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Abstract:

Given the vital and controversial debate on fairness concerns in international climate negotiations, the acceptance of a climate treaty may be fostered if the distribution of costs and benefits from global environmental protection is perceived to be "fair". Since an agreement must be acceptable to all negotiating countries, it is likely that no single burden sharing concept will gain unconditional support from all parties. We have conducted a world-wide survey among participants in international climate negotiations to address the question whether negotiating weights for different fairness concepts may enlarge the bargaining space among heterogeneous agents and overcome the currently dominating self-interested use of fairness claims. Even though our empirical results confirm different positions on burden sharing among key regions, there is evidence that a broad majority favors allocations that are based on a variety of fairness rules. Turning the debate rather towards justice claims based on *needs* than towards *culpability* may serve as a fruitful starting point to depart from a purely egoistic use of equity rules in international climate negotiations.

Keywords: international climate negotiations, distributive justice, equity preferences, burden sharing rules

JEL: D63, H41, Q54

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1. Introduction

Comprehensive approaches to manage conflicting interests among heterogeneous players remain a leading and so far mostly unsolved challenge in international climate policy. The negotiation process on a post-Kyoto agreement has widely stalled and key parties' delegation leaders do not expect a rapid adoption of a new global treaty with substantial commitments from major economies within the next years. Collective gains from international efforts on reducing greenhouse gas emissions (GHG) are likely to be promising but also create strong free-riding incentives. Since a climate treaty has to be negotiated among sovereign actors in absence of any third authority being able to enforce countries to commit to an agreement with binding GHG reduction targets, participation in an international climate agreement remains voluntary. The long-term success of an effective climate treaty crucially depends on solving this enforcement problem (Barrett 1994).

Given the vital and controversial debates on fairness concerns in international climate negotiations, the acceptance of an agreement may be fostered if the distribution of costs and benefits from global environmental protection is perceived to be "fair". Since international treaties among sovereign nations have to be agreed by consensus, it is likely that no single burden sharing rule will gain unconditional support from all agents participating in climate negotiations. Rather a combination of different allocation principles may be beneficial in enhancing the negotiation process. One of the key challenges thereby is to identify a set of plausible and acceptable cost-sharing rules being capable to reach consensus and to serve as a balanced pathway between the two corner positions: an overarching view on justice as fairness behind the veil of ignorance on the one hand and the purely self-interested use of equity rules on the other hand. Our analysis moreover adds to the debate to eventually focus on few key principles to reduce the complexity of ongoing negotiations in order to lower negotiation costs and to enhance the political process (Bretschger 2013).

Based on a comprehensive dataset from a world-wide survey among individuals involved in recent UN Framework Convention on Climate Change (UNFCC) negotiations (i.e., COP 15 in Cancún in 2010, COP 16 in Durban 2011) we investigate whether negotiating weights for different reasonable burden sharing rules enlarges the bargaining space and may be beneficial for future debates.

The prevalent strategy of the UNFCCC on how to achieve a global reduction of GHG emissions so far mainly focused on binding commitments from parties together with specific emission reduction targets. That is, member states are required to agree upon an aggregate abatement level and to distribute the burden among parties. The UNFCCC addresses these

two challenges in rather vague terms: The “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference within the climate system” (UNFCCC, 1992, Article 2) should be approached by parties “in accordance with their differentiated responsibilities and respective capabilities” (ibid., Article 3) (CBDR principle). The first part of the climate question has been addressed by agreement on limiting the global temperature rise 2°C above the pre-industrial average temperature. Whether this threshold is adequate to prevent dangerous interferences with the climate system remains highly uncertain (e.g., Lenton 2011). Even less consensus has been reached among the relevant actors on the second question on how to share the burden of global efforts on combating climate change. The perception on the “fair share” in international negotiations on mitigation targets differs largely among parties at least due to two reasons: Preferences for burden sharing rules on the one hand may be guided by different notions on distributive justice, including e.g., accountability, efficiency, need and equality (Johansson-Stenman and Konow 2010) and on the other hand may be influenced by strategic (self-interested) concerns resulting in a fairness bias between the view of an impartial spectator and a stakeholder.

Following the terms of Ringius et al. (2002), different burden sharing rules such as “equal per capita emissions”, “equal percentage reduction of emissions”, “ability-to-pay” or “polluter-pays” have dominated the recent political and academic debate. Empirical studies on the judgment of different allocation rules reveal heterogeneous preferences among participants in international climate negotiations (Lange et al. 2007, Hjerpe et al. 2011) and confirm tendencies of a self-interested use of these principles. Lange et al. (2010) find that agents in different regions in general support equity principles that are in line with material self-interest, i.e. imposing lower costs on their respective geographical region.

To answer the question on which burden sharing rules should guide the future process towards an international climate agreement, survey-based investigations among stakeholders so far focused on those principles that have been stated most frequently (Lange et al. 2007) or those inducing simultaneously the highest support and the lowest opposition rates (Hjerpe et al. 2011). The approach of combining different distribution rules was taken up by the European Union (EU) in its pre-Kyoto negotiations, see Aidt and Greiner (2002) for an overview. In an early stage of the Kyoto process, the EU pledged a 10% reduction of EU-wide emissions to show leadership in the upcoming UNFCCC negotiations. This aggregate (“bubble”) target was distributed among EU member states according to the “triptych approach” that was advocated by the Dutch presidency. It basically combines an egalitarian rule (for the domestic sector), a grandfathering approach (for energy-intensive heavy industry

to address existing industry structures) and certain quotas for renewable energies in the electricity sector. Even though this burden sharing rule was not identical with the final outcome of agreement in the Kyoto protocol, it was perceived as being useful to facilitate negotiation process at the European level. Further examples for combinations of different burden sharing concepts to successfully address social dilemma situations include transferable harvest quota negotiated for Lake Erie in the 1980s (Berkes and Pocock 1987).

We address the question whether turning discussions rather towards bundles of different fairness rules than aiming at tying all agents to one single rule facilitates negotiations in terms of departing from the currently strictly (self-interested) strategic claims on certain fairness principles. Thereby we analyze how preferences differ among key regions that may play an important role in international climate negotiations.

Our empirical results confirm controversies on burden sharing in current international climate negotiations but at the same time provide insights that add some important notions to previous discussions. Even though the suggested weights differ among participants, there is evidence that negotiators from key regions support a variety of fairness rules to certain extent. Negotiating weights for burden sharing rules may therefore help to enlarge the bargaining space among diverse positions. Turning political debates on burden sharing more towards needs (ability-to-pay principle) rather than towards culpabilities (polluter-pays principle) leads to a more consistent view on fairness and therefore may serve as a fruitful starting point to depart from a purely egoistic use of equity rules in international climate negotiations and to guide the future process.

In the first part of the paper we discuss the ethical background of different fairness concepts that are currently discussed in international climate negotiations. We further give a short summary of the corresponding discussions in UNFCCC and Kyoto negotiations and summarize the existing empirical literature. We describe the data and our empirical strategy together with a discussion of the corresponding estimation results in part 3. The last chapter concludes and summarizes our main findings.

2. Notions of fairness in international climate policy

2.1. Ethical Background

The classic literature of public finance already provides an extensive discussion on requirements for acceptable cost-sharing rules for the provision of public goods dating back to early contributions, e.g., by Wicksell (1896, 1958). In his seminal essay on the principle of

voluntary consent and unanimity, Wicksell (1958: p. 91) requires public expenditures ever be voted upon to simultaneously determine the means of covering their costs. Following this concept, Wicksell suggests unanimity-voting on public expenditures with an underlying taxation according to benefits – that is proportionality or equivalence between value and countervalue – as a justification for tax distributions. Wicksell's unanimity rule is later on taken into consideration in Rawls' fairness criterion in his "Theory of Justice". Following Rawls' interpretation of the unanimity rule, a consensus with respect to a certain burden sharing concept is to be considered as a necessary condition for the provision of a public good: If no consensus can be reached, "the suggested expenditure is wasteful and should not be undertaken (Rawls 1999: p. 250). For practical reasons, Wicksell relaxes the principle of absolute unanimity to approximate unanimity such as three-fourth, five-sixths, or nine-tenth majority voting in the subsequent part of his work to ensure agreement on proposals that are capable of being combined (Wicksell 1958: p. 92). Buchholz and Peters (2005) provide a formal theoretical description of the equivalence principle for distributing tax shares. As a central result of their theorem, a distribution scheme for the provision of a public good will not be accepted unanimously by all agents if the cost-sharing approach was motivated by the (self-serving) desire of some parties to reduce own contribution levels to the public good in order to increase private consumption.

The burden sharing rules that are currently discussed in international climate policy result from different theories of distributive justice. Following the classification of Konow (2003), mainly two different theoretical categories may inspire different views on fair allocation rules: *equity and desert* and *equality and need*. Following the ideas of Aristotle and Locke, justice principles in the class of *equity and desert* theory highlight the dependence of fair allocations and individual actions. While equity theory mainly focusses on the proportionality between output (the potential consequences an individual faces from this allocation) and input (the participant's contribution), desert theory turns towards responsibility and states that only differences owing to effort are fair. These ideas of proportionality and responsibility have inspired the accountability principle that requires "that a person's entitlement or fair allocation (e.g., of income) varies in proportion to the relevant variables which he can influence (e.g., work effort), but not according to those which he cannot reasonably influence (e.g., a physical handicap)"(Konow 1996: p. 14). In terms on environmental policy those who engage in emission reductions should benefit proportionately or, in other words, mitigation costs should be distributed in proportion to the emissions. Therefore, following this concept, an equal initial right to pollute (egalitarian rule) seems most adequate "since it is hard to argue

that some individuals have earned the right to pollute more than others" (Johansson-Stenman 2010, p: 152). The egalitarian principle if often described as a focal point in negotiations on burden sharing due to its simplicity and pragmatism (e.g., Brown 2014).

