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HOW TO INDUCE DEVELOPING COUNTRIES TO ACT AGAINST CLIMATE CHANGE?

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ABSTRACT

This paper analyzes different global agreements on stabilization of greenhouse gas concentrations. Using WorldScan, a 12-region, 11-sector CGE model, a number of stabilization scenarios are quantified. Multiple scenarios from IPCC SRES are used as a base. To induce the developing countries to comply with a global agreement, an allocation of emission rights is suggested that leave those regions not worse of compared to non-compliance. This allocation is determined endogenously by the model. The resulting burden-sharing regime is compared with the benchmark rule of equal emissions rights per capita.

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1. Introduction

Participation of developing countries in climate change mitigation is a must. Both for environmental and for economic reasons. The key question is how to induce commitments from the developing world. This draws attention to the issue of burden sharing. In this paper we analyse two benchmark burden sharing rules for global warming policy.

What many people have suspected for some while has recently been confirmed: the earth is becoming warmer as a result of human activity. This is the conclusion reached by the IPCC, the Intergovernmental Panel on Climate Change (IPCC, 2001). The emission of greenhouse gases will inevitably lead to further warming of the earth in the course of this century. Projections suggest that the average global temperature will go up by anything from 1.4 to 5.8 degrees Celsius. This will lead to a rise in sea levels of between 9 and 88 centimeters. The environmental and economic effects of such changes cannot be reliably predicted, but it is reasonable to suppose that there will be far-reaching consequences before the end of the century. In the political process under the UNFCCC parties have therefore agreed that the nations of the world will seek to stabilize the concentration of greenhouse gases in order to ensure that humanity does not seriously distort the world's climate.

If greenhouse gases are to be stabilized at an acceptable level, it is essential that the developing world adopts emission control measures. All the efforts of the industrialized countries would count for little if the developing countries did not follow suit relatively quickly. Global warming can only be headed off by a treaty under which developing countries also accept emission reduction objectives.

If it is not for environmental reasons alone, there are strong economic reasons to involve developing countries in climate change mitigation. Given the relative cheap abatement options in developing countries, it is cost-effective to exploit these opportunities.

Developing country participation is key to the successful mitigation if climate change. This focusses the attention on how to induce commitments from developing countries. The issue we want to address concerns the relationship between the industrialized and the developing world. This brings forward the problem of equity or burden sharing. Who should pay? For many developing countries, poverty is a more pressing problem than climate change. It is not very likely that they can be persuaded to sacrifice economic growth for the sake of energy conservation. To set the stage, we consider two benchmark cases. First, we consider the egalitarian rule to allocate emission rights on an equal per capita base. Next, we consider a benchmark case in which we allocate developing countries more emission rights per capita than industrialised countries. This compensates income losses from climate policy. If this were done, however, the cost of climate policy can be expected to be much higher for the developed countries.

In general, the costs of climate change policies depend on the reduction effort and the policy instruments chosen. Following Coase (1960) a marketable permits scheme will be cost-effective irrespective of how the permits are distributed. Hence, we assume unrestricted emissions permit trading. We assume a global carbon tax and the lump sum redistribution of its revenues. The reduction effort is the difference the between emission target and emissions in policy free reference case. In this paper we use the new IPCC SRES scenarios as a reference. These emissions scenarios cover a broad range of possible futures. Underlying our analysis is the applied general equilibrium model WorldScan.

The remainder of this paper is as follows. Section 2 addresses the methodology used. We give a short survey of the tool we use for our analysis: the WorldScan model, we sketch the IPCC SRES reference scenarios and we explain the burden sharing rules used. In section 3 we present some results. Section 4 concludes.

