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# How to play fair in international environmental agreements? – Bridging psychological and economic methods

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## Abstract

Global public good provision (e.g. environmental quality) confronts us with problems demanding both national and international co-operation. However among sovereign nations reaching agreement on mutual public good provision is difficult. Slowing down global warming is just one example. Due to the diffusion of greenhouse gases in the earth's atmosphere it is attractive for each individual state that other countries commit themselves to climate protection, whereas one's own state – using the free-rider-strategy – benefits from the protective measures of the others without making any costly national contribution.

On the other hand such a strategic behaviour clashes with moral values, especially concerning motives of justice within society. Should free-riding be preferred from the strategic point of view or rather, out of consideration to justice, national commitments to contribute to climate protection?

Therefore, an analysis of how appraisals of justice and strategic considerations interact is a challenge to international (environmental) policy. Taking a game-theoretic point of view, we analyse three psychological-empirical conceptions of justice: need, equality and equity, and point out how these principles are able to determine the type of game nations are expected to play.

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## 1. Introduction

Today many environmental problems are a global challenge. For example, the emission of greenhouse gases (GHGs) is said to cause global climate change. Since these gases completely diffuse in the atmosphere no single country is able to introduce a nationally most desired emission level. Hence, solving environmental problems, today, often demands two things: national compromise and international co-operation.

In order to analyse the co-operative behaviour of nations (their representatives, respectively) game theory is a useful tool. It is explicitly designed to analyse the interplay of decision makers (the players) acting in accordance with their own individual goals but at the same time having to consider that other players might follow different goals, i.e. they have to consider that the individual interests are at odds (strategic context). With it game theory focuses on a more complex modelling of behaviour than the “simple” maximisation of individual utility does (Shubik 1964). This quality is a strong argument for using methods of game theory when analysing problems of decision making in international relations and thus international environmental politics: the relationship is strategic because agreement has to be reached among sovereign nations that on the one hand, have to focus the well-being of their home country and, on the other hand, the desires and abilities of other countries regarding the performance of international duties.

However, game theory is criticized for not addressing the following of common social values, like justice and fairness considerations,<sup>1</sup> properly. This criticism is either linked to the modelling of the decision makers as purely selfish motivated persons or the assumption of strict rationality, according to which decision makers go for equilibrium points only (e.g., see Bunge 1989, Marwell/Ames 1981). This criticism led to first, a wider modelling of the behaviour of the decision makers (e.g. Bolton & Ockenfels 2000, Fehr & Schmidt 1999) and second, to the introduction of concepts of bounded rationality (e.g. Kahneman 2003, Simon 1990). In the paper at hand we follow a further route: We maintain that game theory is able to introduce different aspects of subjective justice considerations by the players’ freedom to conclude and to design treaties, i.e., by the freedom of choice regarding the game the nations wish to interact in. With it, we pose the hypothesis that in the international arena the justice motive not even determines the behaviour within a specific type of game (e.g. the prisoners’ dilemma) but already - on a more conceptual level - selects the type of game that will be played.

The following section 2 refers to the context of climate negotiations and from an economic point of view briefly discusses the role of national self-interests with regard to the incentives to free ride and the claim for cost-effective emission control. Section 3 takes a psychological point of view dealing with the subjective perceptions of justice on behaviour. Section 4 combines both perspectives by asking what consequences these perceptions might have for modelling the game nations are expected to play when coping with problems of global co-ordination, in particular in the climate context. Finally, section 5 elaborates on the inter-play of self-interest and justice and draws conclusions for the interdisciplinary research agenda.

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<sup>1</sup> In the paper at hand we use the terms fairness and justice as synonyms although justice is more involved with normative issues than fairness which is more closely related to the subjective point of view (e.g. see Albin 1993, Rawls 2001).

## 2. Impact of national self-interests on the design of global emission control: The economic point of view

In the field of climate change nations are faced with the problem of public good provision: For each individual state it is attractive that other countries commit themselves to climate protection, whereas one's own state – using the free-rider-strategy – benefits from the protective measures of the others without making any costly national contribution (e.g. see Barrett 1992, Buchholz & Peters 2003). The temptation to free ride undermines the provision of the public good: in the end it is either not provided at all or, an insufficient level produced. Using methods of game theory these adverse affects are usually described within the prisoners' dilemma game.