Calls for responsibility are frequently used to legitimate a justice norm that requires those who make use of a resource (the capacity of the atmosphere) should compensate the "owners" (the public). In terms of burden sharing rules this idea is captured by the idea of the "polluter-pays" rule that has been announced in a number of international agreements, e.g. within the Organization for Economic Co-operation and Development (OECD 1972) and within the Directive of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage (2004/35/CE) (EC 2004). Responsibility concerns in global climate protection inevitably initiate a debate on responsibility of current generations for historical emissions. It is often claimed that people in industrialized countries should be accountable for the emissions of their ancestors (e.g., Neumayer 2000). For instance, during the first COP in 1995, when governments submitted burden sharing proposals that should accompany the Kyoto negotiation process, the Brazilian delegation suggested a burden sharing rule based on accumulated emissions since the industrial revolution (UNFCCC 1995). The philosophical literature on historic responsibility provides a differentiated view on historical responsibility in climate justice. Critical remarks include the argument that strict liability (responsibility irrespective of culpability) is not applicable to claim historical responsibility because the descendants of past emitters from developed countries may insist that current living conditions in poor countries would be even worth without an (carbon intensive) process of industrialization in Western countries (Schüßler 2011). Moreover it is argued that strict liability would require an avoidance option ("opt-out") with respect to liability risks which had not been given for historic emitters. Instead of harm-related accounts of historic responsibility the discussion often turns towards a more benefit-orientated position (beneficiary-pays rule). Following this argument, profits from harmful past activities that may still accrue in present times, e.g. within the technological progress and the transition from dirty to clean technologies, may lead to claims for redistribution ignoring the question of culpability for those actions. As opposed to this, Leist (2011) and Schüßler (2011) object that individuals cannot morally be forced to compensate others if they did not have information on the risks of their actions in advance. This view may be additionally backboned by the tendency of increasing and widespread global benefits (e.g., by technology transfer) that may be traced back to carbon intensive developments during the industrialization in a small number of countries. All the arguments

related to the concept of excusable ignorance (e.g., Caney 2006), stating that there was no way for past generations in which they could have known that their action was harmful to future generations, are crucially influenced by consensus on the relevant cut-off point for widely accepted scientific knowledge on climate change. Among others, Caney (2006) and Leist (2011) suggest the first IPCC assessment report in 1990 as the appropriate reference point; others (e.g., Neumayer 2000) refer to earlier dates.

Justice concepts in the class of *equality and need* especially pay attention to the wellbeing of the least well-off members of the society. Therein, egalitarism which is probably the oldest concept of justice links equity with equality of outcomes. Moreover, egalitarism "emerge[s] as a special case within a more general system, i.e., the uncontroversial concept of "treating equals equally"" (Konow 2003: p. 1195). The ideas of Rawls and the Social Contract rather focus on agreements for the basic structure of the society behind a veil of ignorance including the difference principle (maximin rule) as one of the leading outcomes of the Social Contract. Another important concept of fairness includes the need principle requiring a satisfaction of basic needs such as food, shelter and clothes for all individuals even if this minimum threshold cannot be achieved by the own efforts. This approach shifts abatement costs mainly towards the developed countries with high economic capacities. This corresponds to an equality norm dating back to Mill's concept of "equality of sacrifice" (Mill 1848) being initially advocated as a principle for tax distributions aiming at harmonizing payoffs among citizens (ability-to-pay rule). In contrast, an equality rule concerning contributions may be rather consistent with an equal percentage reduction of emissions (sovereignty or grandfathering rule). The satisfaction of basic needs stimulates the debate on the misappropriation of the atmosphere as an ownerless common good. In this sense the standard Lockean view of leaving others with 'enough and as good as" might serve as an argument for shifting the burden for mitigation efforts towards the developed countries: Since the capacity of the atmosphere is limited and the developed countries already used it as a sink for GHG emissions, remaining capacities should be available for poor countries to catch up or, put it in another way, rich countries should compensate developing countries for the misappropriation of a good that belongs to humanity as a whole. In contrast, Posner and Weisbach (2010) argue that the equal right of satisfying basic needs does not always and necessarily require equal access to the global carbon sink but inter alia depends on local requirements and conditions. Wicksell (1958) argues that the ability-to-pay principle in contrast to taxation according to benefits can determine only the distribution of the burden but "has nothing whatever to say on the absolute amount of the total tax bill (and hence of the individual's tax bill)" (Wicksell

1958, p. 75). Hence, according to Wicksell, an important requirement for the justification of the ability-to-pay rule is that the aggregated provision level has been indisputably predetermined between all agents involved in the negotiation process. As described in the previous section, there is still a vital debate on aggregate GHG abatement levels to avoid dangerous interferences within the climate system.

2.2. Discussions on burden sharing in the Kyoto process

Equity concerns and calls for fair burden sharing are repeatedly highlighted in UNFCCC documents. In particular, the CBDR principle often serves as a focal point for justice claims. It requires "developed country Parties [to] take the lead in combating climate change […]" (UNFCCC 1992, Article 3.1) and it stresses that "the specific needs and special circumstances of developing country Parties […] that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration." (ibid, Article 3.2). While the CBDR classification calls for the "widest possible cooperation by all countries", it leaves considerable room for interpretation on who belongs to which of the two groups and how to deal with all actors that are in between the developing and the developed countries. Moreover, it becomes clear that discussions on burden sharing should be guided rather by a bundle of different fairness norms rather than by one single principle since the Framework Convention explicitly addresses 'responsibility' (for historical and current emissions), 'need' (for development) and 'cost-effectiveness'.

Inspired by the proposal of the first international climate change conference in Toronto in June 1988 where calls for a reduction in global GHG emissions by 20% of 1988 levels by the year 2005 emerged ("Toronto target", see WCCA 1988), diverging pathways towards future negotiations boiled down to binding commitments from parties together with specific emission reduction targets (Barrett 1998). In the following, after the IPCC 1990 report was published, some OECD countries started to pledge individual commitments. Pledges were calculated to meet the Toronto target (Austria, Denmark, Italy, Luxembourg, New Zealand), to stabilize emissions by the year 2000 compared to a certain base year (Norway, Finland, Switzerland, UK), to stabilize per-capita-emissions (France, Japan), to reduce emissions by a certain percentage rate (Netherland, Germany), or at least to limit future emissions growth (Spain) (ibid.)

An Ad-hoc group was established to define possible definitions for burden sharing approaches among Annex-I countries (UNFCCC 1996). Different approaches were discussed among the parties. A uniform or flat rate reduction target (grandfathering principle) was considered to

facilitate negotiations in contrast to a differentiated approach. The fairness consideration of this concept was based on the idea that progress in development is measured in terms of a country's own national emissions in the corresponding base year. This rule initially received support from negotiators from many key regions, such as AOSIS (Alliance of Small Islands States), EU, G77 (loose coalition of mainly developing countries at the United Nations), China, US, and Canada. Other parties (among them Australia, Hungary, Iceland, Japan, Norway, Switzerland, Brazil) favored a more differentiated burden sharing scheme, e.g. like the Brazilian proposal calling for taking into account historical responsibilities (polluter-pays principle). Other possible indicators for differentiation included national emissions, i.e., on a per-capita base (egalitarian principle), national circumstances like physical and demographic characteristics, or cost-based differentiation (ability-to-pay principle), e.g., in terms of equalizing costs of action in terms of marginal or absolute values. During the ongoing negotiation process, opposition against uniform reduction targets grew and the debate turned toward differentiation in terms of pledging individual targets. In an early stage, individual proposals were set by France, Germany, Switzerland, the UK and Zaire. Other countries (e.g., Japan) informally announced their targets but major emitters (e.g., US, China, Canada) avoided proposing own submissions in official documents (see UNFCCC 2000 for a textual history of the Kyoto protocol and national emission targets). During the following plenary meetings the chairman of the negotiation process decided to assign his own reduction targets (in percent of 1990 GHG emissions up to 2012) based on available information on negotiation positions and to reach an aggregate target of about 5% GHG reduction from 1990 levels in the first commitment period (2008 – 2012). The EU target (−8%) was set between the own pledge (−15% by 2010) and the US proposal on stabilization of emissions at 1990 levels in 2005 (±0%). EU accession countries (Switzerland, Liechtenstein, Monaco) received the same percentage target as EU. Russia and the Ukraine as countries in transition negotiated a weaker targets (−5%). The US target (−5%) was set in line with the Russian obligation; Japan received a slightly lower target (−4.5%) and Canada the same target as the USA and Russia. Other countries were allowed to stabilize or increase their emissions due to the small size of the economy and low emission baselines (Iceland, +10%), national sinks (New Zealand, ±0%). Furthermore, Australia and Norway were given a +5% target. Out of these proposals, Canada (−6%), Japan (−6%), Norway (+1%) and the US (−7%) accepted a stronger target while Australia (+8%), Russia (±0%) and the Ukraine (±0%) achieved lower commitments.

An early draft of the consolidated negotiating text of the Kyoto Protocol included the possibility of agreeing upon a collective emission reduction target first and differentiated

targets to be negotiated later (UNFCCC 2000). This approach was again removed from the agenda quickly since all countries opposed to ratify a protocol without knowing exactly their individual obligations. Barrett (1998) argues that this "bubble approach" further would have created strong free-riding incentives and failed to meet the self-enforcement criterion.

2.3.Empirical Literature on Preferences for Burden Sharing Rules

Several recent empirical papers address the question of preferences for burden sharing rules of international policy makers involved in climate change discussions. Lange et al. (2007) have conducted a world-wide survey of more than 200 participants in international climate negotiations (negotiators and observers). They find strong support for the polluter-pays principle by half of the participants. In accordance to economic self-interest, survey participants from developed countries are less likely to support the polluter-pays or the ability-to-pay principle. Similarly, a burden sharing rules that imposes an exemption from any mitigation obligation until a certain threshold in terms of GDP per capita is reached is strongly favored by less industrialized countries. Interestingly, in contrast to pure economic self- interest, support for an egalitarian approach is widely independent of economic performance. Hjerpe et al (2011) surveyed 500 participants at COP-15 in Copenhagen in 2009 on their support for different burden sharing schemes. In line with the consensus principle in many international environmental agreements, they conclude that a burden sharing rule offering a high probability of agreement should be denoted by high support rates and low opposition at the same time. Similarly to Lange et al. (2007), the authors find strong support for the ability-to-pay rule and the polluter-pays-rule including historic emissions since 1990. With respect to the supporter and opponent concept, their study suggests that the ability-to-pay rule seems most promisingly to successfully guide the negotiation process on allocating mitigation obligations.

Instead of identifying preferences for burden sharing rules on the level of policy makers, Carlsson et al. (2010) have conducted a similar survey among citizens in the US and China in 2009. According to economic intuition, US citizens favor a polluter-pays rule based on current emissions and Chinese respondents prefer a scheme based on historical emissions.

All these results raise the question to which degree justice arguments deviate from the view of the impartial spectator and are rather used to legitimate a burden sharing rule that is consistent with material self-interest. The dissonance between the spectator and the stakeholder views is often referred to as a "fairness bias" (e.g, Johansson-Stenman and Konow 2010). This distortion of the use of fairness norms may "contribute to the frequent conclusion that justice

is merely a ploy, a vacuous concept used opportunistically by self-interested and self-serving agents" (Konow 2000, p. 1072). Lange et al. (2010) report evidence for fairness bias among agents involved in international climate policy. The empirical results support the hypothesis that the individual perception of burden sharing rules is influenced by the associated economic costs and benefits and largely are consistent with material self-interest. Interestingly, according to their study, the strategic use of equity concerns differs among regions. While stated preferences for negotiators from EU, Russia and the USA are fully consistent with self-interest, individuals from G77/China support the ability-to-pay and polluter-pays rule and therefore their position deviates from the prediction (egalitarian rule). Carlsson et al. 2011 extend the empirical research of a fairness bias on a group level by elicitating preferences for burden sharing rules among 400 Swedish citizens in a choice experiment. The choice attributes were given by a certain burden sharing rule (polluter-pays based on historical or current emissions, egalitarian rule) with the respective mitigation requirements for USA, EU, China and associated with the respective yearly cost for the own household until 2050. Anonymizing country labels does not alter decision behavior significantly and therefore no evidence of an ingroup bias can found in the data. The respondents prefer an egalitarian rule with equal per capita emissions although this implies higher cost for them.

