

Equity and Justice in Dealing with Global Warming

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Kverndokk, S. and A. Rose: «Equity and justice in global warming policy», forthcoming in *International Review of Environmental and Resource Economics*.

1. Motivation – China vs. USA

- **Global warming:** Human activity affects the climate via greenhouse gas emissions. May have severe future impacts (IPCC, 2007).
- Global warming is **public good problem**. Incentives to free ride. No reason to expect the problem to be solved without an international agreement.
- The 1997 Kyoto agreement will have a marginal impact on global warming. Main reason: The biggest emitters **USA** (20%) and **China** (22%) do not have any commitments. What are their standpoints in the climate negotiations?
 - **USA:** Do not want to commit unless the large developing countries also commit
 - **China:** Point to their relative lack of resources, low per capita emissions and the fact that the industrialized countries failed to do anything about the problem when they were at a similar key stage of economic development
- The argument for China (and maybe USA) is based on equity. Can these standpoints be justified?

1. Motivation – China vs. USA (cont.)

- I will go through (mainly) economic studies on **equity and justice** to see if the arguments can get support.
- There are however **other arguments** than equity that are important:
 - **Cost efficiency** – cheap mitigation alternatives in LDCs
 - **Irreversibilities** – capital stocks have long lifetime
 - **Significant reductions** – both LCDs and DCs should contribute – scenarios assume a high future per capita growth in LDCs.
- These arguments points in the direction of LDC participation, but not necessary that LDCs should pay for mitigation

2. Why equity?

- Why is equity important?
 - John Rawls (1971): *“Justice is the first virtue of social institutions, as truth is of systems of thought. A theory however elegant and economical must be rejected or revised if it is untrue; likewise laws and institutions no matter how efficient and well-arranged must be reformed or abolished if they are unjust.”*
 - While justice play an important role as a principal of social interactions, it often plays a secondary role in economic policy making (Johansson-Stenman, 1998).
- Why is equity particularly important in climate change policy?
 - Transboundary problem that requires a global solution: Cost-efficiency not enough to make a significant agreement, fairness arguments used for not ratifying Kyoto(?).
 - Climate change policy is to a large extent a question of distributive justice, i.e., how shall we allocate the burdens. Thus, a focus on equity issues are necessary
 - How much should future generations count? (*intergenerational aspects*)
 - How should we distribute the burdens within a generation? (*intragenerational aspects*)
- Here I will focus on **intragenerational** equity.

3. Equity and Justice

- Some important concepts:
 - **Efficiency**: Pareto Optimality is an accepted principle
 - **Equality**: Egalitarianism
 - **Fairness** and **equity**: Often given a specific meaning in economics; non-envy, proportionality.
 - **Justice**: Incorporating all dimensions of evaluation besides efficiency

3. Equity and Justice (contd.)

- When is an action good or bad?
 - Refer to consequences (*substantive fairness, distributive justice*)
 - consequences alone do not guide us (*procedural fairness*)

4. What is just?

Standard economic methodology:

- **Welfarism:** Maximize a **social welfare function** that includes the utility of all the members (countries) of the (international) society: $W=W(u^1, \dots, u^n)$
The focus is on welfare outcomes.

Theories of social justice:

- **Utilitarianism (Harsanyi, 1955):** distribute goods so as to maximize the total utility of members of the society. This is a sub-set of welfarism.
- **Rawlsian Theory (Rawls, 1971):** The difference principle: Primary goods should be allocated so that they are to the greatest benefit of the least advantaged
- **Libertarian Theory (e.g., Nozick, 1974):** Individual freedom prevails except where others may be harmed (basically the same as Pareto superiority)
- Basic rules underlying theories of justice; metaprinciples (Elster, 1993):
 - justice is attached to individual human beings (**ethical individualism**)
 - past practices are irrelevant to distribution in the present, except to the extent that they have left morally relevant and causally efficacious traces in the present (**ethical presentism**)
- Global justice theories → **equity principles**, i.e., how to organize societies or how goods or burdens should be allocated

5. The burdens of climate change

- **Who suffers most from climate change?**
 - some impacts will be beneficial to some sectors, regions and countries while costly to others
 - poorer countries will face higher negative impacts than richer countries
 - But damage cost estimates depend on income: a dollar to a poor person is not the same as a dollar to a rich person. Rich people (or countries) are willing to pay more to avoid damages or to require higher compensation for damages than poor. Thus even if consequences of global warming may be more severe in poor countries the aggregated measure of damages may be lower than in richer countries.
 - How can we deal with this?