The prisoners' dilemma tells the story of two crooks and an attorney, unable to deliver evidence of guilt. In order to send the crooks to prison a chief witness rule, as found in the American legal system, is introduced. It is shown that with the introduction of this rule and the impossibility of the crooks to make binding agreements, both suspects are delivered incentives to confess and to blame each other for being guilty (mutual defection). So, in the end, the attorney is able to imprison them both.<sup>2</sup>

In the climate context the impossibility of making binding agreements delivers the temptation to free ride (i.e., the incentives of the crooks for blaming each other) so that in the end nations keep to the status quo (i.e. the crooks' condemnation to stay under arrest). With it each country (each crook) is worse off compared to a situation where all together had gone for co-operation. (the case where the public good is provided commonly, the crooks stick to silence respectively).

The picture of the real world contradicts this prediction. Concerning the climate context, the countries reached an agreement at the world summit in Rio de Janeiro, 1992: "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities." (Article 3, 1; [http://unfccc.int/resource/conv/conv\\_005.html](http://unfccc.int/resource/conv/conv_005.html) [12.5.04]).<sup>3</sup>

With the agreement in Rio, developing countries were given the opportunity to satisfy their need for economic development and to reduce poverty first of all, before investing in national climate protection. In contrast, the developed countries have to accept obligations of climate protection in accordance with their development of national welfare as well as their emission of GHGs in the past. Following the Rio convention – one of the most important conventions on global environmental concerns - two of humanity's crucial ideals collide: on the one hand, a *sense of justice* heading towards a *collective* means of protecting the global common good and, on the other hand, the following of *individual (national)* self-interests, usually dealt with in terms of national welfare maximisation.

In order to make amendments regarding this tension Rio was followed by regular conferences and negotiation periods. All of them were characterized by the dilemma of the following of national self-interest supporting, if at all, co-operation among a small partition of countries and the pursuit of fair resolutions that could be accepted by a great number of

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<sup>2</sup> For further details see Luce and Raiffa, 1957.

<sup>3</sup> Within the prisoners' dilemma co-operation can be explained by a repetition of the game, i.e. within a dynamic setting (e.g. see Finus 2001, Kreps & Wilson 1982). However, here, assuming a dynamic setting seems not appropriate because the focus is on the initial ignition for setting environmental protocols in force and that calls for a static perspective. Moreover even in a dynamic setting the pre-conditions for the choice of co-operation (e.g. the claims on the discount rate) are not necessarily fulfilled and so the problem of explaining international environmental cooperation remains.

partners. This dilemma is posed by the convention itself: Too many parameters of the convention remained too fuzzy. For example: Which national state of welfare sets the benchmark for having to take measures of global emission control? Which degree of national welfare calls for which national emission target? How is past and future climate-related behaviour to be estimated and weighed? Which degree of capability corresponds to which degree of responsibility? Or, to put it simply: What is meant by “the basis of equity”, “the common but differentiated responsibilities” and the “respective capabilities”?

In Japan in 1997 the nations ended up with the so-called Kyoto Protocol. This protocol meets the idea of Rio by committing the developed countries to engage in climate protection, whereas the developing countries do not have to comply with a national emission ceiling. It is this concession that fails to comply with the criterion of cost-effectiveness, one of the most important criteria to be fulfilled from a purely selfish point of view: Due to selfish (national welfare) considerations climate protection should come up with minimal costs. This is when marginal costs for global emission control are equalised among all countries (*condition of cost-effectiveness*). Meeting this condition implies that countries with high abatement costs have to reduce less emission than countries with lower abatement costs. Referring to the climate regime (marginal) costs of emission abatement are said to be much lower in developing countries than in developed countries (e.g. IPCC 2001). Thus, following the criterion of cost-effectiveness requires developing (compared to developed) countries to abate most, due to their relatively low abatement costs. Consequently, in contrast to the Kyoto agreements, emission reduction to a large extent should be performed in the developing, but not in the developed world.

Although the criterion of cost-effectiveness is not fulfilled the Kyoto Protocol came into force by February, 2005 and that is what surprises from an economic point of view. Of course, in order to make amendments in efficiency, the Clean Development Mechanism (CDM) was established. This mechanism allows for an export of abatement activities from developed to developing nations (see Article 12 of the Kyoto Protocol). Still, using the CDM does not assure meeting the criterion of cost-effectiveness due to several restrictions on its use. For example, the use of CDM has to be in addition to domestic measures. That is, a certain percentage of emission reduction must be performed in a home country even if the same amount of emission abatement could be achieved cheaper in a developing nation.<sup>4</sup>

So, why is it that, regarding control of GHGs, such far reaching exemption rules for the developing countries and restrictions for the developed countries, were made? Is it the justice motive that separates the world into those countries that have to join and to comply with the climate treaty and those countries that don't?