3. Empirical analysis

3.1. Empirical strategy

Both the review on the philosophical and the empirical literature suggest that no single rule is expected to dominate the negotiation process but rather a mixed approach with different reasonable burden sharing rules may facilitate cooperation in a future climate treaty. In our empirical analysis we therefore focus on individual preferences for bundles consisting of different burden sharing rules.

Recent developments in aspiration based bargaining modelling (Ahlert and Lajtos 2011, Ahlert, 2007) apply fundamental concepts from aspiration level theory (Selten 1998) to study the bargaining process in (international) negotiations. Empirical applications include a study on the WTO Agricultural Negotiations of the Doha Round (Lajtos 2010). The main idea of this concept is to model negotiations as adaptation processes being characterized by a successive exchange of reciprocal concessions (Ahlert and Lajtos 2011: p.6). The different proposals crucially depend on certain aspiration levels such as the planned goal, the lowest

acceptable agreement and the planned (threat to) break off negotiations (Ahlert 2007). Experimental evidence suggests aspiration levels not only to affect the distribution of payoffs but also highlights the effect of opponents' behavior (e.g., the first proposal) on own aspiration formation (Liebert et al. 1968). There is little empirical evidence on how other related factors such as economic circumstances, the need for an agreement, experiences from previous negotiations and expectations on opponents' behavior may affect bargaining positions in negotiations (Ahlert and Lajtos 2011).

We consider the assessment of weights for different burden sharing rule as a possibility to observe first concessions from negotiating partners. In a first step we investigate whether participants make use of diversification and include several fairness rules within their preferred bundle. This enables us to better understand whether negotiators rather persist in a corner position or if bundles reflect tendencies of enlarging the bargaining space and sending a signal to opponents in negotiations. Moreover, this provides insights whether the size of bundles differs between key players, i.e. if powerful agents are more likely to avoid an agreement with differentiated burden sharing mechanisms to accelerate the process. Analogously, we investigate whether the perceived need for an agreement, i.e. for vulnerable countries, fosters agents to depart from the purely egoistic position.

Following the typology of Rose et al. (1998) and Ringius et al. (2002) we concentrate on four burden sharing rules that are of particular interest in the current political and academic debate: the egalitarian, the grandfathering, the ability-to-pay and the polluter-pays rule. Taking into account the different notions of historical responsibility discussed in the previous section, the polluter-pays approach enters our survey in two different versions, i.e. based either on current or on historical GHG emissions. We follow the concept of excusable ignorance and choose 1990 as the relevant cut-off point. In addition to these established concepts, we introduce a burden sharing mechanism that is inspired by the beneficiary-pays principle to be understood as benefitting from (past) emissions (e.g., Wicksell 1958, Caney 2006). This concept is closely related to the responsibility concerns of the polluter-pays rule but instead of production-based emissions this rule is guided by consumer-based emissions. The main idea of the consumer-pays rule is that production-based accounting systems do not adequately reflect connections between economies in terms of international trade and investment flows and "might result in a misleading analysis of the underlying driving forces of global, regional, and national emission trends and mitigation policies" (Peters et al. 2011: p. 8903). Taking into account the emissions embodied in trade (i.e. emissions to produce exported goods less the emissions in other countries to produce imported), the picture of the origin of global

emissions changes. Peters et al. (2011) estimate that 11% of the growth in global CO_2 emissions between 1990 and 2008 can be attributed to consumption in developed countries while the production-based inventory projects a 3% reduction. Similarly, using 2004 data, Davis and Caldeira (2010) find that 22.5% of Chinese emissions were exported to foreign regions while emissions imported to the USA exceed those of any other country in the world. This is why a significant share of growth in the consumption of developed countries is included in the emission inventories of developing countries. Therefore, since most rich countries are net importers of emissions and most developing countries are net exporter of emissions, a consumption-based inventory meaningfully changes the responsibilities for emissions among countries: While from a production-based perspective China is the world's largest emitter of GHG emissions, the USA lead the ranking if consumption based emissions are considered (Peters et al. 2011, Supporting Information Index). Potential national or individual impacts concerning burden sharing implications of switching from a production-based to a consumption-based system in global trading scheme are difficult to project and inter alia crucially depend on the price elasticity of demand. Similarly to the polluter-pays rule, we propose two versions of the consumer-pays principle in our survey. The first version only includes current emissions; the second one covers a broader time interval from 1990 to present. Table 1 summarizes the different burden sharing rules together with the verbatim description offered to the survey participants: We consider an egalitarian rule (EGA), a grandfathering rule (GRA), an ability-to-pay rule (ABI), a polluter-pays rule based on current emissions (POL2011) or on average historical GHG emissions since 1990 (POL1990) and, equivalently, a consumer-pays approach (CON1990 or CON2011). In the corresponding survey question, participants were asked to assign weights $\geq 0\%$ to eight different response categories, each of them containing a single burden sharing rule (EGA, GRA, ABI, POL1990, POL2011, CON1990, CON2011) or an open-space category. Total weights should sum up to 100%. After describing the data, our analysis starts with a discussion on the number of burden sharing rules that are included within the individual bundles. We further discuss the distribution of weights within these bundles and then assess the deviation from the corner position of the optimal burden sharing rule in terms of mitigation costs.

3.2. Data description

We derive data for the empirical analysis from a world-wide survey conducted by means of a standardized questionnaire that was sent via email to 5,767 agents involved in climate policy in April 2012. We took the addresses from official UNFCCC lists of participants from COP-

16 in 2010 and COP-17 in 2011[1]. Furthermore, we contacted UNFCCC national focal points for further information on national climate negotiators. All participants obtained an individual login to an online survey in order to control access and ensure that the questionnaire is only filled out once by each individual. In addition, we provide a fillable PDF form of the survey for participants with limited web access that could be sent back via email, postal mail or fax. Two reminders (including some additional contact details obtained from the previous rounds) were mailed in May and June 2012. The questionnaire consists of seven parts: Part A contains individual perceptions of consequences of climate change, Part B asks for the assessment of the importance of international efforts in combating climate change and Part C aims at deriving personal attitudes towards important issues in climate policy. Part D tries to cover bargaining positions of different players in international climate negotiations, Part E focusses on individual preferences for different burden sharing rules to distribute GHG emission reduction targets, Part F refers to alternative institutional frameworks (e.g., voting rules) for international climate agreements and Part G includes some personal questions. Out of a total of 5,840 contacted individuals, 498 (about 8.5%) from 120 countries participated in the survey. About 72% of the respondents provide information of their personal backgrounds (see Table 2). Since not all participants share their attitudes towards all parts of the survey or break-off the questionnaire, our analysis in this paper is based on 329 observations.

In order to identify regional differences in perception of different fairness concepts we follow UNFCCC party groupings (UNFCCC 2013) and we distinguish between five regional groups that may play an important role in international climate negotiations: AOSIS, BASIC, EU27, UMBRELLA/EIG and G77 (without AOSIS and BASIC members). AOSIS is a group of 43 small islands countries that are particularly vulnerable to climate change (i.e. sea-level rise). The coalition, mainly consisting of G77 members, was among the first group that handed in a draft text that aims at cutting GHG emissions by 20% from 1990 levels by 2005 during the Kyoto Protocol negotiations (UNFCCC 2013). The BASIC group (Brazil, South Africa, India and China) is a coalition of four large emerging countries out of the G77 alliance initially formed during the negotiations on the Copenhagen Accord in November 2009 (see e.g., Olsson et al. 2010). The group was initiated and headed by China to commit its members to a joint strategy in international climate negotiations. With respect to the BASIC group in our analysis it should be noted that we do not have any observations from India in our sample. Therefore, when we refer to BASIC in our analysis in the following, it should be noted that

[1] UNFCCC list of participants for the Conferences of Parties remain in many cases provisional due to many ad-hoc changes in attendances. Therefore, not all members of the list of participants were actually present at the COPs.

the results do not include the Indian position within the group. EU27 represents the European Union and its member states. It is considered as an economic integration organization and, therefore, itself is a Party to the international meetings but, apart from its member states, without any additional voting rights. UMBRELLA/EIG (former JUSSCANNZ group) is a loose alliance of industrialized countries which are not members of the EU. The non-formal member list includes Australia, Canada, Japan, New Zealand, Norway, Russia, the Ukraine and the US, additionally supported by the members of the Environmental Integrity Group (EIG) (formed in 2000) consisting of Mexico, Liechtenstein, Monaco, the Republic of Korea and Switzerland. We provide an overview of the different groups in Table 2.

78.5% of the respondents participated as members of national parties in COP 2010 or/and COP 2011 (Table 3). 6.3% of the survey participants live within AOSIS, 10.7% within BASIC, 23.2% within EU27, 10.9% within UMBRELLA/EIG and 42.6% in G77 (without AOSIS and BASIC members). The respective frequencies for all potential survey participants (i.e. for those we obtained contact details) are 9.6%, 13.4%, 17.4%, 14.0% and 42.5%. That is, we have slightly higher shares for EU27 survey participants in our sample in contrast to our initial list.

3.3. Descriptive results

A large majority of participants of over 70% of the sample supports a reduction in global GHG emissions up to 2050 compared to 1990 levels, with an overall mean percentage global reduction of 38.8% including all participants (Table 4). Perceptions on a collective target differ among country groups being highest in EU27 (59.7% reduction) and lowest in BASIC (10.1%). The descriptive results suggest that developed countries from EU27 or UMBRELLA/EIG prefer a more stringent aggregate abatement level than negotiators from developing (mainly from G77 group) or emerging countries (BASIC). Despite these differences with respect to the aggregated mitigation levels there is broad support for a variety of burden sharing rules. Descriptive results indicate a large majority to make use of diversification and to include several burden sharing rules with a positive weight within its preferred bundle. Less than 3% of the respondents restrict their choices to one single rule, whereas more than 80% assign a positive weight to at least half of all fairness rules (Table 5). About 11.6% of the sample gives a positive weight to each fairness rule that was proposed. With respect to regional differences, descriptive results suggest participants from EU27 or UMBRELLA/EIG countries to rather focus on a smaller number of burden sharing rules than respondents from AOSIS, BASIC or G77 countries. More than half of the sample clearly