2. Methodology

Key features of the WorldScan model

To quantify the baseline scenarios and the stabilization variants, we use the WorldScan model. WorldScan is a multiregion, multisector, applied general-equilibrium model, which focuses on long term growth and trade in the world economy (CPB, 1999). WorldScan has been developed to construct scenarios. In this case it is used to supply the general characteristics of the SRES scenarios with corresponding trends of endowments, technology, and international specialization patterns. Distinguishing characteristics of WorldScan are an Armington trade specification, imperfect capital mobility, consumption patterns depending upon per capita income and converging towards an universal pattern, a low-productive sector in developing countries and a distinction between low- and high-skilled labor. Dynamics in WorldScan stem mainly from consumption and investments, which are forward looking.

[Insert Table 1 here]

The model distinguishes twelve broad regions. Table 1 gives an overview. These twelve regions can easily be aggregated into broader regions. Relevant for the analysis of climate change policy is the distinction between industrialized countries and countries in transition (Annex B) and developing countries (non-Annex B). Quite often, like in Bollen, Manders and Timmer (2000), we use a four region version of the model, in which we distinguish the OECD, Eastern Europe and the Former Soviet Union (EEFSU), Asia (ASIA) and the Rest of the world (ROW). There are eleven producing sectors in the energy version of WorldScan (see Table 1). Four sectors concern the supply of energy: coal, oil, gas and electricity. This allows for substitution between different energy carriers. The other sectors are agriculture, energy-intensive products, consumption goods, capital goods, services, transport and raw materials.

Value-added, energy, and materials are inputs to production. Primary inputs to value-added are labor (low-skilled and high-skilled), and capital. In agriculture and in the oil-, gas- and coal- producing sectors, we also distinguish a fixed factor as a primary input to value-added. The fixed factor in fossil energy production can be thought of as a fuel-specific natural resource. Other sectors are characterized by constant returns to scale. These sectors have a horizontal supply curve; the supply elasticity approaches infinity. For all sectors, except the electricity sector, energy input to production is a composite of coal, oil, gas, electricity, biofuels, and renewables. Renewables consist of nuclear, geothermical, solar, and wind energy[1]. We do not consider these to be generated by a separate production sector. Biomass is produced by agriculture. Renewables are produced by the services sector. As a consequence, the prices of biomass and renewables equal the price of agriculture and services, respectively. Since renewables are produced by the utilities sector, a sector with a horizontal supply curve, this input factor serves as a carbon-free backstop in our model.

Technology enters the model in two ways. First, value-added is becoming increasingly productive over time. This technological change is neutral concerning input factors in value-added: labor, capital, and the fixed factor. This value-added productivity is the main driving force behind GDP growth. Next, we assume an energy-specific technological change making the input of energy-producing factors more or less efficient over time. This second form of technological change is, together with changes in relative prices, a force driving behind the change in energy intensities.

The model only accounts for energy-related carbon emissions, *i.e.* the direct consumption of coal, oil, and gas, and their related emissions.

[1] Strictly speaking, the renewables is not the correct label for this category, since nuclear energy is non-renewable.

Calibration

The model is calibrated to the benchmark year 1995, based on the GTAP4E data set (see Hertel *et. al*, 1997, and Malcolm and Truong, 2000). Implicit prices result from the confrontation of the value of output and trade per region in GTAP4 with volume data of output and trade. There is a clear difference between domestic prices and internationally traded prices in some regions. We assume that energy subsidies are the cause for these differences. From the GTAP database we also derive non-energy data such as demand, production, and trade patterns of other goods, and labour and capital intensities in the various sectors. For the source of other data we refer to CPB (2000).

After the calibration of the base year, the model is solved in 5-year intervals spanning the horizon from 2000 to 2100. The data and projections for population size and labour supply coincide with the SRES scenarios. Overall and energy-specific technologies are chosen in such a way that GDP and energy use in the SRES scenarios are reproduced.