### **3. Impact of subjective perceptions of justice on behaviour: The psychological point of view**

Psychological research on justice focuses on the complexity of cost-benefit distributions that individuals or groups assess not only with regard to personal benefits, but also in view of their justice (distributive justice). But, different from other disciplines like jurisprudence, philosophy or political science, justice psychology takes over an *empirical perspective* – not a normative one. The core question is therefore not to decide what is objectively fair but, what people think is fair, why they think so and in which kind these subjective appraisals influence behavioural decisions (e.g. Lerner, 2003; Montada, 2003). In the climate context the criterion of cost-effectiveness requires that emission reductions to a large extent has to be performed

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<sup>4</sup> For further details on the use of this mechanism see e.g., Endres & Oehl (2005), Oberthür & Ott (1999).

in the developing world. This requirement clashes with moral values, especially concerning motives of justice within societies, for example regarding the causing of pollutions: Not all people cause pollution in the same amount and not all are profiting likewise of polluting actions. In the climate context 20% of world's population are consuming 80% of the world's resources. And with regard to the extend of greenhouse gas concentration in the world's atmosphere, the industrialized nations will still be in the first place of causation even if the developing countries will overtake the emitting outputs (cp. Sachs, 1999, 2003). So, why should the developing countries take the highest burden of global emission control?

Justice appraisals are, in the same way as any other judgement, individual as well as social constructs: They vary inter- and intra-individually; they depend on the person, the specific situation, the social context, and many variables more. Moreover fairness appraisals are always a relational judgement, based on different scales of comparison: Both on individual comparison (in matters of time, personal conception of ideals, expectations etc.) and on social comparison (in matters of belonging to social groups etc.). At the same time, one's choice of social reference group defines the scope of the individual fairness judgement by limiting one's own individual, moral community. Therefore, it determines the scope of the subjective perceptions of justice (e.g. Clayton, 1996; Deutsch, 1985; Lerner 2003; Montada, 2003; Opatow, 1996; Tyler, 2000; Tyler & Dawes, 1993; von den Bos, Wilke, Lind, & Vermunt, 1998).

Relating to the principles that lead to a judgement about complex cost-benefit distributions, the results of research are rather clear (e.g. Clayton, 1996, 2000; Deutsch, 1985; Montada, 2003; Tyler, 2000). The individual always reverts to a wide variety of principles, so that the concrete choice of the principle, and therefore – according to the context – the subjective judgement, varies strongly on an inter- and intra-individual level. Beyond the fields of application the equity, equality and need principles are considered as dominant.

The *equity principle* determines the scale of effort, that is, a balanced ratio of input to output. This means that the one with the biggest input should deserve the biggest output. In contrast, *the equality principle* postulates a uniform distribution – equals (i.e. all “members” of a moral community) do equally. Concerning the *need principle*, the scale of individual neediness is decisive. So, in the context of distribution the member with the “most urgent” needs should receive the most.<sup>5</sup>

In case of the negotiations on climate change issues these judgements are transported by the delegations' official representatives and they are intertwined in individual, group specific and lobby preferences as well as anticipated expectations, and many variables more. Hence they are important for explaining environmental co-operation as observed in the climate context.

#### **4. Consequences of subjective justice perceptions for economic modelling**

Psychological research point out that justice is a multi-faceted concept that highly depends on individual and social comparison in various matters. Hence it is straightforward that economic modelling falls short of explaining the impact of justice on decision making if the focus is on one aspect only, e.g. the equal split of payoffs as dealt with by the fairness theories of Fehr &

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<sup>5</sup> Beneath distributive justice there is another essential aspect of subjective judgements relevant to action: procedural justice. Regarding this aspect, it is not the result that is in the centre of interest, but the process and the social togetherness which lead up to a decision. For more details on this aspect esp. Bies & Moag, 1986; Lind & Tyler, 1988; Mikula & Wenzel, 2000; Tyler, 2000.

Schmidt, 1999 and Bolton & Ockenfels, 2000 that are introduced to the climate context by Lange & Vogt, 2003 and Peters & Schuler, 2005.