identifies one single burden sharing rule (mostly POL1990) to be the most important rule within the bundle (Table 6). About 40% of the respondents do not highlight one single rule but rather give an equal highest weight to at least two different fairness rules (mostly POL1990 and POL2011). The descriptive results again shed some light on regional differences. More than two third of the negotiators from BASIC assign a unique highest weight to one single rule (mostly POL1990). In contrast, respondents from UMBRELLA/EIG are more likely to spread equal highest weights to more than one single rule. Interestingly, negotiators from EU27 or UMBRELLA/EIG countries choose EGA to be the most important principle only if they assign a unique highest weight to one single rule. This choice differs if participants from these two regions identify two or more rules to be most important at the same time. In most of these cases, negotiators combine the POL2011 and CON2011 approach (or ABI) but not EGA. This last descriptive observation suggests that decision behavior among negotiators may not only be traced back to regional differences but also to individual perceptions of fairness within national delegation groups. Mean weights for the different burden sharing mechanisms across all participants and separated according to the key regions are shown in Table 7 and illustrated in Figure 1. Averaged over all participants, the highest weight is assigned to the POL principle, both in the 2011 (19.3%) and 1990 version (18.8%), followed by the ABI concept (14.0%). This is in line with the empirical findings of Lange et al. 2007 and Hjerpe et al. 2011. Interestingly, all burden sharing rules on average receive a weight larger than 10%. That is, many negotiators support the different approaches to some extent. However, weights differ significantly. Differences in the perception of fairness concepts among country groups are most sever concerning EGA and the POL1990 approach. Participants from AOSIS, BASIC and G77 assign the highest weight to POL1990 and broadly oppose against EGA. In contrast, negotiators from industrialized countries stress the importance of EGA. This result is rather surprising since the principle of equal per capita emissions is often claimed in the public debate on international climate policy. In contrast, within EU27, EGA is considered to be together with the POL2011 principle the most important burden sharing concept (20.3% each). Analogously, participants from non-EU industrialized countries, on average, assign the second highest weight to EGA (17.5%), being close to the most important concept, the POL2011 rule (18.0%). In contrast to G77 or AOSIS negotiators, participants from BASIC countries put lower weights to the POL approaches and higher weights to CON, i.e. shifting responsibilities from producers to consumers. There is also quite strong support for consumer oriented approaches based on current emissions in the developed world, especially in UMBRELLA/EIG countries (17.1%) but this stands in conflict

to the assessment in AOSIS (9.2%) and G77 countries (9.4%). Table 8 reports substantial opposition rates (i.e. a zero-weight is assigned to a corresponding rule) for GRA and EGA. More than a fourth of all respondents do not include these rules into their preferred bundle. Opposition rates on average are lowest for ABI and POL2011 (14%). Again, regional differences can be observed. AOSIS and BASIC strongly oppose against an approach of equal-per capita emissions. Similarly, opposition rates for G77 countries are largest for EGA and GRA. In contrast, EU27 negotiators avoid GRA and consumption-based approaches. Similarly, UMBRELLA/EIG participants oppose against GRA and a consumption-based approach based on historical emissions. In the following we present results from a series of econometric regression models to investigate whether these differences resulting from descriptive observations are significant in an econometric analysis.

3.4.Econometric models and variables

The major part of the explanatory variables that enter our econometric analysis is taken from self-reported information of participants in the final section of our questionnaire. To capture regional differences on fairness, we distinguish between the four major key regions as discussed in the previous section. The indicator variable AOSIS takes the value one if the respondent's stated home country is a member of the AOSIS group. Analogously, we take into account indicator variables on EU27, BASIC and UMBRELLA/EIG. That is, in our econometric models where country groups enter as explanatory variables, mainly the G77 group (without its AOSIS and BASIC members) serves as the base category. Throughout the paper we refer to "G77" if we make comparisons of estimated coefficients for regional indicator variables in contrast to the base category. We amplify our analysis by further including economic performance indicators from different data sources that may help to explain differences in choice behavior. The variable "GDPpc2011" contains World Bank data on per capita GDP for 2011 or latest available data (in current 1,000 US$) for the respondent's home country (The World Bank 2012). Analogously, HDI2011 takes the value one if the corresponding party is characterized as a country with "very high human development" according to the Human Development Indicator of 2011 (UNDP 2011) and CO2pc2011 covers CO_2 emissions for 2011 on a per capita base (in t CO_2) taken from the European Commission Emission Database for Global Atmospheric Research (EDGAR 2011). In order to address potential impacts on aspiration formation such as vulnerability, bargaining power or need for an agreement we include several variables that assess individual attitudes towards the current negotiation process. NEGCONS equals one if a respondent assess the

consequences of climate change on future living conditions up to 2100 in the respective home country to be "very negative" or "negative". The variable POWERFUL takes the value one if the self-reported bargaining position in international climate negotiations is perceived to be "very powerful" or "powerful". Moreover, we control for the assessment on mitigation efforts by the two largest emitters, China and the USA. LOWRED_US_CHN equals one if the interviewee expects GHG emissions reductions in these two countries relative to BAU without any new international climate agreement up to 2050 to a "low degree" or "no degree". We further include sociodemographic information as control variables. We look at potential age effects on attitudes towards burden sharing rules (AGE in years) and we take into account that the perception of fairness may differ between man and women (FEMALE). Moreover we control for the educational background such that the variable ECON equals one if individual's highest degree is obtained in the field of economics or business administration and NGO equals one if the respondent works for a nongovernmental organization. Furthermore COPparty controls for the participants' positions during COP2010 and COP2011 and takes the value one if the respondent was a delegation member of a party in both conferences. The indicator variable ADJUSTED is introduced for technical reasons. For 16 observations that enter our analysis, the sum of weights either falls below or exceeds 100% and therefore is rescaled manually to 100. We control for potential effects of readjustment: ADJUSTED takes the value 1 if sum of weights initially did not sum up exactly to 100. We provide an overview of the explanatory variables in Table 9. Throughout the paper, the chronological order of explanatory variables remains the same in order to facilitate the interpretation of the estimation results: column 1 controls for country group specific effects with (mainly) G77 countries without AOSIS and BASIC members representing the base category. In columns 2-4 in a first step we successively introduce one of the three economic or emission performance indicators to address potential multicollinearity problems. These may arise due to correlations either within the group of performance indicators or between them and the country group indicator variables. In columns 5-7, we successively control for three different explanatory variables that may be related to predictions from aspiration formation as discussed previously. In the last column, we jointly consider country group effects together with one out of the three economic or emission performance indicators of columns 2-4 and one out of the explanatory variables which are related to aspiration formation of columns 5-7.[2] We choose those

[2] A postestimation analysis on multicollinearity between explanatory variables suggests rather weak evidence for potential multicollinearity problems in our models, never exceeding a mean variance inflation indicator (vif) of 1.29. For instance, the corresponding test after Table 10, column 8 indicates a mean variance inflation factor (vif) of 1.26 being highest for the variable *GDPpc2011* (1.96) meaning that 1/vif = 0.51 of the effect of *GDPpc2011* on the dependent variable is independent from all regressors. In the econometric literature, a vif of 4 (or even 10) has been used as a rule of thumb to indicate serious multicollinearity concerns (see O'Brien 2007 for a critical discussion).

variables which maximized the log-likelihood in columns 2-4 and 5-7 to identify the predominant explanatory sources, i.e. whether attitudes e.g. are driven rather by economic circumstances or by pure membership to a certain country group. In each model specification, we additionally control for sociodemographic information and the adjustment indicator as further control variables.

The first part of the econometric analysis addresses the question whether participants make use of the possibility to combine several burden sharing rules within their bundles. Since we have count data (without zero counts), we apply a zero-truncated count Poisson model (see e.g., Long and Freese 2006). The dependent variable take values between one and eight, i.e. it is equal to one if an individual assign a 100% weight to one single rule and it take the value eight if a positive weight is assigned to all given burden sharing rules and to the open space category.[3] The estimated probability for individual $i = 1, \dots, N$ of observing a count $y_i \in [1,8]$ is given by

$$\Pr(y_i | y_i > 0, \boldsymbol{x}_i) = \frac{\Pr(y_i|\boldsymbol{x}_i)}{1-\exp(-\mu_i)} \text{ for } y_i > 0,$$

with $\Pr(y_i|\boldsymbol{x}_i) = \frac{\exp(-\mu_i)\mu_i^{y_i}}{y_i!}$ and $\mu_i = \exp(\boldsymbol{x}_i'\beta)$ indicating the expected number of occurrence. $\boldsymbol{x}_i$ is the vector of explanatory variables and β the related vector of coefficients. The model relies on the Poisson restriction of equidispersion, that is, equality of conditional mean and variance. A likelihood-ratio test after fitting a zero-truncated negative binomial model does not provide evidence for overdispersion in our sample. Analogously, applying a generalized Poisson model does not suggest our results to be affected by underdispersion.

The second part of the econometric analysis focuses on the distribution of weights. We consider a binary logit model where the dependent variable equals to one if only a single rule is identified to receive the highest weights (i.e. no equal splits between several burden sharing mechanisms). The underlying latent variable framework for each individual $i = 1, \dots, N$ is given by

$$y_i^* = \boldsymbol{x}_i'\boldsymbol{\beta} + \varepsilon_i$$

with iid standard logistic random term ε_i. The probability that the dependent variable equals to one is then given by

[3] Since only a small minority of the sample makes use of the open space category by suggesting an additional burden sharing rule, we have run a model with counts from one to seven as a robustness check. We do not include the underlying tables in the paper since this does not change our main results. We provide these results upon request.

$$\Pr(y_i = 1|\boldsymbol{x}_i) = \Pr(y_i^* > 0|\boldsymbol{x}_i) = \boldsymbol{\Lambda}(\boldsymbol{x}_i'\beta).$$

$\Lambda(\boldsymbol{x}_i'\beta)$ is the value of the distribution function of the standard logistic distribution at the linear function $\boldsymbol{x}_i'\beta$.

In a further step of the second part we analyze to what extent individuals deviate from their most preferred burden sharing rule.

If an individual assigned 60 percentage points to the most preferred burden sharing rules, than the deviation would amount to $100 - 60 = 40$. If weights were equally distributed across all eight response categories that would lead to an average weight of 12.5 percentage points and therefore to a maximum deviation of $100 - 12.5 = 87.5$. Analogously, if 100 percentage points were assigned to one single, the minimum deviation equals to 0. We therefore use a tobit specification with a lower limit of 0 and an upper limit of 87.5 for the econometric analysis. The observed variable y_i relates to the unobserved latent variable as follows:

$$y_i = \begin{cases} 0 & \text{if } y_i^* \leq 0 \\ y_i^* & \text{if } y_i^* > 0 \\ 87.5 & \text{if } y_i^* > 87.5 \end{cases}$$

and $\varepsilon_i \sim N(0, \sigma^2)$.

In the third part, the econometric analysis focusses on attitudes towards POL2011 and ABI because these two rules on average receive highest support and lowest opponent rates in our sample. Since our dependent variable, that is the weight in percentage points which is assigned to a certain rule, is limited between 0 and 100 we apply a tobit model. As a robustness check we also include binary logit models on opposition rates (= zero weights) against these two rules.[4] In addition to maximum likelihood (ML) parameter estimates, we compute average marginal and average discrete probability effects for selective model specifications.

3.5. Econometric results

According to the descriptive results on the number of different burden sharing rules that receive a positive weight, our results confirm regional differences (Table 10, column 1).[5]

[4] As a further robustness check we consider two-part selection (type-2 tobit) model to address potential selection effects but this did not affect our main observations. We therefore do not include the underlying tables in the paper but provide these results upon request.

