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Conditional Clauses in GHG Abatement Legislation

- An Economic Explanation

NEKK01

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Abstract

The aim of this research is to create an understanding for the motivation to include conditional clauses regarding foreign countries in domestic green house gas (GHG) abatement legislation. In addition I aim to explain how these clauses change the strategic environment, in an interaction with the purpose to reach an international environmental agreement (IEA) to combat global warming. I chose this subject because I view a successfully established IEA as the most important way to combat global warming. Conditional clauses in The American Clean Energy and Security Act of 2009 (The Clean Act) are the empirical cornerstones of my research, as the US is the most important actor in this process in character of being the largest industrialized polluter. Conditional cooperation preference, a behavioral economic concept, in combination with the Chicken game is used to explain conditional clauses in The Clean Act. *Conditional cooperation* explains cooperation under certain conditions as opposed to merely free riding, unilateral cooperation and non-cooperation. *Reciprocity*, suggested as a decision rule or mechanism stimulating preferences for conditional cooperation in this case, explains how decision makers are affected by concern with fairness in decisions and how they might retaliate in an irrational way to achieve this. The conditional clauses in The Clean Act might partly be explained by conditional cooperation preferences held by legislators, motivated by the mechanisms reciprocity. It can also be explained as a rational strategic choice through a game of Chicken, and not as a fairness preference.

Keywords: The Clean Act, Conditional Clauses, Conditional Cooperation, Unilateral Cooperation, Reciprocity, Chicken Game

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1. Introduction

1.1 Background and Question

While interning in the US congress last winter I came across H. R. 2454, The American Clean Energy and Security Act of 2009 shortly called The Clean Act, then a proposed legislation recently passed through congress. I was given the task to help analyze and summarize the proposed legislation before it would be amended in the senate for the possible complete enactment of the act. Reading the legislative text, it soon became clear to me that the US will only agree to participate in an international environmental agreement (IEA) on the same or less stringent conditions as their evolving rivals China and India.¹ Undertaking this task I reacted to some segments of the proposed legislation. The particular parts of the act that really caught my eye involved conditional clauses towards other countries, something very rare in US domestic legislation. The conditional clauses in The Clean Act make the US approach working toward an international global warming agreement fundamentally different from the strategy of the European Union. The approach of the EU is essentially a unilateral strategy; the EU will work to reduce its green house gas (GHG) emissions to 20 percent below the 1990's level by year 2020, regardless of other countries emission reduction targets. However, if other countries agree to GHG abatement to a certain level, the EU will increase its emission reduction targets to 30 percent below 1990's level.² A role model with performance incentives to promote good behavior is a simplified metaphoric description of the EU's strategy and its view on the best approach to reach a global agreement. The American approach is harder to describe and explain in one sentence. What is the motivational determinant to include conditional clauses in regulation aimed toward a global warming abatement agreement, and how can this phenomenon be explained by economic theory? This question is what I plan to answer and explain through my research.

1.2 Aims and Significance

The purpose with my research is to, with the help of economic literature, identify and explain the decision rules leading to the inclusion of conditional clauses regarding other countries in GHG abatement legislation. I also aim to explain how

¹ *The American Clean Energy and Security Act of 2009* (H. R. 2454), Sec. 3. International participation, p. 11

² European Commission http://ec.europa.eu/environment/climat/climate_action.htm

these clauses change the strategic environment, in an interaction with the purpose to reach an IEA to combat global warming. By describing how the strategic environment is changed by the conditional clauses in The Clean Act I intend to explore if and why these clauses might be a good strategy to reach a global agreement.

Looking to economic literature for an explanation to conditional clauses, conditional cooperation preferences, as described for example by Fehr and Gächter, held by the legislators could be a motivational determinant. The clauses might not have been written solely because of preferences for fairness, as described by the mechanism reciprocity thought to motivate conditional cooperation preferences, but might be a strategic choice. These two explanations will be explored in my research.

I chose this subject and the use of the proposed US legislation because I view a successfully established US GHG abatement legislation as the most important way to combat global warming. I will now elaborate on this point.

Because of the increased integration and growth of the global economy, and due to the nature of polluting GHG emissions domestic environmental regulation policies have gained far-reaching international attention. Greenhouse gases, from which carbon dioxide is a major contributor to global warming, pollute on a global scale and thus have to be combated on the same scale. It is generally agreed that global sustainable development is achievable through international cooperation in the creation of pollution and emission laws and regulations, combating global warming through the inclusion of all economies, developed or otherwise. But global accords have to be initiated and progress at a national level, taking root locally before they can grow and bloom into an international treaty. The US is the most important actor in this process in character of being the largest industrialized polluter and the world's largest economy.³ Thus I will use the American Clean Energy and Security Act of 2009 (H. R. 2454), the most comprehensive environmental bill ever passed in congress but stalled maybe indefinitely in the senate, to explain the use of conditional clauses in environmental legislation.

The Kyoto protocol was a small first global step in the right direction, where the European Union took a leading role with the announcement of short-term abatement goals. Unfortunately the two most important actors and the largest polluters, USA and

³ United Nations Statistics Division, Millennium Development Goals indicators: Carbon dioxide emissions (CO₂), thousand metric floxnus tons of CO₂

China, decided not to participate in a global agreement on GHG abatement.⁴ The EU's leading role with its unilateral strategy has now been weakened due to the unsuccessful coordination of its member states in reaching the announced short-term abatement goals and the failure to establish new goals for the phase after 2012 when the first commitment period under the Kyoto Protocol expires.⁵ Adding to the deterioration is the present European economic hardship. As the United States is still the most influential actor in the global economy and international affairs, it could be the forerunner in developing viable new strategies to handle environmental issues. Might the US conditional cooperation approach prove to be successful in reaching global cooperation on GHG emission reduction?

With the help of behavioral economic literature on conditional cooperation and reciprocity, together with game theory I intend to explain the inclusion of conditional clauses in GHG legislation. By studying and presenting economic literature explaining conditional cooperation, and linking the explored concepts to the motivation for conditional clauses in the legislation in combination with simple game theory, I will explain the appearance of conditional clauses regarding other countries in the US GHG abatement legislation, and rationalize why these clauses might be a good strategy to reach a global agreement. As my approach is rather original, not much previous research similar to mine has been made. On the other hand, literature describing conditional cooperation and reciprocity is extensive. Ernst Fehr, Simon Gächter and Robert Sugden have made many noteworthy contributions to the field. The application of simple games to describe the environment of the strategic interaction between nations and unions is widespread and highly common in economics but even more common in political science. Matthew Rabin has created a model where he incorporates reciprocity into the environment of strategic games. Some of the work of the above authors, in conjunction with the work of other authors, will be explored in my research.

1.3 Outline of the Thesis

In section 2 my method will be presented. In section 3 I will introduce The Clean Act and present its conditional clauses. Section 4 will describe possible motivational determinants to include conditional clauses in the proposed legislation.

⁴ Ibid.

⁵ The Kyoto Protocol http://unfccc.int/kyoto_protocol/items/2830.php

A behavioral explanation and a strategic explanation will be given here. Doing this I will explore the results from cooperation experiments and the ideas sprung from these results. A link between The Clean Act's conditional clauses and economic theory as well as a basic game theoretical rationalization to include conditional clauses as a strategic action, will be made in this section as well. The EU unilateral approach will be used as a comparing indicator. Section 5 will conclude the research.

2. Method

My research will to a great extent be a theoretical literature study. I will examine an environmental act with conditional clauses, and present ideas from economic literature to explain these clauses. My paper starts with an introduction of The Clean Act and an overview of the conditional clauses found in the legislative bill. By presenting results and ideas sprung from cooperation experiments, pointing to that a majority of decision makers hold preferences for conditional cooperation, I will describe one possible motivational determinant to include conditional clauses in the proposed legislation. Preferences for conditional cooperation give an explanation to cooperation under certain conditions as opposed to merely free riding, unilateral cooperation and non-cooperation. Reciprocity, suggested as a decision rule or mechanism promoting preferences for conditional cooperation, describes how decision makers are affected by concern with fairness in decisions and how they might retaliate in an irrational way to achieve this. Another explanation will be made with the help of a simple game, a game of Chicken, by rationalizing the inclusion of the clauses as a strategic choice.