While Peters and Schuler link the players' behaviour to a difference in the observable policy measure within the approach of Fehr and Schmidt, Lange and Vogt focus on the difference in countries' welfare within the theory of Bolton and Ockenfels. The studies reveal that the degree of international co-operation increases with the players giving more weight to a fair - the equal - split of payoffs respectively duties. Both approaches have in common that the costs of national emission reduction (the incentives to free ride) are counterbalanced by a fair behaviour related to the "equity" preference they are dealing with.

The players revert to this preference irrespective of whom they are playing with. Of course this kind of modelling can be justified by the assumption of homogenous players. However in the climate context the countries - due to varying cultural and economic developments - are very heterogeneous. Consequently, they might not focus (if at all) on the variance of welfare or policy measures alike when performing their national justice consideration. Rather, as pointed out in section 3., the national appraisals of justice are expected to be multi-faceted and to influence behaviour in different ways.

Taking the plethora of subjective motives into account, it is obvious that there is neither a general law for nations being kept in the fatalistic dilemma of the Prisoners, as usually assumed when providing a public good commonly, nor, that there is a law of nature that conjoins the justice motives of nations exclusively into one justice appraisal, e.g. the evaluation of other countries' behaviour with regard to an equal split of payoffs or an equal distribution of policy measures. According to psychological perceptions of justice, quite the opposite applies: Different appraisals of justice can be assumed by different persons, groups and nations. Consequently, it is not to expect that fairness and justice considerations alter the utility functions of the decision makers in the same manner. And moreover, justice considerations are not reflected adequately if the focus is on the national utility functions only. In the paper at hand we propose to deal with the subjective (national) justice appraisals already on a conceptual level, i.e., to link fairness considerations to the choice of the game nations wish to play in the international arena.

To elaborate further on this point of view we concentrate on three – the most important – aspects of distributive justice: Need, Equality and Equity, and, from a game theory's point of view ask how these principles are able to organise the co-operative behaviour of nations, especially in climate politics. In subsection 4.1, we introduce the principle of need, in 4.2 the principle of equality and in 4.3 the principle of equity; in each of these subsections the relationship between the principles and concepts of game theory is considered.

#### *4.1 The principle of need - selecting the game of Chicken*

The Chicken (e.g. Rasmusen, 1994) tells the story of two car drivers on the brink of disaster. They only survive if one of them "swerves". The dilemma is that the one who swerves is blamed as the 'Chicken', the loser of the game, while the other is the hero, the winner of the game. So, each player wants the other to swerve first. If none of the players gives up, the cars crash head-on (dash into abyss respectively) and the game ends with the death of the players, i.e. the outcome the players commonly wish to avoid.<sup>6</sup>

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<sup>6</sup> Therefore the Chicken is also characterised as a dilemma of common aversion (Rapoport & Chammah, 1969). In contrast, the Prisoners' dilemma is classified as a dilemma of common interest (Stein, 1982). The underlying rationale is that in the Prisoners' dilemma independent decision making leads to Pareto-deficient

The current discrimination of developing countries from any emission targets for GHGs and the involvement of the developed countries with targets for emission control can be explained within the Chicken game.

Playing the Chicken, a crucial question is: Who will take the role of the co-operating party (i.e., who will swerve first)? Referring to the climate context and taking the need principle into account, developing countries should have no reduction obligations in order to enable these countries to make up their backlog in economic growth and prosperity. That is how it is recognized in the Rio convention and how it is followed in the Kyoto Protocol. In Kyoto emission targets were assigned for the developed countries “only”. Hence, taking the industrialized and developing countries as game partners the idea of the need principle is introduced by the asymmetric equilibriums of the Chicken: In equilibrium, a portion of countries co-operate while the other portion defects. Dealing with the Chicken, instead of the Prisoners’ dilemma, raises the probability of environmental protection. In equilibrium at least partial co-operation takes place.

This is the picture of the Kyoto Protocol, splitting the World into two parts - on the one hand the industrialized countries that have to assume all emission obligations and on the other hand the developing countries which do not have to assume any responsibility for climate politics.

Although it might be clear that the industrialized countries should take the co-operative duty with regard to the need principle and its interpretation in the climate debate (as outlaid in the Rio Convention, for example). Reality shows, at the national level, this interpretation is not followed in each of the states: On the one hand there are countries that have ratified the Kyoto Protocol, e.g. the European countries, and with that they seem willing to play Chicken. On the other hand there were and still are countries hesitating to ratify the Protocol - e.g. Russia has done so for about 7 years, weighing its own environmental policy against the diplomatic benefits of allying itself closer to the United States, the most important opponent of the Protocol, or to Europe, the biggest supporter of the Kyoto regime. In the end Russia decided to co-operate while the USA withdrew from the Kyoto Protocol completely. That is, Russia accepted to play and to take the position of the Chicken, like the Europeans did, while the US-Americans did not wish to play Chicken at all. Instead, the US together with Australia and other countries now head towards a new alliance that poses emission obligations to the developing countries right from the start.