[5] In order to detect differences within the respective regions beyond those to the base category (i.e., G77 without AOSIS and BASIC members) we have run a series of pairwise postestimation Wald tests after the fitted models on differences in estimated coefficients of the corresponding country groups.

There is evidence that negotiators from EU27 assign positive weights to significant fewer rules than participants from all other country groups except from UMBRELLA/EIG ($p<0.01$). That is, the European position tends to focus more on a burden sharing scheme consisting of a small number of allocation rules rather than amplifying a large variety of different fairness principles. Similar observation holds for UMBRELLA/EIG but this difference is only significant in contrast to the G77 position ($p<0.1$) but not to AOSIS or BASIC. Moreover, the results suggest that economic or emission performance indicators shed further light on negotiation positions towards bundles of possible burden sharing mechanisms. Negotiators from countries with high GDP per capita levels or, analogously, from countries with very high economic development (HDI) are more likely to select fewer rules ($p<0.01$). This result also holds if CO_2 emissions per capita are included as an explanatory variable ($p<0.01$). With respect to the general assessment of climate policy we find that the need for an agreement in terms of vulnerability leads to broader bundles ($p<0.1$). We do not observe differences in the assessment of own bargaining power and emission trends in China or the US to significantly affect decision behavior. If country groups, GDPpc2011 and NEGCONS enter simultaneously into the model, the results suggest rather differences in wealth positions than party groupings to predominantly explain differences in response behavior. No further effects of sociodemographic variables on decision behavior can be observed in our sample.

The econometric analysis on the number of burden sharing being highest weighted adds some interesting insights to the previous observation. The decision whether to highlight one single rule or to distribute equal highest weights among different burden sharing schemes is mainly determined by party grouping and less by economic performance indicators (Table 11, column 8). Even though negotiators from UMBRELLA/EIG countries tend to choose rather smaller bundles there is evidence that these negotiators tend to assign equal highest weights to more than just one single rule.

If we consider deviations from corner positions (i.e. assigning a 100% weight to one single rule) our estimation results suggest that EU27 negotiators are more likely to assign a higher weight to their most preferred burden sharing principle than negotiators from G77 countries ($p<0.1$) (Table 12, column 1). Similarly, negotiators from countries with high GDP ($p<0.01$) and very high human development (HDI) ($p<0.1$) are less likely to balance different burden sharing rules out. If country group effects and economic performance are considered simultaneously, differences appear between EU27 and UMBRELLA/EIG negotiators with more selective choices in the former region ($p<0.1$). We summarize our findings by the following observation:

Observation 1.

Negotiators from economically powerful regions (i.e. EU27 or UMBRELLA/EIG members) rather restrict the discussion on burden sharing of global GHG mitigation efforts to a small number of rules than trying to agree upon a very fragmented approach. In line with this observation, particularly delegates from EU27 tend to assign a higher weight to their most preferred principle.

This result shows clear tendencies from powerful players in international climate negotiations to rather focus on a few key principles in order to reduce complexity and to enhance the future bargaining process. Whether this is a promising approach crucially depends on the question whether the selection mainly excludes burden sharing rules being of low interest among all negotiating parties or if the aim of the selection is to exclude principles that are mainly appealing for opponents. To address this question, in the following we turn our discussion towards two principles that receive high support and low opponent rates, POL2011 and ABI. Table 13 depicts results for different tobit model specifications on weights for the POL2011 principle. With respect to regional differences there is evidence that support from negotiators from BASIC for POL2011 is significantly lower in contrast to G77 members ($p<0.05$). This result stresses ongoing shifts in bargaining positions in current negotiations. While developing countries as a rather homogeneous group broadly supported the Brazilian claims for historical responsibility in the Kyoto process calling for a polluter-pays rule based on accumulated emissions since the industrial revolution, there is a more controversial debate among this principle based on current emission levels. In line with material self-interest, the fast growing emerging members (Brazil, South Africa, India, and China) out of the group of developing countries rather try to avoid a predominant role of the polluter-pays principle based on current emissions. Further postestimation tests (after column 8) of differences between estimated coefficients suggest support rates for POL2011 to be lower in BASIC than in EU27 and UMBRELLA/EIG ($p<0.05$). Countries with high bargaining positions are more likely to assign a lower weight for POL2011 (column 6) but this observation does not hold in a joint estimation of all explanatory variables (column 8). Rather party groupings seem to be reasonable to predict differences in response behavior. Estimation results from an underlying binary logit model on opposition rates against POL2011 (dependent variable =1 if weight for POL2011=0) adds some interesting insights to this finding. There is evidence that opposition rates against POL2011 are larger in BASIC, EU27 and UMBRELLA/EIG countries than in G77 member states ($p<0.1$) (Table 14, column 1). In line with this observation the results

confirm differences on the importance of the POL2011 principle being influenced by economic performance indicators of the corresponding home country. The corresponding coefficients for GDP, HDI and CO_2 are negative and significantly differ from zero (at least $p<0.05$). If again country groups and GDP are considered simultaneously, we report differences in decision behavior only with respect to different GDP levels but not to party groupings. That is, in line with material self-interest, opposition rates towards POL2011 seem to be predominantly driven by economic variables than rather group membership. Point estimates of average marginal effects report opposition rates to rise by 0.4 percentage points (95% confidence interval: 0.2%, 0.6%) for each 1,000 US$ increase in GDP levels of the negotiator's home country of the negotiator's home country resulting in predicted opposition rates of 0.1% for the poorest and 46% for the richest country in our sample (Table 15). We formulate our second observation as follows:

Observation 2.

Negotiators from BASIC countries assign lower weights to a polluter-pays rule based on current emissions (POL2011) than negotiators from G77 (without AOSIS and BASIC members), EU27 or UMBRELLA/EIG countries. In line with material self-interest opposition rates against POL2011 are mainly explained by differences in economic development.

Turning toward the ability-to-pay rule (ABI), results suggest positions among party groups to be less controversial than among the polluter-pays rule. The regional comparison leads to significant differences in the perception of the ABI approach only between the UMBRELLA/EIG group and the G77 group ($p<0.1$) with acceptance rates being even higher in the former case (Table 16). This observation is rather surprising since it suggests negotiators at this stage to depart from a purely self-interested use of fairness norms. Moreover, no differences in average weights for ABI appear if economic performance indicators are taken into account. We do however find differences in response behavior if we abstract from weights and focus on opposition rates against ABI (Table 17, column 8). In line with material self-interest, claims for this fairness concept are more likely to be blocked in rich countries than in poor countries ($p<0.1$). Average marginal effect estimation again reveals lower probabilities for UMBRELLA/EIG members to oppose against ABI (Table 18). Point estimates predict the probability to oppose against ABI to be 10.1 percentage points lower for these negotiators in contrast to the baseline G77 group (95% confidence interval: -19.5%, -0.8%). Accordingly, opposition rates decrease by 0.2% (95% confidence interval: 0.0001%, 0.4%) for each 1,000 US$ increase in GDP levels of the negotiator's home country.

Factors that may influence decision behavior according to aspiration level theory such as the assessment of bargaining power, consequences of climate change on future living conditions, or GHG emissions reductions without any new international climate agreement in the US or China does not affect attitudes towards ABI in our sample. We only observe little impact of sociodemographic factors on decision behavior. There is however evidence that opposition rates against ABI are higher among older negotiators (Table 17). At the same time, younger negotiators are more likely to assign lower weights to POL2011 (Table 13). This finding may lead to the conclusion that fairness norms do not only differ between country groups but also provoke controversies among delegates within groups. We summarize our findings with respect to ABI in our last observation:

Observation 3.

While opposition against the ability-to-pay rule (ABI) is driven by differences in the economic development, we observe tendencies of a more harmonized view on this allocation rule than towards the polluter-pays principle. Against material self-interest, negotiators from the UMBRELLA/EIG group assign higher average weights towards ABI than those from the G77 group.

Comparing this observation with Observation 2 may lead to the conclusion that turning debates on burden sharing of mitigation efforts in international climate negotiations more towards *needs* (ability-to-pay principle) rather than towards *culpabilities* (polluter-pays principle) leads to a more consistent view on fairness and helps at least to some extent to break the cycle of the purely self-interested use of equity rules which is in line with previous empirical findings, e.g., by Hjerpe et al. 2011.

4. Conclusion

Negotiating national obligations for mitigation efforts remains a difficult endeavor in international climate policy. We have conducted a survey among COP participants to assess preferences for burden sharing rules among key players in international climate agreement. Since an agreement must be acceptable among all ratifying parties, it is likely that no single fairness concept will guide the process. Therefore we address the question whether negotiating weights for different fairness principles may enlarge the bargaining space on a future climate treaty. Even though our empirical results confirm difficulties on burden sharing in current international climate negotiations, at the same time provide some insights that may help to enhance progress within the political debate. There is evidence that negotiators from

all key regions show their willingness to accept emission reduction allocations that are based on a variety of fairness rules like in the EU triptych approach. That is, negotiating weights for burden sharing rules may be beneficial in enlarging bargaining space among diverse positions.

An important challenge remains to identify a set of reasonable burden sharing rules in an agreement since suggested weights differ significantly among negotiating parties. Our empirical results indicate a grandfathering rule to attract rather modest support on the international agenda among all partners. Surprisingly, in contrast to previous empirical results, there is evidence that the convergence towards equal-per capita emissions is a concept that is rather supported in developed countries while there is substantial opposition against this approach in developing countries. While we observe high average weights for a polluter-pays concept in all groups of countries there is large disagreement on the respective base year, that is whether to include historical responsibilities or not. It therefore turns out that shifting the debate on burden sharing more towards *needs* (ability-to-pay principle) rather than towards *culpabilities* (polluter-pays principle) leads to a more consistent view on fairness and may help at least to some extent to depart from the purely self-interested use of fairness claims in international climate negotiations. Nevertheless, there is little evidence that restricting discussions on burden sharing only on mitigation efforts may overcome the enforcement problem in a global treaty. To foster the idea of focusing more on needs than on culpability, additional topics like technology transfer and knowledge spillover that are already on the table in climate negotiations should accompany discussions on how to share the burden from reducing global GHG emissions.

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Annex

Table 1: Overview of burden sharing rule

Description	Shortcut
Egalitarian rule: Principle of equal per capita emissions If the population of a country amounts to x% of global population, this country should receive x% of the global entitlements for GHG emissions.	**EGA**
Grandfathering rule: Principle of equal percentage reduction of emissions If the GHG emissions of a country amount to x% of global emissions, this country should receive x% of the global entitlements for GHG emissions.	**GRA**
Ability-to-pay rule: Principle of equal ratio between GDP and abatement costs If the GDP of a country amounts to x% of gross world product, this country should receive entitlements for GHG emissions such that it bears x% of the global abatement costs for reductions of emissions.	**ABI**
Polluter-pays rule: Principle of equal ratio between production-based emissions and abatement costs If the production-based GHG emissions of a country amount to x% of global emissions, this country should receive entitlements for GHG emissions such that it bears x% of the global abatement costs for reductions of emissions.	**POL1990** **POL2011**
Consumer-pays rule: Principle of equal ratio between consumption-based emissions (i.e., production-based emissions adjusted by the net trade balance in emissions of a country) and abatement costs If the consumption-based GHG emissions of a country amount to x% of the global emissions, this country should receive entitlements for GHG emissions such that it bears x% of the global abatement costs for reductions of emissions.	**CON1990** **CON2011**

Note: The polluter-pays and consumer-pays rules may be based on either current or average historical GHG emissions since 1990.