2.1 Limitations

I am aware of several limitations with my method. First of all there could be more mechanisms explaining the inclusion of conditional clauses in the researched legislation than what is researched in my thesis. Another limitation is the fact that the outcome of other related or unrelated issues might have affected the decision-making process of the legislators. The fact that a lot more mechanisms than I account for in my research, concepts taken from other fields than economics, probably also play a role in the regulation creating process and could be explanatory to the issue. A

limitation to my strategic explanation is that it is very hard to say if politicians behave rational and strategic or not. Voters might hold preferences that their representatives do not, and these preferences might reflect the representatives' behavior as a strategic choice or the representatives' behavior might be born out of their own personal preferences. This might make a seemingly irrational choice rational for a politician. Linked to the previously stated limitation is the difficulty to tell if a decision maker is strategically trying to maximize individual utility or collective utility, which might not always be the same. The fact that I only use a simple two-player game as a framework to describe a very complex environment is a simplification and a measured sacrifice I make in order to keep the game easily comprehensible and manageable, and still fit my problem. The players in the game are representing an aggregation of legislating decision makers, in this case US Congressmen as one player. International partners and competitors i.e. other countries or unions will aggregately be representing the other player. This simplification prevents me to account for how legislators in reality are not unified but influenced by what Tsebelis call "nested games" between each other, games interlacing with each other and involving a great number of players, caught like in a web of the actions of other players.⁶ Would reciprocity be the explanation for the conditional clauses in The Clean Act, then reciprocity towards other legislators and constituents can affect decisions too, and make the explanation more complex.⁷ The Chicken game, which I use to describe the strategic environment shaped by The Clean Act, is a brute simplification of the very complex actual strategic international setting for interaction on this issue. Yet, the game is commonly used for similar simplifications, and is a useful tool to explain and predict strategic action and counteraction.⁸ Although how commonly used the Chicken game might be, the use of the Prisoners' Dilemma is widespread and known. The reason for using the Chicken game instead is that it better describe the environment of this strategic interaction than the Prisoners' Dilemma does. A full explanation for the use of the Chicken game is given in section 4.

These limitations aside, it is hard to think of and use other methods to research and to explain conditional clauses in GHG abatement legislation.

⁶ George Tsebelis, *Nested games: rational choice in comparative politics*, 1990

⁷ Sugden, *Reciprocity: The Supply of Public Goods through Voluntary Contributions*, 2009, p. 775

⁸ Arthur A. Stein, *Why Nations Cooperate: circumstances and choice in international relations*, 1993, p. 87

3. The Clean Act of 2009

In this section, I will give an overview of The Clean Act and the targets aimed at with the proposed legislation. The conditional causes in The Clean Act will be presented and discussed and the strategic situation these clauses create will be introduced.

3.1 An Overview of The Clean Act

The House of Representatives passed The Clean Act, also called the cap-and-trade bill, over a year ago. It establishes a US emission-trading scheme by imposing a limit on GHG emissions, would it be enacted in the Senate. The bill is based on a cap-and-trade program with a limit or ceiling on GHG emissions and a program to trade the permits to emit. The World Resources Institute estimates, by including all provisions contained in the legislation and accounting for the economy as a whole including entities not covered by the legislation, that the reductions in GHG emissions from H.R. 2454 “could range from 28%-33% below 2005 levels in 2020 and 75%-81% in 2050”.⁹ As a comparison the already established European cap and trade program (EU ETS) aim at “a reduction in EU greenhouse gas emissions of at least 20% below 1990 levels” by 2020.¹⁰

219 members of congress voted for the legislation (211 Democratic and eight Republican ayes) and 212 members of congress voted against the legislation (44 Democratic and 168 Republican noes).¹¹ Now it’s up to the Senate to amend and enact the US GHG abatement legislation. However, just after the House passed the bill, the Senate voted on a reordering motion that put several other legislation issues ahead of the emission-trading scheme legislation. The opposition is stalling the legislation even further, and due to the democrats’ loss of supermajority last year and their loss in the midterm elections this year, the chance of getting environmental legislature through in the near future are very slim.

The Clean Act might not ever pass through the Senate to become enacted as a regulation but it might possibly become the foundation of a new proposal. Still the fact that a proposed legislation explicitly contains clauses for conditional cooperation,

⁹ Climate Change: Costs and Benefits of the Cap-and-Trade Provisions of H.R. 2454, 2009 p. 5

¹⁰ European Commission http://ec.europa.eu/environment/climat/climate_action.htm

¹¹ Final Vote Results for Roll Call 477

clauses making the regulation compulsory only under certain conditions, is highly interesting and unusual. When and if a new legislative proposal is written it is quite certain that similar conditional clauses as in The Clean Act will be included.

3.2 Conditional Clauses in The Clean Act

Almost all parts of The Clean Act that are aimed at the creation of a global GHG emission reduction program contain conditions for cooperation. The act limits international cooperation by stating that the Administrator, the Secretary of state or the president, should not seek cooperation and cease to cooperate if other countries are not willing to or does not cooperate on the same or more stringent conditions as the US. Already in section 3 the first section after the table of contents and definitions, an information disclosure, a necessity for conditional clauses to work properly, appears in the proposed legislation.

“The Administrator, in consultation with the Department of State and the United States Trade Representative, shall annually prepare and certify a report to the Congress regarding whether China and India have adopted greenhouse gas emissions standards at least as strict as those standards required under this Act. If the Administrator determines that China and India have not adopted greenhouse gas emissions standards at least as stringent as those set forth in this Act, the Administrator shall notify each Member of Congress of his determination, and shall release his determination to the media.”¹²

Under title seven, Global Warming Pollution Reduction Program, it is stated that an international program only qualifies as one to participate in, if it is at least as rigorous as this act.

“The Administrator, in consultation with the Secretary of State, may by rule designate an international climate change program as a qualifying international program if— (1) the program is run by a national or supranational foreign government, and imposes a mandatory absolute tonnage limit on greenhouse gas emissions from 1 or more foreign countries, or from 1 or more economic sectors in such a country or countries; and (2) the program is at least as stringent as the program established by this title, including provisions to ensure at least comparable monitoring, compliance, enforcement, quality of offsets, and restrictions on the use of offsets.”¹³

Section 743. International offset credits (p. 804) and section 754. Requirements

¹² *The American Clean Energy and Security Act of 2009* (H. R. 2454), SEC. 3. INTERNATIONAL PARTICIPATION, p. 11

¹³ *The American Clean Energy and Security Act of 2009* (H. R. 2454), TITLE VII— Title VII—Global Warming Pollution Reduction Program, Part C Program Rules, Section. 728. International Emission Allowances, p. 746

for international deforestation reduction program (p. 830) do also contain multiple pre-required conditions for international cooperation.

Subpart 2 under titel 4 in the legislative proposal would establish an International Reserve Allowance (IRA) program that essentially would work as a tariff on greenhouse gas-intensive imports but only towards countries that does not cooperate with the US on the matter.¹⁴ The creation of tariffs is a sign that cooperation will only occur under conditions set by the maker of the provisions. Furthermore the provision is creating incentive for foreign countries to impose environmental regulation on their markets.

Under section 765, International Negotiations, the President is obligated as soon as possible after enactment of the legislation to notify all non-exempted countries that the United States seeks international agreements “committing all major emitting nations to contribute equitably” to reduce greenhouse gas emissions.¹⁵

“It is the policy of the United States to work proactively under the United Nations Framework Convention on Climate Change, and in other appropriate fora, to establish binding agreements, including sectoral agreements, committing all major greenhouse gas-emitting nations to contribute equitably to the reduction of global greenhouse gas emissions.”¹⁶

The part of the Clean Act named Notification of Foreign Countries forces the president to request of the top 50 polluters a limit to their emissions to an extent described by the Clean Act, or their exports that are considered dirty will be subject to a tariff.