IPCC SRES scenarios

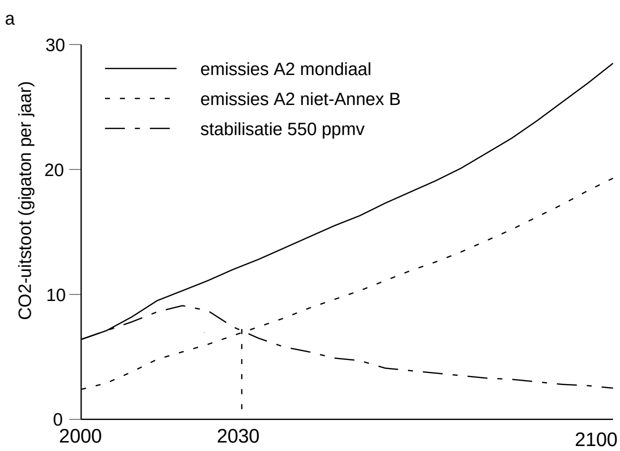
The baseline scenario is of overriding importance for the costs of stabilization of CO_2 concentrations. In this paper we consider the new IPCC scenarios. The IPCC (IPCC, 2000) comissioned a new report on emissions scenarios (the Special Report on Emissions Scenarios, or SRES). Four scenario families were developed. These SRES scenarios are known by the rather unimaginative names of A1, A2, B1 and B2. The four families can be roughly characterized by two dimensions: globalization versus regionalization, and economy versus the environment. The A1 and A2 worlds are dominated by the objective of the people to maximize income, rather than to pursue any environmental goals. In the B1 and B2 worlds local environmental objectives -- such as local air pollution and soil degradation -- are also important. A1 and B1 are characterized by further globalization, while in A2 and B2 the regions remain more diverse and isolated. Globalization may evoke rapid technological progress, leading, e.g., in the A1 scenario to technologies, with relatively low use of fossil energy. From the four families six so-called marker scenarios were chosen A1B, A1F, A1T, A2, B1 and B2. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non-fossil energy sources (A1T), or a balance across all sources(A1B)

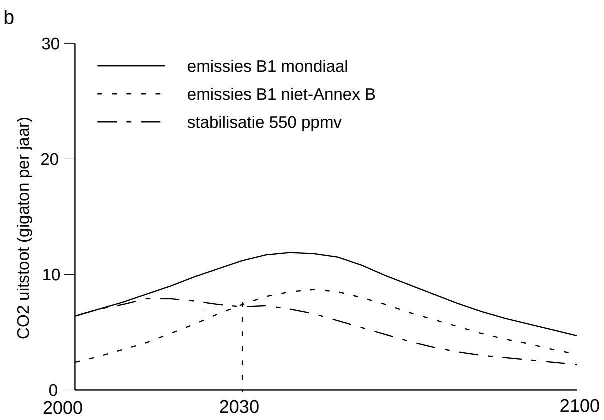
The stories behind these four scenarios have been implemented by different modelling groups. This has resulted in detailed trajectories for GDP, population, and final energy demand. As mentioned above, we mimic these trends by calibrating scenario-specific technological progress. Furthermore, we have introduced other scenario-specific elements to concur with the different storylines. Globalization in A1 and B1 is modelled by reduction of tariffs, lower international transportation costs, and higher long-term price elasticities of trade flows, all leading to more intensified trade relations during the scenario period. Further integration of international capital markets is modelled as convergence of risk premiums. In these globalization scenarios we also assume more rapid convergence of consumption patterns and skill intensities. We have modeled the environmental awareness in the B1 and B2 worlds by changing consumption patterns towards less energy-intensive products and by abolishment of energy subsidies.

Stabilization

If human activity is not to have an undesirable effect on the world's climate, the concentration of greenhouse gases in the atmosphere needs to be stabilised at a safe level. There is evidence to suggest that a 'safe level' is twice the concentration that existed prior to the industrial revolution (Berk, et al, forthcoming). This amounts to a CO_2 concentration of 450 ppmv by the end of the century. In CO_2 equivalents this corresponds to a concentration of 550 ppmv.