Table 2: Overview on party groupings

Description	Shortcut
43 member states of the Alliance of Small Island States	**AOSIS**
Brazil, South Africa, India, China	**BASIC**
27 member states of the European Union	**EU27**
Australia, Canada, Japan, Liechtenstein, Mexico, Monaco New Zealand, Norway, Republic of Korea, Russia, Switzerland, Ukraine, USA	**UMBRELLA/EIG**
133 member states of the G77 group without AOSIS and BASIC members	**G77**

Table 3: Descriptive statistics on the personal background of the respondents

	Relative (absolute) frequency	Number of total observations
Home Country: AOSIS	6.3% (23)	366
Home Country: BASIC	10.7% (39)	366
Home Country: EU27	23.2% (85)	366
Home Country: UMBRELLA or EIG	10.9% (40)	366
Home Country: G77 (without AOSIS and BASIC members)	46.7% (171)	366
Party in COP 2010 or/and COP 2011	78.5%	367
Working for environmental or non-environmental NGO	11.2% (40)	357
Highest degree or training: economics or business administration	19.5% (70)	359
Gender: female	26.2% (98)	374
Age (in years)	45.1 (Min: 23, Max: 78)	368

Note: Number of total observation varies between 357 and 368 because some respondents did not provide information on their socio-demographic characteristics.

Table 4: Average preferred target for changes in GHG emissions up to 2050 compared to 1990 levels

Country group	Change in global GHG (in %)
ALL	- 38.8
AOSIS	- 50.6
BASIC	- 10.1
EU27	- 59.7
UMBRELLA/EIG	- 49.8
G77 (without AOSIS and BASIC)	- 29.9

Note: Two participants of the BASIC group stated a preferred target of doubling and tripling emissions, respectively. If these observations are removed from the analysis, the corresponding average change in BASIC is - 22.9%.

Table 5**:** Absolute and relative frequencies of the number of combined burden sharing rules

	1	2	3	4	5	6	7	8	Total
All	9	19	22	38	37	31	135	38	329
	2.74%	5.78%	6.69%	11.55%	11.25%	9.42%	41.03%	11.55%	100%
AOSIS	0	1	0	1	3	2	8	2	17
	0%	5.88%	0%	5.88%	17.65%	11.76%	47.06%	11.76%	100%
BASIC	0	2	1	6	1	4	14	6	34
	0%	5.88%	2.94%	17.65%	2.94%	11.76%	41.18%	17.65%	100%
EU27	4	3	9	15	11	9	19	0	70
	5.71%	4.29%	12.86%	21.43%	15.71%	12.86%	27.14%	0%	100%
UMBRELLA/EIG	3	1	2	2	8	5	9	2	32
	9.38%	3.13%	6.25%	6.25%	25.00%	15.63%	28.13%	6.25%	100%
G77	1	8	6	9	8	8	75	26	141
	0.71%	5.67%	4.26%	6.38%	5.67%	5.67%	53.19%	18.44%	100%

Table 6**:** Absolute and relative frequencies of the number of burden sharing rules with the highest weight(s) (*w*) among regions

(w)	1	2	> 2	TOTAL	Most chosen rule if w = 1	Most chosen rules if w > 1
All	191	90	48	329	POL1990	POL1990;POL2011
	58.1%	27.3%	14.6%	100%		
AOSIS	9	5	3	17	POL2011	POL2011;POL1990
	52.9%	29.4%	17.7%	100%		
BASIC	24	8	2	34	POL1990	POL1990;CON1990
	70.6%	23.5%	5.9%	100%		
EU27	35	18	17	70	EGA	POL2011;CON2011
	50.0%	25.7%	24.3%	100%		
UMBRELLA/EIG	14	11	7	32	EGA	POL2011;CON2011,ABI
	43.8%	34.4%	21.9%	100%		
G77	86	40	15	141	POL1990	POL1990;POL2011
	61.0%	28.4%	10.6%			

Table 7**:** Mean weights for burden sharing rules across different regions

	EGA	GRA	ABI	POL 2011	POL 1990	CON 2011	CON 1990	Other(s)	TOTAL N
all	12.7%	10.0%	14.0%	18.8%	19.3%	11.5%	11.2%	2.6%	100% 329
AOSIS	5.5%	16.6%	14.5%	19.2%	23.8%	9.2%	11.1%	0.2%	100% 17
BASIC	9.2%	8.4%	15.2%	14.0%	21.2%	12.6%	14.9%	4.7%	100% 34
EU27	20.3%	7.2%	15.5%	20.3%	12.5%	12.8%	9.9%	1.4%	100% 70
UMBRELLA/ EIG	17.5%	9.9%	16.1%	18.0%	10.5%	17.1%	8.8%	2.0%	100% 32
G77	9.5%	9.7%	11.7%	19.8%	24.7%	9.4%	12.3%	2.9%	100% 141
Diff	14.8	9.4	4.4	6.3	14.2	7.9	6.1	4.5	

Note: Diff = Difference between region with highest percentage share and region with lowest percentage share

Table 8**:** Opposition to certain burden sharing rules across different regions (weight = 0)

	EGA	GRA	ABI	POL 2011	POL 1990	CON 2011	CON 1990	TOTAL N
all	26.14%	26.44%	13.98%	13.98%	17.33%	19.76%	23.71%	100%
	86	87	46	46	57	65	78	329
AOSIS	41.18%	17.65%	5.88%	5.88%	0%	17.65%	5.88%	100%
	7	3	1	1	0	3	1	17
BASIC	38.24%	17.65%	8.82%	17.65%	5.88%	17.65%	8.82%	100%
	13	6	3	6	2	6	3	34
EU27	24.29%	45.71%	18.57%	20.00%	38.57%	30.00%	40.00%	100%
	17	32	13	14	27	21	28	70
UMBRELLA/ EIG	21.88% 7	34.38% 11	12.50% 4	25.00% 8	31.25% 10	21.88% 7	37.50% 12	100% 32
G77	19.86% 28	19.15% 27	12.77% 18	5.67% 8	4.26% 6	13.48% 19	12.77% 18	100% 141

Table 9: Descriptive information on explanatory variables

Variable		share (n = 329)
	Group of countries	
AOSIS	= 1	5.17%
BASIC	= 1	10.33%
EU27	= 1	21.28%
UMBRELLA/EIG	= 1	9.73%
	No information for 13 observations	3.95%
	Economic or emission performance indicators	
GDPpc2011	in current 1,000 US$ Mean: 18.72 Min: 0.23 (Democratic Republic of the Congo) Max: 115.04 (Luxembourg)	
	No information for 17 observations	5.17%
HDI2011	= 1 (very high human development)	33.13%
	No information for 19 observations	5.78%
CO2pc2011	in t CO_2 Mean: 4.79 Min: 0.02 (Chad) Max: 25.74 (Bahrain)	
	No information for 19 observations	5.78%
	Assessment of international climate policy	
NEGCONS	= 1 if respondent assesses the consequences of climate change on future living conditions up to 2100 in his/her home country to be “very negative” or “negative”	72.34%
	No information for 32 observations	9.73%
POWERFUL	= 1 if respondent assesses the bargaining position of his/her home country in current international climate negotiations to be “very powerful” or “powerful”	23.49%
	No information for 31 observations	9.42%
LOWRED_US_CHN	= 1 if respondent assesses the USA and China will reduce their GHG emissions relative to BAU without any new international climate agreement up to 2050 to a “low degree” or “no degree”	45.26%
	No information for 2 observations	0.61%
	Sociodemographic information	
AGE	in years Mean: 45 Min: 23 Max: 76	
	No information for 13 observations	3.95%
FEMALE	= 1	24.53%
	No information for 7 observations	2.13%
ECON	= 1	18.54%
	No information for 20 observations	6.08%
NGO	= 1	10.03%
	No information for 21 observations	6.38%
COPparty	= 1	72.34%
	No information for 14 observations	4.26%
	Consistency indicator	
ADJUSTED	= 1	4.83%

Table 10: Maximum likelihood estimates in zero-truncated Poisson models, dependent variable: Number of rules with a weight > 0

VARIABLES	(1) nrules	(2) nrules	(3) nrules	(4) nrules	(5) nrules	(6) nrules	(7) nrules	(8) nrules
AOSIS	-0.0203							-0.0243
	(0.0670)							(0.0883)
BASIC	-0.0301							0.0374
	(0.0593)							(0.0592)
EU27	-0.247***							-0.0417
	(0.0555)							(0.0709)
UMBRELLA/EIG	-0.123*							0.131
	(0.0669)							(0.0810)
GDPpc2011		-0.00622***						-0.00629***
		(0.00103)						(0.00144)
HDI2011			-0.220***					
			(0.0449)					
CO2pc2011				-0.0140***				
				(0.00454)				
NEGCONS					0.117*			0.0739
					(0.0618)			(0.0581)
POWERFUL						-0.0553		
						(0.0506)		
LOWRED_US_CHN							0.0409	
							(0.0391)	
AGE	-0.00293	-0.00259	-0.00240	-0.00222	-0.00250	-0.00267	-0.00280	-0.00268
	(0.00182)	(0.00176)	(0.00181)	(0.00185)	(0.00188)	(0.00186)	(0.00182)	(0.00187)
FEMALE	0.0412	0.0318	0.0296	0.0303	0.0252	0.0216	0.0219	0.0247
	(0.0402)	(0.0394)	(0.0401)	(0.0408)	(0.0437)	(0.0437)	(0.0403)	(0.0429)
ECON	-0.0587	-0.0350	-0.0379	-0.0466	-0.0430	-0.0633	-0.0556	-0.0392
	(0.0485)	(0.0492)	(0.0502)	(0.0517)	(0.0529)	(0.0527)	(0.0521)	(0.0499)
NGO	-0.00902	0.0245	0.0105	0.00522	0.00463	0.000260	0.0235	-0.0123
	(0.0582)	(0.0573)	(0.0566)	(0.0565)	(0.0629)	(0.0614)	(0.0597)	(0.0668)
COPPARTY	-0.0200	0.00888	0.00456	-0.0152	-0.0569	-0.0652	-0.0185	-0.00296
	(0.0474)	(0.0463)	(0.0485)	(0.0501)	(0.0506)	(0.0483)	(0.0489)	(0.0512)
ADJUSTED	-0.00227	-0.00500	0.0330	0.0292	0.0624	0.0451	0.0233	0.0239
	(0.0776)	(0.0769)	(0.0849)	(0.0877)	(0.0781)	(0.0778)	(0.0857)	(0.0849)
Constant	1.969***	1.963***	1.925***	1.928***	1.804***	1.937***	1.872***	1.913***
	(0.0955)	(0.0871)	(0.0893)	(0.0894)	(0.112)	(0.0939)	(0.0944)	(0.115)
log likelihood	-596.00	-582.33	-583.77	-588.61	-554.46	-552.46	-607.04	-529.83
Observations	284	280	278	278	261	261	286	255