“As soon as practicable after the date of the enactment of this title, the President shall provide a notification on climate change described in paragraph (2) to each foreign country the products of which are not exempted under section 768(a)(1)(E). ...A notification described in this paragraph is a notification that consists of— (A) a statement of the policy of the United States described in subsection (b); and (B) a declaration— (i) requesting the foreign country to take appropriate measures to limit the greenhouse gas emissions of the foreign country; and (ii) indicating that, beginning on January 1, 2020, the international reserve requirements of this subpart may apply to a covered good.”¹⁷

Section 766 declares the United States’ multilateral negotiating objectives on

¹⁴ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: International Reserve Allowance Program, p. 1123-1126

¹⁵ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: International Negotiations, p. 1114

¹⁶ *Ibid.*

¹⁷ *Ibid.*

the issue. The objectives are to cooperate “equitably” under a “binding agreement” including “all major green house gas-emitting countries”, while recognizing “competitive imbalances” “between parties and non-parties of the agreement” and to “include... remedies for any party to the agreement that fails to meet its greenhouse gas reduction obligations.” The inclusion of “remedies” in the act is a sign that the legislators are trying to prevent a free rider problem by creating correctional measures.¹⁸

“The negotiating objectives of the United States with respect to multilateral environmental negotiations described in this subpart are - (1) to reach an internationally binding agreement in which all major greenhouse gas-emitting countries contribute equitably to the reduction of global greenhouse gas emissions; (2)(A) to include in such international agreement provisions that recognize and address the competitive imbalances that lead to carbon leakage and may be created between parties and non-parties to the agreement in domestic and export markets; and (B) not to prevent parties to such agreement from addressing the competitive imbalances that lead to carbon leakage and may be created by the agreement among parties to the agreement in domestic and export markets ; and (3) to include in such international agreement agreed remedies for any party to the agreement that fails to meet its greenhouse gas reduction obligations in the agreement.”¹⁹

Section 767 is the determining section of the conditional clauses aim toward foreign countries in the proposed legislation. It states that the regulation is compulsory only under certain conditions. It declares that, if the President determines that an international reserve allowance program “would not be useful” for an “industrial sector because its exposure to carbon leakage is the result of competition in export markets with goods produced in countries not implementing similar greenhouse gas emission reduction policies... the President may determine not to apply an international reserve allowance program” to that sector. Leaving the President the option not to cooperate and to keep the industrial sectors in the US (basically all US industrial sectors without limitations) out of an international program under conditions that the sectors would be subject to unfair competition by entering an IRA program.²⁰

“To the extent the President determines that an international reserve allowance program

¹⁸ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: United States negotiating objectives with respect to multilateral environmental negotiations, p.1115

¹⁹ Ibid.

²⁰ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: Presidential reports and determinations, p. 1116

would not be useful for the eligible industrial sector because its exposure to carbon leakage is the result of competition in export markets with goods produced in countries not implementing similar greenhouse gas emission reduction policies, an identification of, and to the extent appropriate a description of how the President will implement, alternative actions or programs consistent with the purposes of this subpart (and, in such case, the President may determine not to apply an international reserve allowance program to the eligible industrial sector).”²¹

If the US is not participating in an international agreement by year 2018, which is one of the main purposes of the Clean Act, the President ought to “establish an international reserve allowance program... unless the President determines... that such program would not be in the national economic interest or environmental interest of the United States.”²² The ultimate condition for cooperation, by rule in the act, is the economic and environmental interest of the country.

“If, by January 1, 2018, a multilateral agreement consistent with the negotiating objectives set forth in section 766 has not entered into force with respect to the United States, the President shall establish an international reserve allowance program for each eligible industrial sector to the extent provided under section 768 unless—the President determines and certifies to the Congress with respect to such eligible industrial sector that such program would not be in the national economic interest or environmental interest of the United States.”²³

3.3 The Strategic Situation

Looking at the strategic situation the Clean Act would create if enacted, one can see it as a Sequential game where the US states: I cooperate only if you cooperate just as much or more. The US strategy seems to be to tie its own hands by the wheel with the legislation, forcing other parties to cooperate equitably or choose an unattractive alternative with extended global warming and no US cooperation or emission reduction. With the conditional clauses in The Clean Act the US is averting free riding on the US without promising not to free ride herself. This is made possible by Subpart 2: Presidential reports and determinations, the clause in The Clean Act that give the President the power to decide whether an IEA is in the “national economic and environmental best interest of the United States”, which means that the US never actually obliges to follow the legislation if ever fully enacted.²⁴ That is a very hardline

²¹ Ibid.

²² *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: Presidential reports and determinations, p. 1118

²³ Ibid.

²⁴ Ibid.

and hawkish approach. This dilemma of the commons is similar to many public good games. The environment of the dilemma and the strategic situation created, would the Clean Act or another US legislation containing similar conditional clauses be enacted, is best described as a game of Chicken. This will be explored in the later part of the next section, but first I will describe how the decision to include conditional clauses in the Clean Act might be explained by preferences for fairness.

4. An Economic Explanation of Conditional Clauses

In this section, I give a behavioral explanation and a strategic explanation of the conditional clauses in The Clean Act. I present behavioral theories that could be the motivational determinant to include conditional clauses in The Clean Act. Based on the presented behavioral economic theory, I give an explanation to the inclusion of conditional clauses in GHG abatement legislation. Preferences for fairness are suggested to influence legislators' decisions on this matter, and the mechanism reciprocity is suggested to be the determining fairness decision rule, which also explains conditional cooperation. Are these preferences the motivational driver or could the conditions for cooperation be explained as a rational implementation of cooperation as a strategic choice? This question will be answered at the end of this section with the help of a two-player game called Chicken, a framework describing the environment of this strategic interaction.

4.1 A Behavioral Explanation

Empirical tests show a clear tendency for a higher level of cooperation in public goods experiments, compared to what have been “predict(ed) by standard economic theory assuming rational and selfish individuals”, according to Fehr, Fishbacher and Gächter.²⁵ The observed cooperation is conversely declining and heterogeneous over time. A research paper by Fehr, Fishbacher and Gächter investigates a possible explanation to this observation. They conclude that some people are “conditional cooperators, i.e., people who are willing to contribute more to a public good the more others contribute”.²⁶ The decline in cooperation over time and sequences of plays is

²⁵ Fehr, Fishbacher and Gächter, *Are People Conditional Cooperative?*, 2000, p. 2

²⁶ Ibid. (Also in Rabin, *Incorporating Fairness into Game Theory and Economics*, 1993, p. 1283-1284)

explained by the ability of purely selfish individuals to induce non-cooperative behavior in the conditional cooperator. The authors explain the motivation for conditional cooperation as motivation “in its own” or as a result of preferences for fairness. Fairness preferences suggested by the Fehr, Fishbacher and Gächter to motivate conditional cooperators are altruism, warm-glow, inequality aversion or reciprocity.²⁷ As explained by Palfrey and Prisbrey (1997), if a subject holds altruistic preferences, her utility is increasing with the payoff of the whole group, not only by her own payoff. Warm-glow preferences on the other hand increase the subject’s utility by a set amount, by her own contribution to the group.²⁸ Thus motivated by altruism or warm-glow, a decision-maker is willing to cooperate on a more stringent condition than his partner, freely contributing more than others. The conditional clauses in The Clean Act clearly states that the US will only cooperate with other countries following conditions equally or more stringent than in The Clean Act. This makes altruism, warm-glow and inequality aversion not useful in explaining the conditional clauses in The Clean Act. Negative reciprocity ought to best explain the conditional clauses in the act if the clauses are motivated by a preference for fairness, as it is the only one of the mentioned fairness preferences that might make the decision-maker willing to cooperate only on equal or less stringent conditions than his partner. The concept of reciprocity will be explored under the next heading.

4.1.1 Evidence of Conditional Cooperation

“Are People Conditional Cooperative?” by Fehr, Fishbacher and Gächter present a standard linear public goods experiment that “directly elicits subjects willingness for conditional cooperation”.²⁹ The experiment is designed as a variant of the strategy method first applied by Selten in 1967 with a monetary incentive, constructed so that the predicted outcome according to standard theory is complete free riding. The strategy method makes the participants “indicate for each average contribution level of other group members how much they want to contribute to the public good”, as Fehr, Fishbacher and Gächter writes.³⁰ Each group is made up of four individuals whom each have to decide how to spend 20 tokens. The decision is

²⁷ Ibid.