Figure 1 Emissions and stabilization in A2 and B1, 2000-2100





We illustrate stabilization in two IPCC SRES scenarios in figure 1. In each graph, the solid line shows how global emissions of fossil CO_2 would develop if no action were taken to prevent climate change. Figure 1a shows a 'dirty' scenario (A2), while figure 1b shows a 'clean' scenario (B1). Under the dirty scenario, CO_2 emissions would continue to increase, quadrupling between 2000 and 2100. Under the clean scenario, by contrast, CO_2 emissions reach a plateau in the course of the century.

The dashed line in each graph shows the course that global emissions of fossil CO_2 should take if the atmospheric concentration is to be stabilized by 2100 at the safe level of 550 ppmv (twice what it was before the industrial revolution and about 50% higher than it is today). Under the dirty A2 scenario, the difference, in terms of emission levels, between what would happen with control measures and what would happen without would continue to widen. Control measures would continually need to be upgraded in order to maintain a stable concentration. Even under the clean B1 scenario, intervention would be necessary, and by 2100 emissions would have to be well below 2000 levels.

The dotted line in each graph represents emissions in non-Annex B countries, assuming that no control measures are implemented. It will be seen that, without intervention, greenhouse gas emissions from these countries alone will by 2030 exceed the maximum global levels consistent with a stable atmospheric concentration of 550 ppmv. The obvious corollary of this is that the Annex B countries cannot possibly achieve stabilization on their own. In other words, the scope of the Kyoto treaty, which sets modest targets for Annex B nations only, is quite limited in relation to the scale of the problem. Clearly, there is an urgent need for developing countries to adopt climate policies. The question is how such countries can be persuaded to limit emissions, when economic growth is perceived to be so much more important than the environment?

Burden sharing

One 'acceptable' way for developing countries to address the issue of global warming is to grant them sufficient tradable rights to ensure that the adoption of climate policy does not deliver net economic disadvantage. Where a global market in emission rights exists, the distribution of those rights determines the way the burden of climate policy is shared. Following Coase (1960), a marketable scheme will be cost-effective irrespective of how the permits are distributed. Many allocations may be considered (e.g. see Rose et al., 1998). To set the stage, we consider two benchmark approaches to burden sharing:

1. the allocation of emission rights on a per capita basis (equal rights case);
2. the allocation of emission rights on the basis that non-Annex B countries do not suffer a net loss of income (compensatory allocation).

In the first regime, we assume that Kyoto will be implemented. From 2015 onwards, all regions join a global agreement and their emissions targets converge to equal per capita levels in 2030. In the second regime, allocation of rights for developing countries is determined endogenously. Emission rights for industrialized countries adjusted in a proportional way.

3. Results

Equal rights per capita

We start with the equal per capita case. Table 2 shows the effects of stabilization for the A2 and the B1. These two scenarios cover a wide range of possible futures. Besides emissions in the reference case, the targets and the actual emissions are given. The costs of stabilization are measured as the loss in national income.

[Insert Table 2 here]

- In all Industrialized regions (Annex B) actual emissions are higher than the emission targets. These regions buy emission rights.
- All developing regions, except Middle East, North Africa sell emission rights. Their emission are below their targets
- Income effects in the A2 case are stronger, due to the more stringent reduction effort
- Sub-Saharan Africa and India (and rest of the world) are the winners. They experience a gain compared to the no-policy situation

Table 3a and 3b give a further decomposition of the income effects. The total effect is decomposed in a GDP-effect, a terms-of-trade effect (TT), the effect capital flows (YOIF) and the effect due to permits transfers.

[Insert Table3a and 3b here]

- GDP-effects dominate the overall effect, except for SSA and IND where huge inflows of permit transfers occur.
- The effects of terms-of-trade effects and the change in capital flows, due to changing interest rates play a minor role.

Table 4 shows the income effects for all six marker scenarios.

[Insert table 4 here]

Compensatory rights

Next, we turn to the case where developing regions are granted enough emission rights to prevent them suffering an income loss from stabilization policies. Table 5 shows the emissions and emission rights per head of population in all twelf regions in 2050 that would lead to stabilization of the atmospheric concentration at 550 ppmv. The associated income losses are also given. The table indicates how the burden of climate policy would be shared, both under the dirty A2-scenario (Table 5a) and under the clean scenario B1 (Table 5b).