This picture of the real world should feed back to the modelling of players’ behaviour in climate negotiations. Following strictly rational calculation, taking the lead in climate politics by playing “Kyoto” (i.e., by playing Chicken) calls for additional benefits for assuming the co-operative duty. This is due to the fact that - regarding the time horizon of the Kyoto Protocol - revenues from decreases in climatic damages are not expected to be higher than (or equal to) the induced abatement costs. Consequently the choice of co-operation is very likely to come up with higher national welfare costs than the choice of defection. Moreover, even if this would not hold, it can be shown (e.g. Finus 2001) that public good (environmental quality) provision by a partition of countries (the asymmetric equilibrium focused in the Chicken) delivers a lower payoff than unilateral defection (i.e. the case where the home country benefits as a free-rider from public good provision by foreign countries). Thus in any

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equilibrium outcomes. Therefore the players have a common interest to seek for Pareto-improvements by mutual cooperation while in the Chicken the actors are primarily interested in avoiding a particular outcome which is mutual defection - in the environmental context: the stick to the status quo. More detailed on the possibilities of public good provision within the Chicken game Lipnowski & Maital, 1983.



case, taking the co-operative duty has to be motivated. For the Chicken game different suggestions are in the literature (e.g. see Rasmusen 1994):

For example the co-operative duty is taken if the opponent game partner credibly binds itself to the choice of defection. In the climate context the rejection of any duties regarding developing countries' emission abatement might have been considered credible due to their low economic prosperity. Nevertheless incentives to co-operate did not arise in all of the developed countries. For example Europe moved forward while the USA did not. Following the considerations of the paper at hand this is explained by differing perceptions of justice: While from the viewpoint of the US the neediness of the developing countries does not justify an exemption from national emission control, this does from the European point of view. Hence additional benefits for being a co-operative party might have been delivered for Europe and other co-operating countries by the developing world's taking advantage of free riding i.e., by the design of the Kyoto Protocol in accordance with the need principle. For them this design delivers the missing benefit, able to close the gap between national (marginal) abatement costs and induced (marginal) benefits from local emission control. Thus the difference between costs and benefits is able to pose an initial approximation of the value of need. If the difference is positive but co-operation is still performed, the value of need backs up the choice of co-operation within the Chicken. So, the difference gives a first hint at willingness to pay for playing and for taking the role of the Chicken as a measure to enforce the need principle.

Within this line of argument one is able to explain first of all, the discrimination of the developing world from climate protection and secondly, why nations assume the position of the Chicken even though, with regard to national abatement costs, the nations would do better with the choice of defection. Moreover, on a context independent level, one can say that the need principle selects the Chicken game and additionally allocates the roles of the game partners i.e., it determines who the co-operating party is. With that justice appraisals are able to structure the way international co-operation is performed.

Above that the withdrawal of the US from the Kyoto regime and the hesitation of other countries to ratify the Protocol emphasize that incentives to co-operate do not force all of the countries into co-operation. This raises further questions: Do countries withdraw from international treaties because they reject the need principle - to play Chicken at all? Or is it because they wish to benefit as free riders in the Chicken game? - Or rather, because they perceive themselves as members of the needy group?

Dependent on the answers to these questions, analysts might either be confronted with dissatisfaction regarding the allocation of roles within a specific type of game (here, the Chicken) or with a preference for playing different types of games.

#### *4.2 The principle of equality- introducing the game of Stag hunt*

Considering the principle of equality, it could be judged as fair if developing countries, right from the start, are obliged to set targets for GHG control as the industrialized countries did. This is particularly because the developing countries will benefit from the control of GHGs, too, and, likely benefit even more than the industrialized nations.