²⁸ Palfrey and Prisbrey, *Anomalous behavior in public goods experiments: How much and why?*, 1997, p. 830

²⁹ Ibid.

³⁰ Ibid.

between investing the tokens in a public good project or to keep the tokens for your own direct payoff. The monetary payoff function for the public good project below was explained to the decision makers prior to their investment decision.³¹

$$\pi_i = 20 - g_i + 0.4 \sum_{j=1}^4 g_j$$

Source: Fehr and Gächter, 2000

The public good derived from the project equals the sum of all contributions g_j to the project. As seen in the payoff function, 0.4 tokens is the marginal payoff of each token contributed to the public good. Thus, complete free riding by the whole group is predicted by standard theory.³² The game is only played once in order to extract the preferences unbiased of intertemporal strategy decisions. This blocks the participants from being affected by “reputation formation” or other concerns related to iterated games.³³ Data collected from the experiment show that around 50 percent of the participants are in fact conditional cooperators, as their contribution to the group increases as the group members average contribution increases and vice versa. Only one third of the participants in the tests were free riding. A conclusion drawn from the evidence of inclination to conditional cooperation can explain the commonly seen decline of cooperation in repeated public goods games. Still, free riding is also a part of the problem though complete selfishness is only partly explaining non-cooperation. As seen in figure 1, most conditional cooperators in the experiment show a self-serving bias as they contribute less to the common good than others do on average.³⁴ Thus selfishness, although not complete selfishness as predicted by standard economic theory, together with some fairness preferences seems to partly be explaining cooperation difficulties in common goods games. This pattern aligns well with the conditional clauses in The Clean Act stating cooperation only on equal or less stringent conditions as foreign countries.

³¹ Fehr, Fishbacher and Gächter, *Are People Conditional Cooperative?*, 2000, p. 3

³² Ibid.

³³ Ibid. p. 6

³⁴ Ibid. p. 12

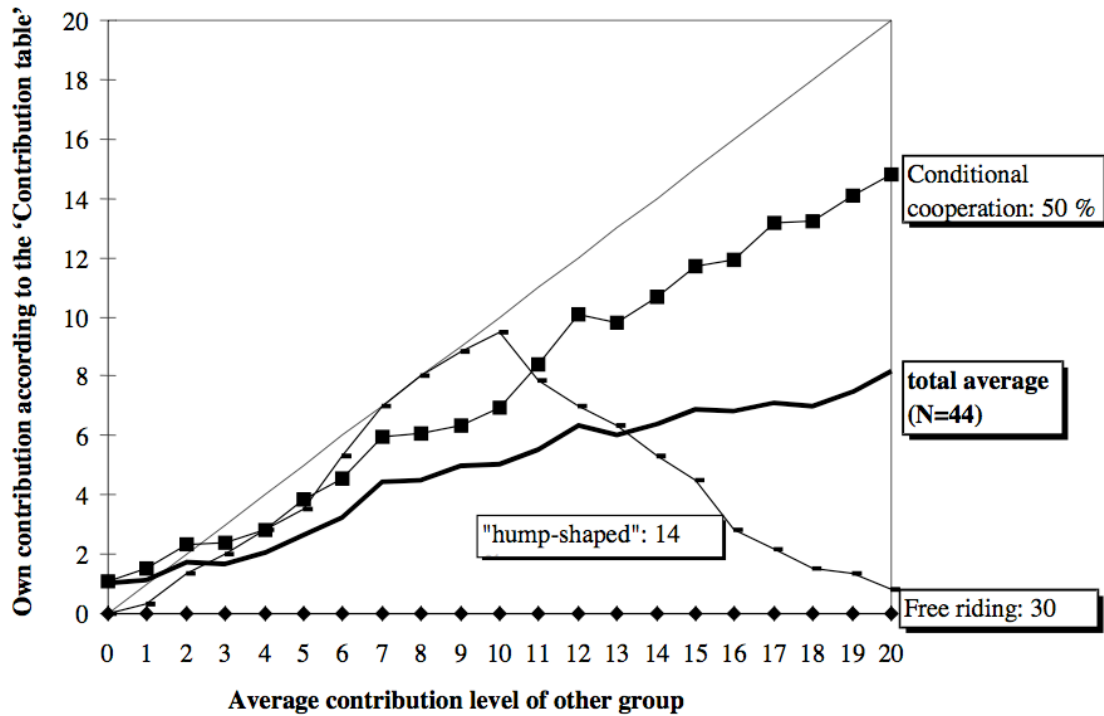


Figure 1 show average own contribution level for each average contribution level of other members (Diagonal = perfect conditional). Source: Fehr and Gächter, 2000

In the next section I will describe the implications the fairness decision rule reciprocity has on decisions and explain how reciprocity might lead to an incline for conditional cooperation preferences.

4.1.2 Reciprocity

In “Fairness and Retaliation: The Economics of Reciprocity”, one of the most noteworthy articles on reciprocity, Fehr and Gächter write that the view in standard economic theory of the human character as purely self-interested is wrong, and that a lot of people are not at all purely self-interested but behave in a reciprocal way (see also Dufwenberg and Kirchsteiger 1998).³⁵ According to Fehr and Gächter reciprocal behavior is to act nicer and more cooperative than predicted by the self-interested model, in response to friendliness and the vice versa in response to mean and aggressive behavior.³⁶ In “Reciprocity: The Supply of Public Goods through Voluntary Contributions”, Sugden simply describe reciprocity as a principle that

³⁵ Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 159 and also Dufwenberg and Kirchsteiger, *A Theory of Sequential Reciprocity*, 1998, p. 1

³⁶ Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 159

states, “not that you must always contribute towards public goods, but that you must not take a free ride when other people are contributing”.³⁷ Fehr and Gächter point to that evidence from cooperation experiments show that even though most people behave reciprocal, some do behave purely self-interested and these two dominant types have a mutual affect on each other’s behavior. When the reciprocal and the self-interested type interact, they dominate the outcome depending on the environment of the interaction.³⁸ The reciprocal type affects the outcome in competitive markets with incomplete contracts, and in the opposite environment, an environment with “strong material incentive to free ride” as Fehr and Gächter put it, the self-interested type dominates the outcome.³⁹ But if there are ways to punish free riders, built into the environment, then the reciprocal type will dominate the self-interested type into cooperation. This “power to enhance collective actions and to enforce social norms” is what Fehr and Gächter describe as “one of the most important consequences of reciprocity”.⁴⁰

The ultimatum game, in which two participants are to divide a predetermined amount of money, is commonly used to experimentally demonstrate negatively reciprocal behavior, behavior were the mechanisms causing reciprocity hinder cooperation in environments where cooperation is predicted by the self-interested model (see for example Dufwenberg and Kirchsteiger (1998), Fehr and Gächter (2000) and Rabin (1993)).⁴¹ The participants are given a role of either the proposer or the responder. The proposer is to give one proposal on how to divide the money with the responder. It is up to the responder to agree and receive the proposed amount of money, or to refuse the offer and receive nothing. If the responder accepts the offer, the proposer will receive the remaining amount, but if the offer is refused both participants will instead receive nothing. The result in this game, over hundreds of plays, is that when offered less than 30 percent the responder is very likely to reject the offer and rather receive nothing than receive a small portion while being unfairly treated. This contradicts with self-interest maximizing behavior. The results change only marginally when the amount increase to sums as high as two months salary.⁴²

³⁷ Sugden, *Reciprocity: The Supply of Public Goods through Voluntary Contributions*, 1984, p. 775

³⁸ Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 160

³⁹ *Ibid.*

⁴⁰ *Ibid.* p. 161

⁴¹ *Ibid.* (Also in Rabin, *Incorporating Fairness into Game Theory and Economics*, 1993, p. 1284 and Dufwenberg and Kirchsteiger, *A Theory of Sequential Reciprocity*, 1998, p. 2)

