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by

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Abstract

Behavioural economics attracted attention from environmental economists: it should help to understand why people do not respond to environmental policy measures, based on neoclassical assumptions, as predicted by theory. Moreover, understanding motives and driving forces behind pro-social, pro-environmental and cooperative behaviour should help to improve environmental policy design. The aim of this paper is a critical discussion of the way how this branch of research is interpreting the explanatory power and the normative (policy) implications of behavioural economics.

Keywords: Behavioural economics, environmental economics, policy design, methodology

JEL Classification: B41, D0, D70, Q57, Q58

1 Introduction

Neoclassical environmental economics and its implications for environmental policy have been under a critical debate for several decades. The criticism relates to both, flaws and shortcomings in its explanatory power and understanding of sustainability, as well as the limits of effective policy measures to trigger the economy towards a sustainable path. As one important criticism is about the artificial assumptions regarding agent's behavior and the functioning of markets, it is evident that the research field of Behavioural Economics (hereafter: BE) attracted a lot attention from environmental economists. BE aims to develop positive approaches to understand human decision making, based on empirical and primarily experimental data, as opposed to the normative approach of a pure self-interested fully rational agent. Therefore, it helps to develop a better understanding of the behavioural basis e.g. of unsustainable consumption patterns, or the effects of environmental policy measures on behavior when the latter is also motivated by other things than monetary incentives (see Knetsch (2003), Stern (2010), van den Bergh et al.(2000) on such a research agenda).

This inspired many scholars to apply well-known results and insights from BE to the context of environmental problems, to run behavioural experiments, especially designed for environmental policy problems, and to draw (more or less tentative) conclusions for policy design. Beside the fast growing literature on specific issues, a couple of articles are reviewing extensively the behavioural-environmental economics literature, such like Shogren and Taylor (2008), Venkatachalam (2008), Shogren, Parkhurst, and Barnerjee (2010), Baddeley (2011), and especially Gsottbauer and van den Bergh (2011). The aim of this contribution is therefore not to review all the valuable insights from BE again, or to summarize the overview articles, but to raise some general critical questions about the lessons to be learned from BE for better environmental policy.

Environmental problems, caused by unsustainable patterns of production and consumption, are a real-world problem, and BE puts the decision making of the real homo sapiens in the focus, replacing the homo oeconomicus (Thaler (2000)). Therefore, it is evident that the tenor of the literature is very optimistic regarding the potential lectures to be learned from BE. Since real agents are boundedly rational and motivated in a more complex way than by money prices, it could be expected to develop a deeper understanding,

e.g. how agents respond to environmental tax incentive schemes. Numerous stylized facts and descriptive concepts from BE such like framing effects, endowment effects, different biases in perception and information processing, habit formation, hyperbolic discounting, as well as other-regarding and pro-environmental preferences, fairness, reciprocity, voluntary cooperation, and trust are considered and applied to numerous fields in environmental economics such like (un-)sustainable consumption, environmental public goods, climate change etc. The overall message is that all these effects matter, that they have an impact on the effectiveness of policy measures, and that they should be considered for proper policy design. Environmental policy, only based on command-and-control or price incentive schemes, is judged to be insufficient and in need to be complemented by alternative mechanisms to influence behaviour. I do not argue against this perspective since I am also convinced that BE is a proper basis for ecological economics and a sustainability policy design. But I have the impression that the optimism mentioned above is sometimes a bit blind:

(a) Behavioural-environmental economics is often referring to observed “anomalous” effects (coming from bounded rationality) or intrinsic motivations (coming from bounded self-interest). The explanatory power of BE, however, is not critically reflected. This can lead to a misunderstanding of behavioural “deficits” which might lead to problematic policy conclusions.

(b) The lessons to be learned from BE are predominantly lessons for a social planner aiming to implement sustainability policy. Considering the behaviour of voters, politicians, and bureaucrats in a representative democracy where policy programs have to be voted for, designed, and implemented, the perspective of Public Choice theory is missing. This perspective, however, is typically based on traditional (neoclassic) assumptions. Nevertheless, it is argued that potential merits of the Public Choice perspective are not sufficiently acknowledged in explaining deficits of environmental policy and developing better policy options.

(c) Are there really new policy measures or better designed policy instruments which are deduced from insights of BE? In many cases there is not a straightforward link between a theoretical behavioural approach and an implemented policy tool whose improved effectiveness is measurable by an econometric model. There are too many simultaneous and hardly discriminable behavioural effects, and the numerical parametrization of the BE

models is very sensitive to the context and not generalizable. Thus, BE is more “inspiring” new routes in environmental policy.

The paper discusses these points in the subsequent sections 2 - 4. Section 5 provides an example of a qualitative lesson from behavior-environmental economics which goes hand in hand with suggestions from Public Choice. Section 6 concludes.

2 On the Explanatory Power of Behavioural Economics

2.1 Bounded Rationality – should policy mitigate decision anomalies?

The term “bounded” indicates deficiency, faults, defects. It is often argued that real agents have limited cognitive abilities like information processing capacities, and limited information which prevents them from making optimal decisions. Limited information, however, does not constitute any bounded rationality since also perfect Bayesian rationality implies that agents take the choice which maximizes subjectively expected utility, given subjective beliefs based on a given (typically limited) information set. The cognitive abilities are indeed limited which leads to several interesting effects (“anomalies”) which, however, should not be interpreted unilaterally as deficient deviations from truly rational behaviour which deserve corrections. Moreover, common definitions of bounded rationality emphasize cognition and neglect the constructive, if not constitutive role of emotions (see Elster (1996, 1998), Loewenstein (2000)).