[Insert Table 5a and 5b here]

Under the dirty scenario, per capita emissions in 2050 would still be four times as high in Annex B countries as in other countries. This is because the global emission reduction effort would be concentrated in the non-Annex B countries, where action is more cost-effective. If rights were distributed on a per capita basis, developing countries would on average suffer about a 3% loss of income, while Annex B countries suffered a 4.8% loss. In order to compensate developing countries for income lost as a result of climate policy, it would be necessary to give them (much) greater rights than those extended to industrialized countries. Indeed, the level of compensation would need to be such that the Annex B countries would actually have negative rights. Hence, in order to continue emitting greenhouse gases, Annex B countries would need to buy rights from other countries. The resulting GDP losses for Annex B nations would then exceed 7%. The trade in emission rights would lead to large financial flows from Annex B countries to non-Annex B countries. Acquisition of emission rights would cost the average Annex B country 3% of its national income. The sale of rights would account for 4% of developing countries' income. This is many times greater than what they currently receive in development aid. This would in effect be the price that industrialized countries had to pay to get developing countries to pursue a climate policy.

Under the clean scenario, the per capita allocation of rights would lead to much lower income losses. In both Annex B countries and non-Annex B countries, the loss of GDP in 2050 would be around 0.5% on average. Nevertheless, a very considerable redistribution of rights would be necessary to compensate developing countries for their losses. This is primarily because the price of emission rights would be lower under this scenario, since much less would need to be done to realize a stable situation. The cost of climate policy to Annex B countries would be about twice as high if rights were allocated on a compensatory basis as if they were allocated on a per capita basis.

[Insert table 6 here]

4. Discussion

If greenhouse gases are to be stabilized at an acceptable level, it is essential that the developing world adopts emission control measures. In principle, it is possible to allocate emission rights in such a way as to compensate developing countries for the cost of participating in the global effort to control climate change.

However, this would involve granting industrialized countries negative rights. Consequently, the cost of climate policy would rise considerably for the industrialized countries.

References

Berk, M., J. Minne, B. Metz, (forthcoming) *COOL Global Dialogue, Synthesis Report*, RIVM.

Bollen J.C., A.J.G. Manders and H.R.T. Timmer (2000), The benefits and costs of waiting, Early action versus delayed response in the post-SRES stabilization scenarios, *Environmental Economics and policy Studies, Vol. 3 No. 2,* Springer-Verlag Tokyo.

Böhringer, Ch. and H. Welsch, 1999, Contraction of Global Carbon Emissions and International Emissions Trading: The Economic Impact of Alternative Permit Allocation Rules, *CEEPR Discussion Paper* 99-13, Mannheim.

Coase, R., 1960, The Problem of Social Costs, *Journal of Law and Economics*, **3**, pp. 1-44.

CPB, 1999, *WorldScan - The Core Model*, CPB, The Hague.

IPCC, 2001, WG I Third Assessment Report, Cambridge University Press, Cambridge.

Nakicenovioc, N. et al. (eds.), 2000: *IPCC Special Report on Emissions Scenarios*, Cambridge University Press, Cambridge.

Rose, A., B. Stevens, J, Edmonds M. Wise, 1998, International Equity and Differentiation in Global Warming Policy, *Environmental and Resource Economics*, **12**: pp. 25-51.