⁴² Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 161

Fehr and Gächter also point out that evidence of positive reciprocity has been found in a multitude of trust games experiments. As with negative reciprocity, positive reciprocal behavior does not seem to diminish with increased amounts to distribute.⁴³

Fehr and Gächter refers to the results from a series of studies on individual decisions that have shown that between 40 to 66 percent of the participants act in a reciprocal way and that between 20 to 30 percent act in a purely selfish manor (they refer to Gächter and Falk, 1999; Berg, Dickhaut and McCabe, 1995; Fehr and Falk, 1999). Other studies point to a larger tendency to penalize bad behavior than to reward kind behavior (referring to Offerman, 1999; Charness and Rabin, 2000).⁴⁴ Fehr and Gächter point out four different views to the cause and motivation behind reciprocal behavior without making their own stance clear. Mentioned motivational determinants are, as the authors write, “the desire to maintain equity” and “the desire to punish hostile intentions and to reward kind intentions”. Other suggested causes are that “people do not respond to the intention but to the type of person they face” and that reciprocity could be “a form of boundedly rational behavior “.⁴⁵

If the motivational determinant behind the inclusion of conditional clauses in the Clean Act would be a fairness mechanism leading to reciprocal behavior, the desire to maintain equity is the one explanation that best fit the nature of the included conditional clauses. The desire to maintain equity is evident in for example section 766 of the Clean Act were the US declares that the United States’ multilateral negotiating objective is to cooperate equitably.⁴⁶ In this way negative reciprocity could well be the motivation behind the conditional cooperation clauses in The Clean Act. In “Homo Reciprocans”, Fehr and Gächter, prove through decision experiments that reciprocal behavior acts as a norm enforcer in a similar way as preferences for conditional cooperation does, as reciprocity is suggested to induce these preferences in the first place.⁴⁷

4.1.2.1 Reciprocity Pronounce a Trend

As mentioned before and as explained by Fehr and Gächter, positive reciprocity make players in public goods games willing to contribute to the common good as a

⁴³ Ibid. p. 162

⁴⁴ Ibid.

⁴⁵ Ibid. p. 162-163

⁴⁶ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: United States negotiating objectives with respect to multilateral environmental negotiations, p.1115

⁴⁷ Fehr and Gächter, *Homo Reciprocans*, 1998, p. 10-13

response to the kind action of other players that also do contribute (see also Sugden 1984).⁴⁸ But what implications do reciprocity has in a repeated game? If the reciprocal type observe self-interested types free riding and see free riding as an unfriendly action, then negative reciprocity can make the reciprocal type free ride as a response to this unfriendly action. In this way the reciprocal type is trend sensitive and pronounce a beginning trend, whether it is positive or negative, although negative reciprocity is found to act as a stronger motivational determinant than positive reciprocity. If the portion of the participants in a public goods game that is reciprocal experience both free riding and contributions to the public good, the reciprocal type might contribute as a response to the friendly action or free ride as a response to the unfriendly action. But as previously explained, the reciprocal type is more prone to react to an unfriendly action than to a friendly action. Thus the actions of a minority of self-interested types can make reciprocal types behave in a self-interested way, making them free ride too.⁴⁹ However, if the reciprocal type is given the opportunity to react to unfriendly actions in another way than free riding on its own, a way to punish or restore equilibrium whatever motivates reciprocity, the reciprocal type tends to keep contributing to the public good and use this correctional measure, even though it might be costly, to force the self-interested type into cooperation. This will lead to a positive trend of contributions to the public good.⁵⁰ The interaction between the reciprocal type and the self-interested type and how they can induce their respective behavior on the other type in certain strategic environments leads will be further discussed in the strategic explanation under the heading The Power of Correctional Measures.

4.2 A Strategic Explanation

In this section I will give a strategic explanation to the inclusion of conditional clauses in GHG abatement legislation by the help of the Chicken game. As previously mentioned in my research, the US approach with The Clean Act seems to be to tie it own hands by the wheel with the proposed legislation, forcing other parties to cooperate or choose an unattractive alternative with extended global warming and no cooperation at all. This approach creates a specific strategic environment whether it is

⁴⁸ Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 159 and Sugden, *Reciprocity: The Supply of Public Goods through Voluntary Contributions*, 1984, p. 775

⁴⁹ Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 160-161

⁵⁰ Ibid. p. 164-165

made on purpose or not. The strategic environment and the predicted outcome of interaction in this environment will be described and explained through the Chicken game. First I will explore how the inclusion of correctional measures in a strategy aimed at cooperation can make stated reciprocity a rational strategic choice.

4.2.1 The Power of Correctional Measures

In A “Theory of Fairness, Competition, and Cooperation”, Fehr and Schmidt show through their model that, theoretically the reciprocal type can, even as a minority, induce cooperation into a selfish majority in a public good game with costly punishment opportunities other than free riding.⁵¹ In a range of public good experiments conducted with and without correctional measure or as Fehr and Gächter call it “punishment opportunities”, in addition to free riding, Fehr and Gächter show that the correction of free riders by the reciprocal type make the self-interested type cooperate and contribute to the public good.⁵² Two versions of this repeated game was played. In one version the participants never played with the same persons more than once, the “Perfect Stranger” version and in one version the participants always played with the same persons, the “Partner” version.⁵³ In addition to show the correctional effect punishment have on free riders, the experiments also showed that free riders get punished in proportion to how much they free ride. The observed pattern is nearly identical in both versions of the game; hence the reciprocal type punished free riders in these games almost without concern for future returns. This is shown in figure 2.⁵⁴

⁵¹ Fehr and Schmidt, *A Theory of Fairness, Competition, and Cooperation*, 1999, p. 841-842

⁵² Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 165-166

⁵³ *Ibid.* p. 165

⁵⁴ *Ibid.* p. 166

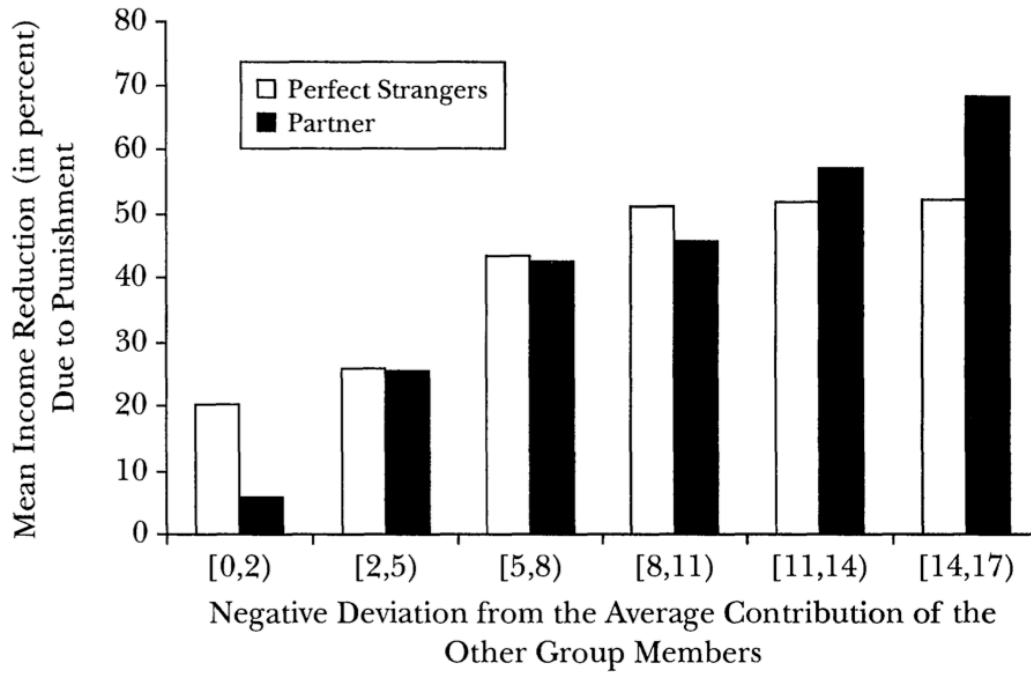


Figure 2 shows the mean income reduction for a given negative deviation from the mean contribution of other group members. Source: Fehr and Gächter, 2000