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, eight categories

Table 11: Maximum likelihood estimates in binary logit models, dependent variable: Single rule with highest weight

VARIABLES	(1) singlerule	(2) singlerule	(3) singlerule	(4) singlerule	(5) singlerule	(6) singlerule	(7) singlerule	(8) singlerule
AOSIS	-0.326							-0.155
	(0.526)							(0.639)
BASIC	0.396							0.304
	(0.430)							(0.457)
EU27	-0.353							-0.454
	(0.317)							(0.403)
UMBRELLA/EIG	-0.716*							-0.943*
	(0.403)							(0.501)
GDPpc2011		-0.00452						0.00534
		(0.00557)						(0.00776)
HDI2011			-0.238					
			(0.258)					
CO2pc2011				-0.00406				
				(0.0245)				
NEGCONS					-0.113			-0.163
					(0.332)			(0.346)
POWERFUL						0.0721		
						(0.298)		
LOWRED_US_CHN							-0.0620	
							(0.246)	
AGE	0.00785	0.00908	0.00940	0.00981	0.00607	0.00498	0.00663	0.00913
	(0.0113)	(0.0112)	(0.0112)	(0.0112)	(0.0115)	(0.0115)	(0.0110)	(0.0119)
FEMALE	0.0465	-0.0111	-0.00964	-0.0101	-0.0418	0.0454	0.0448	-0.0945
	(0.307)	(0.304)	(0.306)	(0.306)	(0.318)	(0.318)	(0.301)	(0.329)
ECON	0.266	0.250	0.253	0.236	0.128	0.255	0.254	0.170
	(0.311)	(0.304)	(0.305)	(0.306)	(0.311)	(0.307)	(0.302)	(0.322)
NGO	0.461	0.465	0.439	0.460	0.375	0.318	0.409	0.361
	(0.431)	(0.417)	(0.422)	(0.425)	(0.444)	(0.433)	(0.428)	(0.459)
COPPARTY	-0.297	-0.350	-0.348	-0.370	-0.252	-0.145	-0.300	-0.372
	(0.319)	(0.317)	(0.317)	(0.318)	(0.328)	(0.327)	(0.313)	(0.350)
ADJUSTED	-0.716	-0.721	-0.679	-0.699	-0.777	-0.750	-0.750	-0.772
	(0.628)	(0.606)	(0.604)	(0.608)	(0.658)	(0.661)	(0.610)	(0.720)
Constant	0.153	0.112	0.0964	0.0331	0.239	0.0206	0.131	0.317
	(0.635)	(0.607)	(0.606)	(0.609)	(0.692)	(0.636)	(0.606)	(0.747)
log likelihood	-189.72	-189.25	-187.78	-188.14	-177.08	-177.83	-194.04	-170.06
Observations	284	280	278	278	261	261	286	255

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 12: Maximum likelihood estimates in Tobit models, dependent variable: Deviation (=100-weight) from highest weight rule

VARIABLES	(1) deviation	(2) deviation	(3) deviation	(4) deviation	(5) deviation	(6) deviation	(7) deviation	(8) deviation
AOSIS	1.614							-1.247
	(5.591)							(7.777)
BASIC	-1.341							3.112
	(3.005)							(2.961)
EU27	-6.162*							-0.489
	(3.208)							(4.500)
UMBRELLA/EIG	0.259							8.026
	(4.134)							(5.377)
GDPpc2011		-0.136**						-0.152
		(0.0585)						(0.0926)
HDI2011			-4.392*					
			(2.598)					
CO2pc2011				-0.125				
				(0.221)				
NEGCONS					5.832*			5.178
					(3.467)			(3.412)
POWERFUL						-2.186		
						(2.905)		
LOWRED_US_CHN							1.534	
							(2.300)	
AGE	-0.179	-0.167	-0.162	-0.168	-0.152	-0.139	-0.165	-0.158
	(0.111)	(0.111)	(0.112)	(0.115)	(0.113)	(0.115)	(0.112)	(0.113)
FEMALE	2.257	2.175	2.199	2.146	1.956	1.685	1.785	2.015
	(2.412)	(2.422)	(2.423)	(2.420)	(2.568)	(2.443)	(2.333)	(2.593)
ECON	-1.025	-0.00835	-0.109	-0.397	-0.171	-1.141	-0.585	-0.304
	(2.946)	(3.063)	(3.040)	(3.017)	(3.060)	(2.999)	(2.968)	(3.151)
NGO	-4.491	-2.993	-3.396	-3.188	-4.014	-4.357	-2.890	-4.434
	(3.264)	(3.427)	(3.273)	(3.258)	(3.552)	(3.410)	(3.348)	(3.826)
COPPARTY	0.290	1.115	0.904	0.502	-1.496	-2.966	0.281	0.555
	(3.082)	(3.121)	(3.144)	(3.130)	(3.269)	(3.016)	(3.081)	(3.458)
ADJUSTED	3.852	3.789	4.757	4.423	5.049	3.820	4.675	4.451
	(4.011)	(4.035)	(4.186)	(4.128)	(4.516)	(4.535)	(4.118)	(4.575)
Constant	70.92***	70.35***	69.32***	69.01***	64.12***	70.91***	67.88***	65.30***
	(5.379)	(5.090)	(5.060)	(5.057)	(5.881)	(5.364)	(5.349)	(6.141)
log likelihood	-1219.57	-1202.10	-1196.19	-1197.64	-1126.43	-1119.81	-1232.34	-1095.13
Observations	284	280	278	278	261	261	286	255

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 13: Maximum likelihood estimates in Tobit models, dependent variable: Weight for POL 2011

VARIABLES	(1) POL2011	(2) POL2011	(3) POL2011	(4) POL2011	(5) POL2011	(6) POL2011	(7) POL2011	(8) POL2011
AOSIS	1.236							-2.102
	(3.253)							(3.770)
BASIC	-7.625**							-8.390**
	(3.484)							(3.401)
EU27	0.150							2.600
	(3.441)							(5.266)
UMBRELLA/EIG	-2.190							3.064
	(4.280)							(5.125)
GDPpc2011		-0.0631						-0.141
		(0.0702)						(0.111)
HDI2011			-1.460					
			(1.002)					
CO2pc2011				-0.162				
				(0.218)				
NEGCONS					-4.347			
					(4.088)			
POWERFUL						-5.464**		-3.164
						(2.696)		(2.979)
LOWRED_US_CHN							3.300	
							(2.307)	
AGE	0.285**	0.309**	0.313***	0.311**	0.276**	0.271**	0.299**	0.276**
	(0.117)	(0.119)	(0.120)	(0.122)	(0.122)	(0.123)	(0.119)	(0.118)
FEMALE	0.793	0.882	1.231	1.013	0.659	0.400	0.511	0.738
	(2.519)	(2.547)	(2.619)	(2.575)	(2.887)	(2.683)	(2.482)	(2.723)
ECON	1.915	2.093	2.170	2.116	2.066	2.219	1.707	2.782
	(3.215)	(3.272)	(3.222)	(3.240)	(3.327)	(3.238)	(3.181)	(3.347)
NGO	-1.158	-0.909	-1.726	-1.131	0.623	-0.426	-0.911	0.0184
	(2.838)	(2.869)	(2.797)	(2.864)	(3.223)	(3.064)	(2.972)	(3.355)
COPPARTY	-0.675	0.257	0.118	-0.129	0.149	-1.814	0.358	-1.586
	(2.872)	(3.151)	(3.017)	(2.989)	(3.213)	(3.060)	(2.936)	(3.430)
ADJUSTED	0.0892	1.120	1.681	1.654	0.490	0.576	2.294	-0.941
	(4.491)	(4.551)	(4.578)	(4.565)	(5.182)	(4.964)	(4.613)	(4.814)
Constant	6.203	4.264	6.841	3.986	7.748	7.438	2.184	9.155
	(5.594)	(5.525)	(5.906)	(5.406)	(6.607)	(5.582)	(5.577)	(5.601)
log likelihood	-1118.81	-1104.35	-1095.38	-1096.31	-1020.90	-1010.49	-1125.49	-983.82
Observations	284	280	278	278	261	261	286	254

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1,

Table 14: Maximum likelihood estimates in binary logit models, dependent variable: Opposition (= zero weight) against POL2011

VARIABLES	(1) OPP POL2011	(2) OPP POL2011	(3) OPP POL2011	(4) OPP POL2011	(5) OPP POL2011	(6) OPP POL2011	(7) OPP POL2011	(8) OPP POL2011
AOSIS	-0.371							0.181
	(1.064)							(0.965)
BASIC	0.961*							0.753
	(0.559)							(0.710)
EU27	0.845*							-0.168
	(0.476)							(0.556)
UMBRELLA/EIG	1.051*							-0.485
	(0.556)							(0.913)
GDPpc2011		0.0293***						0.0364***
		(0.00670)						(0.0106)
HDI2011			0.742***					
			(0.179)					
CO2pc2011				0.0552**				
				(0.0281)				
NEGCONS					-0.204			
					(0.446)			
POWERFUL						0.761*		0.645
						(0.403)		(0.518)
LOWRED_US_CHN							-0.543	
							(0.367)	
AGE	-0.0184	-0.0218	-0.0227	-0.0224	-0.0218	-0.0222	-0.0201	-0.0216
	(0.0153)	(0.0165)	(0.0157)	(0.0163)	(0.0154)	(0.0160)	(0.0155)	(0.0170)
FEMALE	-0.438	-0.392	-0.480	-0.391	-0.352	-0.314	-0.375	-0.292
	(0.485)	(0.489)	(0.492)	(0.468)	(0.465)	(0.468)	(0.462)	(0.477)
ECON	0.556	0.487	0.445	0.483	0.422	0.503	0.512	0.369
	(0.419)	(0.442)	(0.430)	(0.425)	(0.421)	(0.426)	(0.423)	(0.430)
NGO	-0.679	-1.127	-0.555	-0.714	-0.747	-0.626	-0.731	-1.057
	(0.666)	(0.777)	(0.673)	(0.698)	(0.711)	(0.682)	(0.713)	(0.855)
COPPARTY	0.274	-0.0726	0.0164	0.167	0.202	0.434	0.115	-0.0424
	(0.477)	(0.503)	(0.491)	(0.476)	(0.468)	(0.455)	(0.467)	(0.523)
ADJUSTED	0.426	0.391	0.0202	0.100	0.219	0.353	0.0692	0.713
	(0.864)	(0.841)	(0.881)	(0.807)	(0.796)	(0.831)	(0.789)	(0.838)
Constant	-1.808*	-1.555*	-3.105***	-1.311	-0.810	-1.453*	-0.876	-1.769
	(0.935)	(0.858)	(0.970)	(0.804)	(0.912)	(0.797)	(0.813)	(1.190)
log likelihood	-102.06	-96.78	-95.88	-103.45	-104.18	-100.51	-106.66	-88.57
Observations	284	280	278	278	261	261	286	255