Table 1 Regions and sectors in WorldScan

Regions	Sectors
Annex B	
OECD	
• United States (USA)	Materials
• Western Europe (EU)	• Agriculture and foodstuffs
• Japan (JAPAN)	• Energy-intensive goods
• Rest OECD (POECD)	• Consumption goods
EEFSU	• Capital goods and durables
• Eastern Europe (EE)	• Domestic services
• Former Soviet Union (FSU)	• International services and transport
Non-Annex B	• Other raw materials
ASIA	
• China (CHINA)	Energy
• Dynamic Asian Region (DAE)	• Coal
• India and Rest of the World (INDIA)	• Oil and petroleum products
ROW	• Natural gas
• Middle-East and North Africa (MNA)	• Electricity
• Sub-Saharan Africa (SSA)	
• Latin America (LAM)	

Table 2 Emissions, targets and costs in A2 and B1, 2050

	A2				B1			
	Base[a]	Targets[a]	Emissions[a]	Costs[b]	Base[a]	Targets[a]	Emissions[a]	Costs[b]
USA	2,3	0,2	0,9	-5,6	1,1	0,3	0,7	-0,9
JAPAN	0,5	0,1	0,2	-1,7	0,2	0,1	0,1	-0,2
POECD	0,3	0,0	0,1	-6,6	0,2	0,0	0,1	-1,1
EU	1,2	0,2	0,6	-2,7	0,5	0,3	0,4	-0,4
EE	0,4	0,0	0,1	-12,9	0,2	0,1	0,1	-1,3
FSU	1,2	0,2	0,3	-13,2	0,7	0,2	0,4	-1,7
MNA	2,4	0,5	0,6	-9,0	2,8	0,5	1,2	-1,9
SSA	0,8	0,8	0,2	16,0	0,9	1,0	0,3	1,6
LAM	1,3	0,5	0,5	-5,5	1,2	0,5	0,7	-1,3
CHINA	3,7	0,9	0,7	-5,6	2,4	0,9	1,0	-2,1
DAE	0,8	0,4	0,4	-4,1	0,6	0,4	0,4	-0,7
INDIA	0,9	1,2	0,3	14,9	0,7	1,5	0,4	0,7

[a] Gigaton carbon
[b] % of national income, relative to reference scenario

Table 3a **Decomposition costs in A2, 2050**

	A2 equal rights per capita				
	GDP	TT	YOIF	PERMITS	INCOME
USA	-2,9	-0,4	0,1	-2,4	-5,6
JAPAN	-0,9	0,2	-0,1	-0,9	-1,7
POECD	-3,7	-0,5	0,3	-2,7	-6,6
EU	-1,3	0,1	-0,2	-1,3	-2,7
EE	-8,5	-0,2	0,2	-4,4	-12,9
FSU	-8,9	-0,9	1,0	-4,3	-13,2
MNA	-6,6	-1,0	0,0	-1,3	-9,0
SSA	1,9	1,0	0,2	12,9	16,0
LAM	-5,2	0,1	0,0	-0,4	-5,5
CHINA	-9,3	0,2	0,4	3,1	-5,6
DAE	-4,3	0,2	0,1	-0,2	-4,1
INDIA	2,5	1,0	0,3	11,1	14,9

Table 3b **Decomposition costs in B1, 2050**

	B1 equal rights per capita				
	GDP	TT	YOIF	PERMITS	INCOME
USA	-0,6	0,0	0,0	-0,3	-0,9
JAPAN	-0,3	0,2	0,0	-0,1	-0,2
POECD	-0,7	-0,1	0,0	-0,3	-1,1
EU	-0,5	0,1	0,0	-0,1	-0,4
EE	-1,0	0,1	0,0	-0,4	-1,3
FSU	-0,9	-0,2	0,0	-0,5	-1,7
MNA	-0,2	-1,0	0,0	-0,7	-1,9
SSA	0,4	-0,1	0,1	1,3	1,6
LAM	-1,2	0,1	0,0	-0,2	-1,3
CHINA	-2,1	0,1	0,0	0,0	-2,1
DAE	-0,9	0,1	0,0	0,0	-0,7
INDIA	-0,2	0,0	0,0	0,9	0,7