The correctional effect punishment has on the self interested type's behavior is shown in figure 3 as the difference of the progression of the average contribution level, with and without punishment opportunities. Figure 3 also shows a distinct difference in the contribution levels between the perfect stranger version of the experiment and the partner version of the experiment.⁵⁵

⁵⁵ Ibid. p. 167

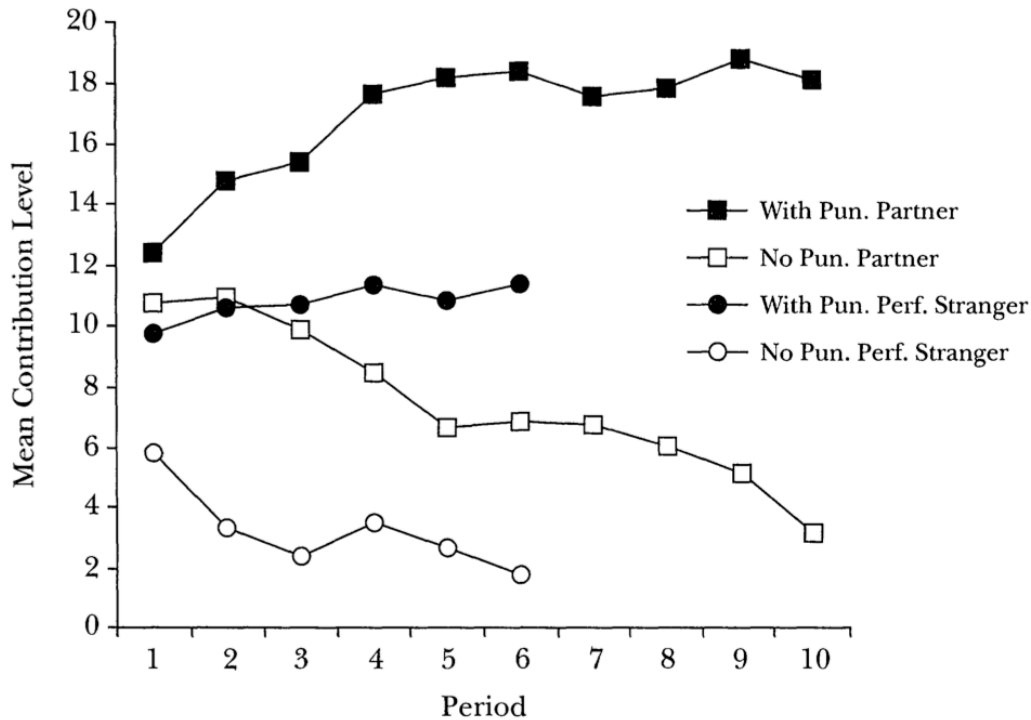


Figure 3 shows the evolution of average contributions levels with and without the punishment option in the partner version and in the perfect stranger version. Source: Fehr and Gächter, 2000

These observations ought to motivate the reciprocal type to create a strategy with correctional measures in a public goods game, much like the US is doing with the conditional clauses in The Clean Act. Hopfensitz and Reuben show that in an environment with a sequence of plays of correction and retributions and a correcting “punishment institution”, punishments effectively work as an encouragement to cooperation.⁵⁶ However, punishment in public goods games have also shown to have a crowding out effect of positive reciprocity that might create losses in welfare, although only marginally.⁵⁷ Thus Stated reciprocal behavior should prove a good strategy to induce cooperation in a strategic environment with punishment opportunities.

The US strategy can be seen as an ultimatum. They are willing to cooperate only under equal conditions or under less stringent conditions than their partners. If the ultimatum is not accepted, both players will go down a very undesirable path. A parallel to the simple ultimatum game and the little more advanced game of Chicken

⁵⁶ Hopfensitz and Reuben, *The Importance of Emotions for the Effectiveness of Social Punishment*, 2009, p. 1549

⁵⁷ *Ibid.* p. 1534

can be made with an explanatory effect.⁵⁸ In the ultimatum game the US would be the proposer and suggest half (equal conditions) or less and other countries would be the responders that had to decide whether to accept or reject the offer. Who appointed the US as the proposer? Seen as an ultimatum, the US proposal of 50 percent or less, cooperation under equal or less stringent conditions as is the proposal in The Clean Act, is predicted to be accepted by a responder. Remember that most proposals above 30 percent are perceived fair and were accepted over a large number of plays in decision experiments.⁵⁹ Fairness is the determining factor in the ultimatum game. The proposer in the ultimatum game is chosen by random selection or appointed by the game's administrator. This gives the proposer legitimacy to propose and its proposal should be perceived as more fair than in a situation where the proposer is self-appointed. With The Clean Act the US has appointed itself as the proposer, which could be perceived as unfair and decrease the legitimacy of a US proposal, compared with a proposal made in a simple ultimatum game.

An explanation of the implications of the incorporation of fairness into the strategic environment will be made in the next section. To better and more realistically explain the strategic environment The Clean Act would create, if ever enacted, I will demonstrate the predicted outcome of this strategic interaction with the help of the game Chicken. To contrast the strategic environment and the predicted outcome thereof, generated by the conditional clauses in The Clean Act, I will play the Chicken game in an environment shaped by the EU unilateral approach as well. This will be made in the next section.

4.2.2 A Game of Chicken

Looking to standard economic theory and rational choice subject to utility maximization, the strategic situation of global warming, a collective goods problem, can be simplified and described as a two-player game with a cooperation aspect and a coordination aspect. A non-cooperative game, with different weights put on cooperation and non-cooperation subject to the action of the other player can, even though simplified, quite well describe the strategic situation of this problem and how

⁵⁸ Rabin, *Incorporating Fairness into Game Theory and Economics*, 1993, p. 1289-1290

⁵⁹ Fehr and Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 2000, p. 161, Rabin, *Incorporating Fairness into Game Theory and Economics*, 1993, p. 1284 and Dufwenberg and Kirchsteiger, *A Theory of Sequential Reciprocity*, 1998, p. 2

the environment and the predicted outcome change by the inclusion of conditional clauses. What is usually used to explain non-cooperation can in this case be used to describe an environment for cooperation. This is because the US is comparably a very large player in this game, thus other countries are dependent on the cooperation of the US in order to successfully abate climate change.⁶⁰ Dependency on its size as a polluter, in order for the US approach to work, will be discussed in the last part of section 4.

I will contrast conditional clauses as a strategy with the EU's approach of unilateral cooperation. The framework I use is a two-player game, thus I make a simplifying assumption to fit my problem with the game. The players in the game are representing an aggregation of legislators, in this case US Congressmen as one player. Potential international partners and competitors will aggregately be representing the other player. This simplification prevents me from describing how legislators in reality are not unified but influenced by games between each other, so called "nested games" involving a number of actors.⁶¹

The game that I will use to explain the rationale of including conditional clauses towards foreign countries in legislation on this legislative issue is called Chicken. The game Chicken is commonly used in political science to explain the environment of the strategic interaction between nations, and the original idea was coined from car chicken races, where racers speed towards each other. The driver who steers off the collision course becomes the chicken. If both cooperate and turn at the same time just before the collision, no one becomes chicken. Crashing, by mutual defection, is the least preferred outcome.⁶² In Chicken, the cost for mutual defection is so high that it is both players' least preferred outcome, it is worse than to become the chicken; to cooperate while the other player defects. Chicken seems to be a good analogy for the strategic environment of the climate change problem, as the cost for mutual defection outweighs the cost of mutual cooperation and defection by other players. Because Chicken better describes the environment of this strategic interaction, I will use it instead of the better known and more commonly used Prisoners' Dilemma. The determining difference between Chicken and the Prisoners' Dilemma is that in Chicken mutual defection is the least preferred outcome for both players, not

⁶⁰ Climate Analysis Indicators Tool (CAIT) Version 7.0, World Resources Institute, 2010

⁶¹ George Tsebelis, *Nested games: rational choice in comparative politics*, 1990