5. The burdens of climate change (contd.)

- **Equity weights:**

- Do not add up monetized losses. Instead, add up welfare losses using equity weights, and then monetize.

- Start with a Social Welfare Function (SWF):

$$W=W(u^1,\dots,u^n), \quad u^i= u^i(Y^i_0-D^i,Z^i_0)=u^i(Y^i_1,Z^i_1).$$

Calculate changes in welfare due to climate change:

$$\Delta W=-(W_1 \cdot u_Y^1 \cdot D^1 + \dots + W_n \cdot u_Y^n \cdot D^n)$$

Monetize by dividing with u_Y^i .

5. The burdens of climate change (contd.)

- **Conclusions on Equity Weights:**
 - Equity weighted estimates of the marginal damage of CO₂ emissions are substantially higher than estimates without equity weights (by a factor of ten or more, Anthoff et al. 2007) → damages in LDCs such as China should count more (a critique against Stern, 2007)
 - What are the consequences of this? Equity weights can be made for national decision making, and different ethical views on how to care about other countries give very different estimates for marginal damage or carbon taxes (Anthoff and Tol, 2007).
 - Equity weights are also appropriate when it comes to sharing the burden of mitigation.
 - But weighting the costs has implications for optimal emissions: Even if different weight factors give substantially different damage estimates, they actually yield the same optimal emission reductions (Azar, 1999). This argument does not take monetary transfers into account.
 - Aggregate damage costs depend on SWF, but it is hard to make a SWF that represent the ethical views of all agents (Brekke et al, 1996)
 - Equity versus efficiency: If income distribution is just, equity weights are identical, thus one alternative to using equity weighing is to redistribute income (Hylland and Zeckhauser, 1979).



6. The burdens of climate change policies

- **Sharing the burden of mitigation internationally**

- The costs of greenhouse gas mitigations are not evenly distributed among regions or countries
- Cheap reduction options are mainly found in Eastern Europe and developing countries
- Does this mean that these regions should abate more?

We will look at two possibilities to implement an agreement; carbon taxes (no international transfers) and tradable emission permits (international transfers).

7. Implementing a climate agreement using carbon taxes

- According to standard economic theory, optimizing a global welfare function $W=W(u^1, \dots, u^n)$, would require a uniform tax set equal to the marginal damage of greenhouse gas emissions (first best optimization)
→ cost effectiveness (see, e.g. Stern, 2007)

This result can be criticized from an ethical point of view:

7. Implementing a climate agreement using carbon taxes (cont.)

1. **Welfare (equity) weights:** Using welfare weights means that weighted marginal abatement costs should be equalized across all countries (Eyckmans et al., 1993; Chichilnisky and Heal, 1994): If the (weighted) marginal utility of consumption of the private good is higher in poor countries than in rich, marginal abatement costs should be lower in poor countries than in rich.

→ Carbon taxes should be higher in rich countries than in poor

A traditional cost-effective solution can be restored using side payments; would require transfers from rich to poor.

7. Implementing climate agreements using carbon taxes (cont.)

2. **Realism of assumptions in first best outcome:** The first best outcome requires a full set of policy instruments available, especially international redistribution via lump sum taxes. These are not available → consider a second best outcome.

Consider two countries: rich and poor. If international redistribution (lump sum transfers) is not possible, the tax in the poor country should be lower than in the rich.

The poor country can devote more resources to the production of private goods and less to the public good (the environment) and this will therefore work as an income transfer from the rich country to the poor (Sandmo, 2007).

→ lower production efficiency but still increase in the global social welfare function

7. Implementing climate agreements using carbon taxes (cont.)

→ while the US view is supported by standard economic theory, taking equity seriously supports less abatement in China.