This line of argumentation supports the standpoint of the US-Americans in climate politics. Regardless of the agreement in Kyoto 1997 the president of the USA, George W. Bush, stated in March 2001 that the Kyoto Protocol is an unfair and ineffective means to encounter climate change and the consequences thereof, because it does not take adequate account of 80% of the world's population in the reduction of GHG emissions, namely, the developing countries (see,

[www.whitehouse.gov/news/releases/2001/06/20010611-2.html](http://www.whitehouse.gov/news/releases/2001/06/20010611-2.html) [17.3.05]). Since then the USA refuse ratification of the Kyoto Protocol. This perception of justice might already have disposed the USA to acquire the Byrd-Hagel-Resolution of 1997. The Byrd-Hagel-Resolution recommends refusing any international environmental convention if it does not require a meaningful contribution from the developing countries.<sup>7</sup> Such an “everyone or no one” – mentality is stylised by the game of *Stag hunt*<sup>8</sup>.

The Stag hunt game is a parable of a hunting society, depicting ideas of Rousseau 1964: Food for the whole community is secured if all members of the society participate in a stag hunt (i.e. here, the common provision of a public good) where the stag is circled jointly to prevent from escape. However each single hunter has an incentive to break out of the circle if a rabbit passes by (temptation to free ride). The chase of the rabbit secures his own minimum food requirements and, for the stag, offers the opportunity to escape, leaving the rest of the community without food (public good provision is undermined). In the end, given the uncertainty of the behaviour of the players, all members of the community may hunt individually in order to escape from starving (one equilibrium outcome – the stay in the status quo). This choice leaves all members of the community worse off compared to the case where all together participate in the Stag hunt (the second equilibrium outcome – mutual co-operation).

In the Stag hunt in equilibrium each member of the community co-operates or they all defect together. Here, as is the case when playing Prisoners’ or Chicken, mutual co-operation is recognized as the best position to settle into from a global point of view. However, in contrast to the Prisoners’ dilemma and the Chicken, co-operation is the rational choice if all others act likewise in a co-operative way. Then incentives to free-ride are not at work, undermining the choice of global co-operation in the Prisoners’ dilemma and the Chicken game. In the Stag Hunt, building up trust regarding the co-operative behaviour of others is the most important means to enhance the possibility of co-operation.

In the climate context trust in the co-operative behaviour of others is provided by the procedure of national ratification. To set the Kyoto Protocol in force a double-binding mechanism was found: at least 55 countries have to ratify the Protocol and the aggregate 1990 emissions of these countries must add up to a minimum of 55% of the CO<sub>2</sub>-emissions of the countries listed in annex I of the United Nations Framework Convention on Climate Change (e.g. Oberthür & Ott 1999).

Now focus on the implementation of the equality principle by playing Stag hunt: Free riding is disadvantageous if all players act likewise in a co-operative way. Hence, the benefits within each nation (given the case of mutual co-operation) have to be higher than the benefits of choosing the free-ride (i.e. welfare induced by the choice of defection). In addition, a positive benefit is to result only if a critical threshold of participation is exceeded. In the extreme case of the equality perception of justice the threshold has to call for participation of all of the countries. Following these considerations, national welfare functions either have to

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<sup>7</sup> See US Senate Resolution 98, 12.06.97. Moreover see, Li et al. (2004), showing that the position of the US-government is strongly supported by US-households. Moreover, going beyond the climate context, see Okun (1975), emphasising that within the American society the equality principle is pre-dominant. If this view is transferred to the climate context the current discrimination of the developing countries from any abatement obligations is able to contradict the equality appraisal of justice and consequently should be rejected.

<sup>8</sup> E.g. see Oye, 1986.

be discontinuous or nations have to hold welfare functions with the benefits of justice being activated or deactivated, depending on the status of ratification.<sup>9</sup>

In such a setting one is able to explain the withdrawal from an international treaty, the splitting of countries into co-operators and defectors, respectively, by dissent regarding the threshold value (i.e., the minimum participation of countries): Following the equality principle, all members of the community should be treated alike. Hence, the threshold value (the process of ratification) has to require participation of all nations (here, involved with climate change). Beyond this threshold there is no scope for co-operative behaviour based on the equality perception of justice. In the field of climate policy this means that there is no chance to play Kyoto with the US-Americans as long as the developing countries are not called upon to play as well. Since the double-binding mechanism of the Kyoto Protocol (having impact on the selection of players) sets the participation threshold below the 100% rate, a touch of need comes into play, motivating exemption rules for specific players (here, the developing countries). With that, dissent regarding the national understandings of justice arises, able to kick potential players (here, the US-Americans) out of the game. However, taking the exit option does not necessarily imply the desire to not play at all. It might also be the motivator for playing a different type of game with different game partners as suggested (see section 4.2. above) by the current strive of Australia, the US and other countries for a climate treaty different from the Kyoto Protocol. Future will show if there is an out-competition between Chicken and Stag Hunt or, if co-existence of different games gets feasible.