⁶² Arthur A. Stein, *Why Nations Cooperate: circumstances and choice in international relations*, 1993, p. 87

cooperation while the other player defect on you as in the Prisoners' Dilemma (see figure 4 for a comparison). To give the rationale for using the game of Chicken to describe the strategic environment of this issue, let us remember that the long-term predictions of the effect of global warming would unabated lead to catastrophic events and generate devastating costs to our global society.⁶³ The projected future costs are so great that a decision-maker will focus more on absolute costs than on fairness. As a contrast, in a setting where a decision-maker only suffer a little and his opponent does the same, the decision-maker is happy as the power balance is unchanged: the focus is on relative costs and equity. If the issue is regarding devastating costs to your state, as global warming is in the long term, a rational decision-maker are not happy to pay these costs just as long as his opponent incur the same costs. Thus it seems reasonable to suggest that for a large polluter abating climate change even though some other countries might not, ought to be more desirable and a rational approach compared to no abatement at all. In Chicken, the cost for mutual defection is so high that it is both actors' least preferred outcome. This line up with the preferences of the US, read from the Clean Act and for the preferences of the EU with its unilateral strategy. In addition a number of significant research papers, the Stern Review: The Economics of Climate Change being the most prominent, clearly suggests that climate change abatement would be an economically rational policy compared to doing nothing, as the projected cost from climate change plainly outweigh the cost of abatement.⁶⁴ In the Clean Act the US clearly acknowledges the full graveness of the situation and the importance of US actions and cooperation, yet, as effect of conditional causes previously discussed, the US will only cooperate on equal or less stringent conditions than other countries.⁶⁵

⁶³ Nicholas Stern, *Stern Review: The Economics of Climate Change*, 2006, p. 285

⁶⁴ Nicholas Stern, *Stern Review: The Economics of Climate Change*, 2006, p. 285

⁶⁵ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title VII—Global Warming Pollution Reduction Program Part A, Global Warming Pollution Reduction Goals and Targets SEC. 701. Findings and Purpose, p. 678-681 “(1) Global warming poses a significant threat to the national security, economy, public health and welfare, and environment of the United States, as well as of other nations. (2) Reviews of scientific studies, including by the Intergovernmental Panel on Climate Change and the National Academy of Sciences, demonstrate that global warming is the result of the combined anthropogenic greenhouse gas emissions from numerous sources of all types and sizes... Accordingly, controlling emissions in small as well as large amounts is essential to prevent, slow the pace of, reduce the threats from, and mitigate global warming and its adverse effects... (6) Nations of the world look to the United States for leadership in addressing the threat of and harm from global warming. Full implementation of the Safe Climate Act is critical to engage other nations in an international effort to mitigate the threat of and harm from global warming. (7) Global warming and its adverse effects are occurring and are likely to continue and increase in magnitude, and to do so at a greater and more harmful rate, unless the Safe Climate Act is fully implemented and enforced in an

CHICKEN		Player B		PRISONERS' DILEMMA		Player B	
		C	D*			C	D*
Player A	C	3, 3	1, 4**	Player A	C	3, 3	1, 4
	D*	1, 4**	0, 0		D*	4, 1	2, 2**

Figure 4 shows the game of Chicken and the Prisoners' Dilemma in the basic strategic setting.

In the Chicken game the positive consequences of mutual cooperation outweighs the cost of cooperation and is thus preferred by both players to the least preferred outcome, mutual non-cooperation. In its basic form, without any specific strategy, the model predicts non-cooperative behavior, as free riding is the most beneficial strategy given that the other actor cooperates. In the game, the same preferences for both actors for the cost of global warming are assumed.

Under the next three headings the strategic interaction in the game will be discussed and displayed in figure 5, 6, 7, 8 and 9. The numbers in these figures, describing the strategic environment created by a unilateral approach and a conditional approach reflects the order in which the players prefer different outcomes, not the direct weights they put on the outcomes. The number 4 is the most preferred outcome and the number 0 is the least preferred outcome, descending in that order.

expeditious manner.”

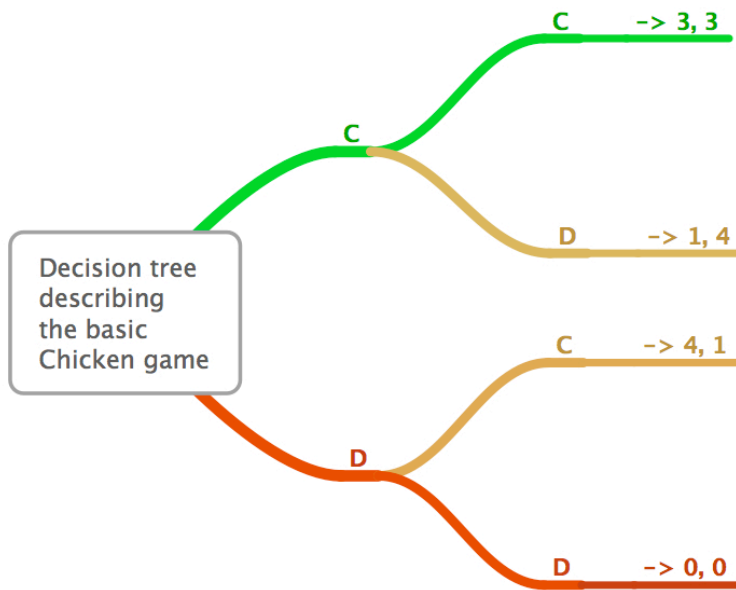


Figure 5 shows a decision tree with possible paths to different outcomes in order of preferences, in the basic strategic environment of the Chicken game. The highest number is the most preferred.

4.2.3 The EU Unilateral Approach

The EU unilateral strategy with reduction targets no matter if other countries decide to cooperate and set their own ambitious reduction targets or not, creates an environment where defection on the EU is the best-response and the predicted outcome denoted ** in figure 6. Mutual cooperation is not predicted by the game, thus the EU strategy of being a forerunner and act like a role model seems to be unsuccessful. Looking at the decision tree in figure 7 the EU starts the sequence by cooperating, leaving the other player with the option to cooperate and reach a mutual gain and the second most preferred outcome (3, 3) or to defect on the EU and reach the most preferred outcome (4) leaving the EU with its second least preferred outcome (1). The equilibrium, defection on the EU, is reached, as the other player is utility maximizing by free riding on the EU. Without a third actor to make sure cooperation, in this problem an imposing international regulating framework, the aggregated utility will never be maximized and other players will free ride on the EU. Thus the model suggests that the EU, as a rational utility maximizing legislator, should seek to create strong international imposing regulations to make sure cooperation and the success of its unilateral strategy. A strategic interaction between the EU and the US is predicted to reach a mutual cooperation outcome as the EU pre-commit to cooperate, as does the US under the condition that cooperation is on equal

or more stringent terms. This goes in line with the ambitious reduction targets set by the EU. The big strategic difference between the EU unilateral approach and the US conditional approach is that the US approach prevents the country from becoming the “sucker” that other countries free ride on. If another player is a unilateral cooperator, mutual cooperation will always be the equilibrium while interacting with the EU.

CHICKEN Unilateral Cooperation		Player B	
		C	D*
EU	C*	3, 3	1, 4**
	D	X	X

Figure 6 shows the game of Chicken with the strategic environment created by a unilateral cooperation strategy, as is the EU approach. X denotes outcomes that cannot be reached in the environment created by the EU approach.

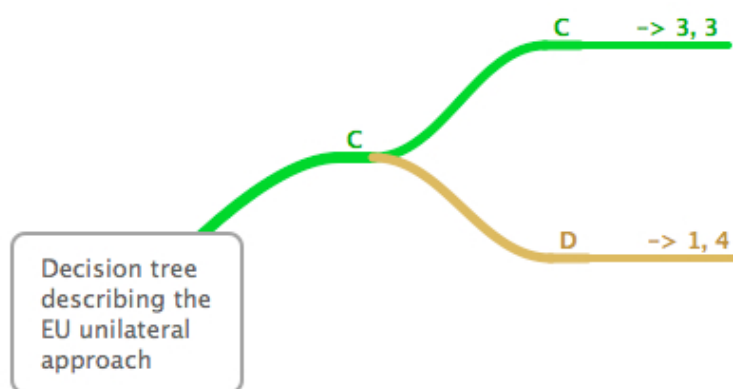


Figure 7 shows a decision tree with possible paths to different outcomes in order of preferences, as a creation of the EU approach. The highest number is the most preferred. The EU starts the sequence by cooperating, now other players have the option to cooperate and gain (3) or defect and gain (4).