Table 4 **Costs of stabilization in all six scenarios, 2050[a]**

	equal rights					
	A1B	A1T	A1F	A2	B1	B2
USA	-2,8	-1,0	-6,1	-5,6	-0,9	-2,1
JAPAN	-0,8	-0,3	-2,2	-1,7	-0,2	-0,3
POECD	-2,8	-1,0	-6,0	-6,6	-1,1	-2,2
EU	-1,3	-0,5	-3,1	-2,7	-0,4	-0,8
EE	-1,7	-1,2	-7,4	-12,9	-1,3	-4,7
FSU	-3,5	-2,3	-8,4	-13,2	-1,7	-5,6
MNA	-7,3	-2,1	-4,3	-9,0	-1,9	-3,2
SSA	7,0	4,0	11,6	16,0	1,6	9,1
LAM	-2,7	-0,7	-2,4	-5,5	-1,3	-0,9
CHINA	-4,9	-3,0	-9,0	-5,6	-2,1	-2,0
DAE	-2,5	-1,4	-4,4	-4,1	-0,7	-0,9
INDIA	2,0	1,1	2,4	14,9	0,7	3,3

[a] % of real national income, relative to reference scenario

Table 5a Costs, emissions and rights associated with stabilization in A2, 2050

		equal rights		compensatory rights	
	Emissions[a]	Rights[a]	Costs[b]	Rights[a]	Costs[b]
USA	2,1	0,4	-5,6	-0,3	-6,6
JAPAN	1,5	0,4	-1,7	-0,2	-2,6
POECD	1,7	0,4	-6,6	-0,3	-8,4
EU	1,3	0,4	-2,7	-0,2	-4,0
EE	1,2	0,4	-12,9	-0,2	-17,4
FSU	0,7	0,4	-13,2	-0,2	-23,9
MNA	0,5	0,4	-9,0	1,1	0
SSA	0,1	0,4	16,0	0,1	0
LAM	0,5	0,4	-5,5	1,0	0
CHINA	0,3	0,4	-5,6	0,6	0
DAE	0,5	0,4	-4,1	0,8	0
INDIA	0,1	0,4	14,9	0,2	0

[a] tons of carbon per capita
[b] % of national income, relative to referece scenario

Table 5b Costs, emissions and rights associated with stabilization in B1, 2050

		equal rights		compensatory rights	
	Emissions[a]	Rights[a]	Costs[b]	Rights[a]	Costs[b]
USA	1,9	0,7	-0,9	-1,8	-1,6
JAPAN	0,9	0,7	-0,2	-1,1	-0,6
POECD	1,5	0,7	-1,1	-1,6	-2,0
EU	0,9	0,7	-0,4	-1,0	-0,9
EE	1,3	0,7	-1,3	-1,0	-2,8
FSU	1,2	0,7	-1,7	-1,4	-4,9
MNA	1,4	0,7	-1,9	2,2	0
SSA	0,2	0,7	1,6	0,4	0
LAM	1,0	0,7	-1,3	2,1	0
CHINA	0,7	0,7	-2,1	1,5	0
DAE	0,7	0,7	-0,7	1,2	0
INDIA	0,2	0,7	0,7	0,5	0

[a] tons of carbon per capita
[b] % of national income, relative to referece scenario

Table 6 Costs of stabilization in all six scenarios, 2050[a]

compensatory rights

	A1B	A1T	A1F	A2	B1	B2
USA	-4,9	-1,7	-8,3	-6,6	-1,6	-2,1
JAPAN	-2,1	-0,8	-3,6	-2,6	-0,6	-0,4
POECD	-5,7	-2,1	-9,2	-8,4	-2,0	-2,3
EU	-2,9	-1,1	-5,0	-4,0	-0,9	-0,9
EE	-5,0	-2,4	-11,3	-17,4	-2,8	-5,2
FSU	-10,7	-4,9	-16,8	-23,9	-4,9	-6,0
MNA	0	0	0	0	0	0
SSA	0	0	0	0	0	0
LAM	0	0	0	0	0	0
CHINA	0	0	0	0	0	0
DAE	0	0	0	0	0	0
INDIA	0	0	0	0	0	0

[a] % of real national income, relative to reference scenario