### *4.3 The principle of equity- calling for the No Conflict game*

As argued in section 3. above, justice appraisals are relevant to actions at all levels of social systems. Therefore, the choice of a justice principle might not only determine the reference group the co-operative duty should be addressed to. The justice motive might also affect behaviour within a specific group - here, the group of co-operators under the Kyoto Protocol.

Regarding the equity principle, countries with a minor responsibility for the greenhouse effect should make some small (proportional) contributions while the highest burden should be taken by the main polluters. The assignment of nationally different emission obligations takes country-specific facilities of reducing greenhouse gases into account and reflects differentiated responsibilities for the greenhouse effect. For example France was only imposed a minor emission target because the French organisation of energy production in comparison to other European countries leads only to minor GHG emissions.<sup>10</sup> Therefore within the EU-Burden-Sharing, France “only” has to keep its GHG emissions at the level of 1990 (zero emission target). On the other hand Germany agreed to reduce its GHG emissions by 21% in comparison to 1990. Thereby low-income countries, like Portugal, should be allowed to raise their emissions of GHGs by ensuring that the EU-target of the Kyoto Protocol (-8% in comparison to 1990) could still be achieved.<sup>11</sup> Thus the targets of the Kyoto parties at least show a flavour of a balanced ratio of input to output as called for by the equity criterion. Hence it is very suggestive that this principle drives the co-operative behaviour

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<sup>9</sup> In the climate context the concept of minimum critical coalition was already introduced by Heal, 1994. However Heal made no reference to subjective perceptions of justice.

<sup>10</sup> In France 80% of the energy is produced by nuclear power plants. In comparison to Germany each citizen in France only releases 60% of CO<sub>2</sub> emissions.

<sup>11</sup> For further economic elaborations on EU's climate policy see e.g. Endres & Ohl, 2005.

within the inner circle of the Kyoto parties (the developed countries and the countries in transition).<sup>12</sup>

With the introduction of the equity principle the *No Conflict game*<sup>13</sup> becomes relevant: A consequential implementation of the equity perception of justice presumes that *all* industrial nations accept and fulfil their obligations as determined in the Kyoto Protocol (the agreement of EU-burden-sharing, respectively). This pattern of co-operation is ruled out by No Conflict game. In equilibrium all players (here, the inner circle of industrial nations having signed the Protocol) take on a co-operative contribution - some countries a lower one and other countries a higher one.

However, according to classical cost-benefit considerations in public good dilemmas, free riding is advantageous even if countries have to perform with a less ambitious emission targets. That is because any target going beyond the national optimum – which usually characterizes the status quo (e.g. see Barrett 1994; Finus 2001) - introduces (marginal) abatement costs that are higher than the induced (marginal) benefits of local emission control. Hence the choice of co-operation has to be pushed by further benefits e.g., provided by a fairness preference that, for a specific group of players (the moral community), recommends the choice of co-operation if the duties are determined with regard to equity appraisals. Additionally diplomatic considerations might take place. In particular in small groups it might be possible to exclude free riders from services members of the in-group of co-operators enjoy. In the climate context this might especially hold for the member states of the EU. These countries closely interact with each other in a variety of fields. Thus within these countries issue linkage and moral persuasion is more easily to perform than within the whole community of nations. Therefore, within the inner circle of the Kyoto parties an analysis of the interplay of the justice motive and purely selfish considerations is most important.

The interplay of social (global) and individual (national) considerations is highlighted in a talk of German chancellor, Gerhard Schröder, during a congress of the German council of sustainable development in Berlin, May 2002 (see [www.bundesregierung.de/Reden-Interviews/Reden-,11636.79971/rede/Rede-von-Bundeskanzler-Schroed.htm\[17.03.05\]](http://www.bundesregierung.de/Reden-Interviews/Reden-,11636.79971/rede/Rede-von-Bundeskanzler-Schroed.htm[17.03.05])). There, Schröder pointed out that sustainable development has to start in one's own country and global justice is most essential for survival of mankind. However, Schröder added that Germany already plays a leading role in terms of climate protection in Europe and that now it is the task of the other countries to make up the difference.