4.2.4 The US Conditional Approach

The conditional clauses in The Clean Act create a strategic environment with a new best-response for the opponent (Player B), mutual cooperation C, C marked ** (3, 3 in figure 8). In this way the conditional clauses in The Clean Act is predicted to induce cooperative behavior on other countries.

CHICKEN Conditional Cooperation		Player B	
		C*	D
US	C*	3, 3**	X
	D	4, 1	0, 0

Figure 8 shows the game of Chicken with the strategic environment created by a conditional cooperation strategy, as is the US approach. X denotes an outcome that cannot be reached in the environment created by the US approach.

The decision tree in figure 9 help to explain the strategic situation and show how mutual cooperation is the best response. The conditional clauses in The Clean Act, states that the US will only cooperate under equal or less stringent conditions as other countries. This rules out an outcome where the US cooperates and the other player defect on the US, path D, C (4, 1 In figure 8), which is the equilibrium outcome in the strategic environment the EU unilateral strategy generates, with defection on the EU as a result. Now, in the environment with US conditional clauses, other countries can decide to defect along path D, D and reach the least preferred outcome mutual defection (0, 0 In figure 8), or cooperate with the US going down path C, C and reach the predicted outcome, the equilibrium mutual cooperation (denoted 3, 3 in figure 8). Outcome (4, 1 in figure 8 and 9) showing US defection, is marked in grey to show that although possible, it is highly unlikely that the President will exercise the power given to him by the conditional clauses in The Clean Act to

not to cooperate, if he decides that it is not in the best economic and environmental interest of the country to do so.⁶⁶ After all, conditional cooperation to “reach an internationally binding agreement in which all major greenhouse gas-emitting countries contribute equitably to the reduction of global greenhouse gas emissions” is the main objective of the US with The Clean Act.⁶⁷

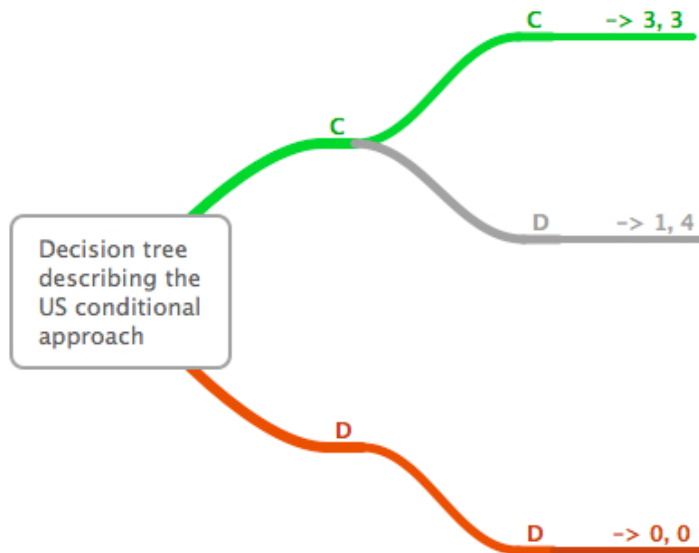


Figure 9 show a decision tree with possible paths to different outcomes in order of preferences, as a creation of the US approach. The highest number is the most preferred.

4.2.5 Incorporating Fairness into the Game

A twist to the games that creates a more realistic environment where cooperation might be less likely to occur is when irrational fairness preferences such as reciprocity are brought into the games. Rabin does this in “Incorporating Fairness into Game Theory and Economics” (1993), and creates a model accounting for reciprocity. In “A Theory of Sequential Reciprocity” (1998), Dufwenberg and Kirchsteiger make a modification to Rabin’s model, as a critique to Rabin’s approach, with multiple sequences and more than two players in the games. The incorporation of reciprocity into the games makes the games quite complex and does not help to explain the inclusion of conditional clauses in The Clean Act. Although by including

⁶⁶ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: Presidential reports and determinations, p. 1118

⁶⁷ *The American Clean Energy and Security Act of 2009*, (H.R. 2454), Title IV, Subpart 2: United States negotiating objectives with respect to multilateral environmental negotiations, p.1115

reciprocity into the game one might explain an environment created by the above-mentioned strategies where neither of the strategies leads to mutual cooperation. In the case of the US strategy, incorporating fairness, in the shape of the mechanism reciprocity, might actually lead to mutual defection. If the conditions for cooperation in The Clean Act are perceived as highly unfair other countries might respond reciprocally, punishing by not cooperating at all even though this outcome is less preferred than mutual cooperation. A new equilibrium would emerge as outcome D, D, (0, 0 in figure 8) for the US conditional approach. The outcome is only predicted to change for the EU unilateral strategy if other countries would hold very strong fairness preferences and perceive its own defection on the EU as unfair to the EU's forerunner approach. A similar explanation on how the game of Chicken is changed, and a new equilibrium are created by the incorporation of fairness preferences is made by Rabin (1993).⁶⁸

4.2.6 Dirtiness Matters in the Game

A complexity in trying to explain strategies to reaching a global agreement on GHG emission reductions with the help of games is that the game changes when it is played with the largest polluters in comparison to when it is played with marginal polluters. The major polluters must cooperate in emission reduction to effectively turn the negative trend before GHGs reach catastrophic and irreversible levels in the atmosphere. Small polluters would at least theoretically be less inclined to cooperate and more prone to free ride, as the defection of a small polluter only has a small effect on global warming abatement. In the opposite way a large polluter could possibly force a small into cooperation, claiming it will not cooperate unless the small polluter cooperate to. The worlds five largest polluters with China and US in the top make up for over 50 percent of the pollution and China and US alone is responsible for over 30 percent.⁶⁹ Thus non-cooperation while others cooperate i.e. free riding, as captured by the Chicken game, might not be the most preferred strategy at least in the long-term for neither US nor China nor EU, as their cooperation is essential for the abatement of global warming. This makes free riding, if motivated by expected utility maximization, a poor strategic choice for the largest polluters and might alter the

⁶⁸ Rabin, *Incorporating Fairness into Game Theory and Economics*, 1993, p. 1289-1290

⁶⁹ Climate Analysis Indicators Tool (CAIT) Version 7.0, (Washington, DC: World Resources Institute, 2010)

cooperation preferences so that even unilateral cooperation might prove a good strategy. This might have been one reason for the EU to adopt its unilateral approach.

5. Conclusion

In real life situations, decision makers, in this case US congressional legislators, seem to be motivated in a lot of different ways, and maybe this all depends not only on the strategic nature of the situation but also on other properties of the setting where the situation takes place. To explain the conditional clauses in The Clean Act I only account for reciprocal motivation and strategic utility maximization. Nevertheless, reciprocal behavior could be a major motivational determinant to write conditional clauses in The Clean Act. Literature describing the principle reciprocity explains the motivation to the incorporation of these clauses in The Clean Act, even though reciprocity is a fairness principle suggested to be irrational. Maybe the power of reciprocity “to enhance collective actions” is what the US brings into the strategic environment through the conditional clauses in The Clean Act, intentionally or unintentionally. Similarly, the conditional clauses in the Clean Act could as well be borne purely out of a strategic action. Although the conditional clauses in The Clean Act might never be used in a real strategic interaction, they proved in the Chicken game, a game that in its basic setting is a non-cooperative game, to create an environment where the predicted outcome is mutual cooperation, the goal of The Clean Act. Whether the US conditional approach is intentional or not is hard to prove. But theoretically it makes for a good strategy to reach an IEA on global warming abatement, if ever implemented. Thus the inclusion of conditional clauses in The Clean Act could be the effect of a rational choice. In contrast, as also shown by the Chicken game, it is also possible that the much softer unilateral strategy of the EU is inducing free riding on foreign countries, and is thus an irrational approach to reach an IEA.

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