8. Tradable emission permits

- We now turn to international transfers
- Standard economic theory: A system of tradable permits makes it possible to separate efficiency and justice considerations (given that the outcome of the trade is considered equitable)
- This is challenged by the studies mentioned above.
- However, several studies have looked at how distributive justice should ideally be taken into account in the allocation of tradable emission permits.

I present three views:

8. Tradable emission permits (contd.)

- Allocate according to population (Kverndokk, 1995)
 - Equal per capita emissions
 - In correspondence with meta-principles (ethical individualism and presentism) and to avoid distribution based on morally arbitrariness.
- Allocate according to historical accountability (Neumayer, 2000)
 - Every human is given an equal share of the global resource atmosphere independent of place and time
 - In correspondence with science, polluter-pays-principle and the principle of equality of opportunity (Rawls)

8. Tradable emission permits (contd.)

- Do not only consider the fair allocation, but also the fair exchange (Helm and Simonis, 2001)
 - Starting point: Equal per capita emissions follows from justice theories
 - Concerned about the outcome not just the initial distribution. Put several criteria for the outcome such as *Pareto efficiency*, *Envy-freeness*, *Individual rationality* and *Stand alone criterion*
 - One criterion that may be binding is the *stand-alone-criterion*: No agent should be made better off than he would be if he were able to use the whole resource on his own
 - Either allocate permits freely according to some equity criteria (population) and put restrictions on trade, or trade freely and put restrictions on allocation (“contraction and convergence”)

8. Tradable emission permits (contd.)

→ All three views of permit allocations all support transfers from the rich countries to the poor.

- Note that the outcome of the trade depends on **how emissions of a country is measured**
 - Production accounting principle → in favor of DCs
 - Consumer accounting principle (Ecological Footprint) → in favor of LDCs
 - LDC will probably be assigned lower levels of emissions with the latter principle
 - These give totally different incentives
 - Which one should be preferred from ethically reasoning?

9. Concluding remarks on USA vs. China

- It is hard to argue that emissions should only be reduced in DCs such as USA.
- While the Chinese view is not entirely supported, several studies incorporating equity argue for lower mitigation in DCs or for monetary transfers from DCs to LDCs:
 - Equity weights
 - Restrictions on (lump sum) international transfers
 - Allocation of tradable emission permits
 - Consumer accounting principle of emissions
- But will this be the outcome of international climate negotiations?

10. Equity in international climate negotiations

- Global warming is a **public good problem**: no reason to expect the problem to be solved without an international agreement
- **The process of negotiations (game theory):**
 - Assume selfish agents:
 - Benefits from free riding
 - Little credibility of punishment
 - Fairness is not taken into account
 - The number of signatories will be small compared to the number of players in the game, or the emission reductions will be small compared to the full cooperative outcome (Barrett, 2005).

10. Equity in international climate negotiations (cont.)

- **Can we improve upon the result?**
 - A social norm saying that countries should not free ride gives more cooperation (Hoel and Schneider, 1997), but do countries care about such social sanctions?
 - Can equity arguments facilitate negotiations?
 - Serve as a focal point that reduces negotiation costs (Schelling, 1960), but this assumes that countries agree on a single equity criterion
 - Self-serving use of equity principles (Lange et al., 2007)

10. Equity in international climate negotiations (cont.)

- Behavioral economics (Brekke and Johansson-Stenman, 2008):
 - People are willing to choose cooperative behavior but only if others are doing so
 - They are willing to contribute more to good social causes if they think other people are contributing and teams are more altruistic than individuals
 - Reciprocity such as punishments is not always motivated by future gains, which may make punishments more credible
 - But:
what is perceived as fair is often influenced by self interest, and
we would like to avoid situations and information that would force us to reflect over ethical issues if this is in conflict with our material interest

11. Concluding remarks

- Taking equity seriously would require lower climate targets in LCDs than DCs or substantial monetary transfers.
- Whether this would be the outcome of the climate agreement hopefully signed in Copenhagen next year is hard to tell.