This statement on the one hand emphasizes the importance of global justice and points to the fact that Germany with its ratification of the Kyoto Protocol accepts the status of the developing countries as free riders under the Kyoto Protocol (the developing countries do not have any national emission obligations due to the principle of need). On the other hand Schröder calls other countries to make up the difference and with that stresses that for Germany a free ride of other developed nations committed under the Kyoto protocol is not acceptable. Thus Germany seems willing to play Chicken with regard to the developing world but it is not with reference to other industrialized countries.

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<sup>12</sup> With regard to the developing countries one might argue that the introduction of the Clean Development Mechanism (CDM) also meets the idea of the equity criterion: The developing countries “only” have to perform with duties of reporting if they accept the installation of “clean” technology in their own countries that is financed by the industrialized nations. However the CDM was introduced to enable the industrialised nations to reduce their GHGs in the developing countries at a reasonable price. Therefore, backing up the integration of this mechanism with reference to a justice principle is critical.

<sup>13</sup> For details e.g. see Stein, 1982.

This point out that referring to one justice appraisal (here, the need principle) is not sufficient to explain the whole organisation of co-operative behaviour. Within the inner circle of the Kyoto parties a dominance of the need principle is not observed instead the equity principle seems at work. Implementing this principle comprehensively among the subgroup of industrialised countries depends on the willingness of these countries to play the No conflict game. This willingness also decides on whether the critical threshold of national ratifications is reached i.e., on whether the Chicken game is played on the global scale, enabling the developing countries to satisfy their need for poverty reduction first and to enjoy the service of public good provision – at least for a while - free of charge.

## **5. Interaction of self- interest and justice appraisals: Conclusions and Outlook**

Our analysis points out that focusing exclusively on an equal split of payoffs, goods, services or duties when dealing with the justice motive, is not sufficient for adequate reflection on the different aspects of fairness and justice appraisals. Instead it became obvious that the co-operative behaviour of different nations and groups is very likely to be based upon *different* motivations. Beneath the classical maximization of individual (national) benefit, there are subjective justice motives significant that are able to interact with each other and the selfish motive. In the paper at hand we took a closer look at three principles: *need, equality* and *equity*.

Taking the game-theory point of view, we laid out that these principles are able to impact the type of game nations are willing to play, the selection of the game partners and the roles they have to play. Thus justice and fairness appraisals not only determine behaviour within a specific type of game, they rather organise the co-operative behaviour of nations already on a conceptual level i.e., they create the system (the game) itself, within which the players are going to interact in.

In the climate context for example Germany seems willing to play and to accept the position of the Chicken concerning the relationship between developed and developing nations. However regarding the inner relationship of the industrial nations, Germany refuses this position (Schröder asked other nations to make up the difference). On the other hand the USA withdrew from the Kyoto-regime completely. Regarding the Byrd-Hagel-resolution, the US-Americans follow the “everyone or no one”-mentality as symbolized by the game of Stag hunt. With it the equality perception of justice comes into play. Since the Kyoto agreements are not designed to introduce this principle, America in essence rejects playing at all, respectively, chooses the free-ride within the Chicken Game as posed by the design and the ratification of the Kyoto Protocol that takes the neediness of the developing countries into account.

Thus perceptions of justice are not inflexible predefinitions. They rather interact with other motives and are part of complex social negotiation dynamics. Accordingly, fairness judgements are defined as relational concepts which are essentially determined by the social reference group, that is, by the scale value of the moral community. Consequently every negotiation process is characterized by social dynamics which are reflected in the individual preferences of motives and every exertion of a justice principle involves changes in the social (and in this case also in the ecological) system. As a rule this raises new questions concerning the distributions which need to be negotiated again under the conceivability of justice and self-interest. The heading towards a new climate agreement (as an alternative to the Kyoto Protocol) by Australia, the US and other countries is one example. Therefore, in the future, an integrative approach involving empirical-psychological and economic research is needed in

order to offer information on how fairness appraisals are characterized, what implications they have for action, whether (and if so, how) they are connected with different types of games and the selection of the game partners, the options and the goals the players follow. In the future such an approach will allow for a broader theoretical modelling by integrating empirical results into existing economic models and to derive important conclusions

- a) concerning the interplay between strategic decision making and fairness considerations of heterogeneous nations.
- b) concerning the relative importance of the motivating influence of the subjective appraisals on the national negotiation behaviour
- c) for the design of environmental treaties aiming to include specific players, e.g. in climate negotiations the USA and the developing countries, and
- d) on a contextually independent, but environmentally and socially relevant level, regarding a critical reflection of the idea of man as “Homo Oeconomicus”.

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