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 15: Average marginal and discrete probability effects estimates in binary logit models, dependent variable: Opposition (= zero weight) against POL2011

Explanatory variables	dy/dx	[95% Conf. Intervall]	
AOSIS	0.020	-0.197	0.237
BASIC	0.091	-0.101	0.283
EU27	-0.017	-0.126	0.092
UMBRELLA/EIG	-0.046	-0.191	0.100
GDPpc2011	0.004***	0.002	0.006
POWERFUL	0.073	-0.051	0.198
AGE	-0.002	-0.006	0.001
FEMALE	-0.026	-0.118	0.065
ECON	0.055	-0.051	0.162
NGO	-0.081	-0.182	0.021
COPPARTY	0.023	-0.077	0.123
ADJUSTED	0.095	-0.160	0.350

Average marginal and probability effects are calculated after the ML estimation reported in Table 14, column (8), *** p<0.01, ** p<0.05, * p<0.1

Table 16: Maximum likelihood estimates in Tobit models, dependent variable: Weight for ABI

VARIABLES	(1) ABI	(2) ABI	(3) ABI	(4) ABI	(5) ABI	(6) ABI	(7) ABI	(8) ABI
AOSIS	2.583							1.991
	(2.623)							(2.893)
BASIC	2.135							4.756
	(2.647)							(2.991)
EU27	2.141							2.556
	(2.409)							(3.201)
UMBRELLA/EIG	4.394*							3.771
	(2.247)							(2.891)
GDPpc2011		0.0472						0.0325
		(0.0399)						(0.0586)
HDI2011			0.827					
			(0.675)					
CO2pc2011				0.207				
				(0.155)				
NEGCONS					-2.315			
					(2.453)			
POWERFUL						-1.115		-2.307
						(1.918)		(2.123)
LOWRED_US_CHN							-2.191	
							(1.583)	
AGE	-0.0959	-0.100	-0.102	-0.110	-0.111	-0.0862	-0.0959	-0.0841
	(0.0769)	(0.0763)	(0.0760)	(0.0769)	(0.0795)	(0.0806)	(0.0757)	(0.0819)
FEMALE	0.335	0.198	0.116	0.168	0.325	0.738	1.301	-0.597
	(1.952)	(1.955)	(1.966)	(1.969)	(2.188)	(2.137)	(2.014)	(2.051)
ECON	1.959	2.049	2.138	2.090	1.707	1.941	2.202	1.815
	(1.991)	(1.965)	(1.991)	(1.993)	(2.064)	(1.991)	(1.968)	(2.007)
NGO	-2.811	-3.148	-2.594	-2.689	-3.239	-3.228	-2.971	-2.705
	(2.432)	(2.425)	(2.467)	(2.489)	(2.807)	(2.779)	(2.611)	(2.693)
COPPARTY	0.00152	-0.666	-0.599	-0.416	0.456	-0.906	-0.336	-0.989
	(2.263)	(2.218)	(2.204)	(2.199)	(2.250)	(2.267)	(2.194)	(2.349)
ADJUSTED	0.817	0.426	0.130	-0.0844	1.726	1.746	-0.700	3.215
	(2.931)	(2.853)	(2.898)	(2.842)	(2.770)	(2.639)	(2.961)	(2.742)
Constant	15.38***	16.57***	15.16***	16.64***	19.10***	17.49***	17.89***	15.46***
	(4.596)	(4.386)	(4.719)	(4.407)	(4.980)	(4.578)	(4.384)	(4.854)
log likelihood	-1014.89	-1000.67	-992.88	-993.55	-940.93	-942.04	-1026.81	-909.21
Observations	284	280	278	278	261	261	286	254

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 17: Maximum likelihood estimates in binary logit models, dependent variable: Opposition (= zero weight) against ABI

VARIABLES	(1) OPP ABI	(2) OPP ABI	(3) OPP ABI	(4) OPP ABI	(5) OPP ABI	(6) OPP ABI	(7) OPP ABI	(8) OPP ABI
AOSIS	-0.697							-0.406
	(1.062)							(1.106)
BASIC	-0.343							-0.893
	(0.671)							(0.881)
EU27	0.652							-0.151
	(0.418)							(0.562)
UMBRELLA/EIG	-0.354							-1.337
	(0.651)							(0.847)
GDPpc2011		0.0158**						0.0195*
		(0.00690)						(0.0106)
HDI2011			0.333**					
			(0.154)					
CO2pc2011				0.0267				
				(0.0308)				
NEGCONS					0.272			
					(0.501)			
POWERFUL						-0.0118		0.186
						(0.436)		(0.514)
LOWRED_US_CHN							0.0711	
							(0.359)	
AGE	0.0277*	0.0268*	0.0251*	0.0261*	0.0336**	0.0290*	0.0289**	0.0274
	(0.0150)	(0.0144)	(0.0143)	(0.0148)	(0.0165)	(0.0159)	(0.0147)	(0.0167)
FEMALE	-0.184	-0.153	-0.235	-0.167	-0.106	-0.116	-0.156	-0.0626
	(0.447)	(0.451)	(0.451)	(0.448)	(0.490)	(0.481)	(0.449)	(0.502)
ECON	-0.235	-0.408	-0.412	-0.349	-0.157	-0.181	-0.323	-0.190
	(0.478)	(0.496)	(0.481)	(0.485)	(0.486)	(0.482)	(0.482)	(0.531)
NGO	0.482	0.298	0.491	0.352	0.551	0.552	0.379	0.579
	(0.571)	(0.623)	(0.582)	(0.565)	(0.565)	(0.568)	(0.564)	(0.644)
COPPARTY	-0.210	-0.205	-0.178	-0.133	-0.112	0.109	-0.136	-0.0960
	(0.453)	(0.472)	(0.467)	(0.459)	(0.487)	(0.529)	(0.464)	(0.525)
ADJUSTED	-0.630	-0.511	-0.668	-0.672			-0.529	
	(1.034)	(1.030)	(1.049)	(1.077)			(1.063)	
Constant	-2.987***	-3.157***	-3.682***	-2.974***	-3.538***	-3.292***	-3.047***	-3.238***
	(0.834)	(0.785)	(0.804)	(0.766)	(1.084)	(0.870)	(0.843)	(0.937)
log likelihood	-108.85	-108.21	-108.08	-110.04	-98.58	-97.29	-111.29	-92.70
Observations	284	280	278	278	250	250	286	243

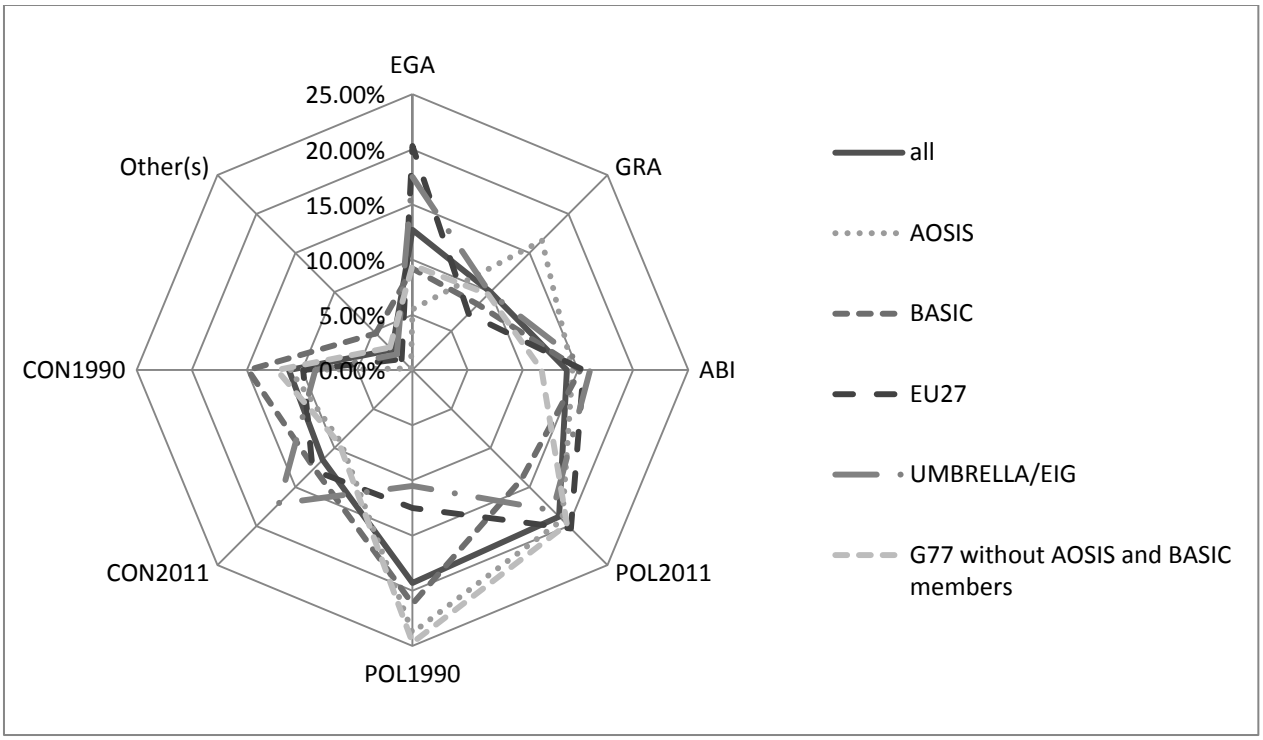
Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1, the control variable "adjusted" was removed in the models (5), (6) and (8) due to perfect fits

Table 18: Average marginal and discrete probability effects estimates in binary logit models, dependent variable: Opposition (= zero weight) against ABI

Explanatory variables	dy/dx	[95% Conf. Intervall]	
AOSIS	-0.031	-0.226	0.163
BASIC	-0.070	-0.189	0.049
EU27	-0.010	-0.128	0.108
UMBRELLA/EIG	-0.101**	-0.195	-0.008
GDPpc2011	0.002*	-0.000	0.004
POWERFUL	0.018	-0.099	0.134
AGE	0.003	-0.001	0.007
FEMALE	-0.012	-0.115	0.091
ECON	-0.023	-0.129	0.083
NGO	0.084	-0.103	0.272
COPPARTY	-0.008	-0.124	0.109

Average marginal effects are calculated after the ML estimation reported in Table 17, column (8), *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Weights for different burden sharing rules among country groups


EGA
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
GRA
ABI
POL2011
POL1990
CON2011
CON1990
Other(s)
all
AOSIS
BASIC
EU27
UMBRELLA/EIG
G77 without AOSIS and BASIC members