cambridge: Cambridge University Press.

Mueller, B. (2001), *Fair Compromise in a Morally Complex World*. Paper presented at the Pew Conference on Equity and Global Climate Change. Washington DC, 17–18 April, 2001. http://www.pewclimate.org/events/

Munasinghe, M. (2000), 'Development, Equity and Sustainability in the Context of Climate Change', in M. Munasinghe and R. Swart (eds.), *Climate Change and its Linkages with Development, Equity, and Sustainability*. Proceedings of the IPCC Expert Meeting held in Colombo, Sri Lanka, 27–29 April 1999. LIFE/RIVM/World Bank.

Rayner, S. and E. L. Malone (2000), 'Climate Change, Poverty, and Intragenerational Equity at National Level', in M. Munasinghe and R. Swart (eds.), *Climate Change and its Linkages with Development, Equity, and Sustainability*. Proceedings of the IPCC Expert Meeting held in Colombo, Sri Lanka, 27–29 April 1999. LIFE/RIVM/World Bank.

Rawls, J. (1971), *A Theory of Justice*. Cambridge, MA: Harvard University Press.

Rose, A., B. Stevens, J. Edmonds and M. Wise (1998), 'International Equity and Differentiation in Global Warming Policy: An Application to Tradable Emission Permits', *Environmental and Resource Economics* **12**(1), 25–51.

Sandel, M. J. (1982), *Liberalism and the Limits of Justice*. Cambridge: Cambridge University Press.

Schokkaert, E. and J. Eyckmans (1999), 'Greenhouse Negotiations and the Mirage of Partial Justice', in M. H. Dore and T. D. Mount (eds.), *Global Environmental Economics: Equity and the Limits to Markets*. Oxford: Blackwell Publishers, pp. 193–217.

Sidiqi, T. A. (1995), 'Energy Inequities Within Developing Countries: An Important Concern in Global Environmental Change Debate', *Global Environmental Change* **5**, 44–454.

Statistical Bureau of China (1999), *China Statistical Yearbook*. China Statistics Press.

Taylor, P. W. (1986), *Respect for Nature: A Theory of Environmental Ethics.* New Jersey: Princeton University Press.

Toth, F. (ed.) (1999), *Fair Weather? Equity Concerns in Climate Change*. London: Earthscan.

Toth, F., M. Mwandosya, C. Carraro, J. Christensen, J. Edmonds, C. Gay-Garcia, H. Lee, K. Meyer-Abich, E. Nikitina, A. Rahman, R. Richels, R. Ye, Y. Wake and J. Weyant (2001), Decision Making Frameworks', in B. Metz, O. Davidson, R. Swart and J. Pan (eds,), *Climate Change 2001: Mitigation*. Cambridge: Cambridge University Press.

UNFCCC (United Nations Framework Convention on Climate Change) (1998), *Framework Convention on Climate Change*. Bonn.

UNFCCC (1998), *Kyoto Protocol*. Bonn

World Bank (2000), *World Development Report*, 2000/1. Oxford: Oxford University Press.