Since boundedly rational agents are characterized by numerous robust deviations from the predictions of rational choice theory, BE helps to explain why environmental policy, based on neoclassical environmental economics, is of limited success. It might help to explain e.g. why we stuck in non-sustainable consumption patterns even when price signals have been changed by policy measures. Therefore, these “behavioural deficits” are often seen as a genuine justification for governmental intervention in addition to traditional “market failure” (Shogren and Taylor (2008)). Such an argument approves the neoclassical approach as the normative benchmark: perfect rationality and its related efficiency concepts are - implicitly and unacknowledged - still the ideal. As it is argued below, the

observable effects of boundedly rational behaviour could be interpreted as evolutionary adapted smart “behavioural technologies” rather than anomalies and rationality deficits.

The discussion what can be learned from BE mostly starts with references to observable effects (the stylized facts of BE) like framing and endowment effects, and some descriptive concepts like hyperbolic discounting or reciprocity. Denominating and describing effects does not provide an explanation. The framing effect does not explain why people are not invariant in case of structurally equivalent choice problems. The base rate effect does not explain why people are not able to form Bayesian posteriors etc.. As long as behavioural-environmental economics is only based on considering numerous descriptive concepts from BE, it cannot claim to have superior explanatory power compared to neoclassical environmental economics.

One flagship of theoretical concepts in BE is the (Cumulative) Prospect Theory which aims to explain several behavioural effects in lottery choice (Kahneman and Tversky (1979), Tversky and Wakker (1993)). Without going into detail here, I argue that Prospect Theory, although Kahneman and Tversky are one of the most prominent advocates of BE, has to be interpreted as a contribution to the family of Non-Expected Utility (NEU) Theory, comparable to e.g. Rank-Dependent Utility, Regret Theory, or Weighted-expected Utility (see Kischka and Puppe (1992)). It provides an axiomatic framework which allows choice behaviour to be described by an S-shaped utility function with a reference point. Therefore, certain observable framing and weighting effects are now in line with consistency requirements of preference axioms. Like all NEU models, it follows the explanatory style of the orthodox rationality approach by extending or relaxing its axiomatic framework. Relaxing the axioms and allowing for more choice patterns, including other-regarding preferences, could be seen critically as a “neoclassical repair approach” rather than a truly behavioural alternative (see Güth (2008)).

Without going into detail of the methodological question “What is an explanation?” it would be desirable to understand why real agents exhibit these numerous patterns which deviate from the standard rationality approach. First attempts to explain boundedly rational behaviour considered decision costs or deliberation costs when processing information and evaluating decision options (overview in Conlisk (1999)). The orthodox approach is interpreted as a special case when these costs are zero or being neglected. Therefore, cheap simple heuristics or rules-of-thumb might perform better as the attempt

to apply costly optimization. Another interesting approach by Heiner (1983, 1988) argues that processing information and deriving appropriate decisions based on these informations, is always afflicted with some stochastic errors. Rule-governed behaviour, delayed decision making, and ignorance of information are then explained as effective tools to control these errors and their impact on the decision quality. A further approach is the empirically based “fast and frugal heuristics that makes us smart” literature around Gerd Gigerenzer and the ABC research team (Gigerenzer et al. 1999)). They argue that more or less simple heuristics for statistical inferences about the environment as well as for decision making processes are more efficient than trying to apply Bayesian inferences and to optimize. The latter would imply the exploration of huge data sets which requires more time and produces more errors, making the decision behaviour less robust. Fast and frugal heuristics, instead, help to organize behaviour in a complex environment more successfully. These heuristics are domain-specific, implying that there is not “the” best performing one. The superiority of smart rules is at least true when the agent operates in environments to which the biological evolution has adapted him (including the social interaction in small groups). This is expressed by the notion of “ecological rationality” (Reimer and Hoffrage (2006)).

It is worth mentioning that terms like rules or heuristics portray decision making as an algorithmic cognitive-based process. This is misleading because also emotions play not only an additional but constitutive role in orienting behaviour, and coordinating it in social groups (Pfister and Böhm (2008), Frank (1988)). What these explanations mentioned above have in common, is that behaviour is seen as an outcome of an adaption process which selects for successful patterns in terms of material preferences. Although specific effects lead to deviation from fully rational solutions in a specific choice situation, the general pattern - when applied to “typical” choice situations - enables a successful behaviour in accordance to the agent’s material preferences. Aumann (2008) argues, that this can be seen as rule-rationality as opposed to act-rationality which is the core of axiomatic expected utility theory (see also Vanberg (2004)). The point to be made here is that an interpretation of decision patterns as “anomalies” and “deficiencies” to be healed by governmental regulation, is based on a serious lack of understanding BE as an explanatory approach.

But how could boundedly but rule-rational behaviour contribute to an explanation why

the economy is on an unsustainable path? Ecological rationality, as defined above, does not necessarily imply pro-environmental and ecologically correct behaviour. The claim that the observed behavioural patterns have been adapted successfully to the ecological environment of the humans, does not say much what happens if this environment is changing drastically and rapidly by human artifacts. People are now operating in a technomorphic environment, characterized by a very high degree of global division of labor where interactions are coordinated to a large extent in anonymous markets rather than in small groups. The consequences of the own decisions (and errors) are not local and not always observable. But even if we argue that nowadays deviations from perfect rationality might be partially responsible for environmental problems, it is still problematic to conclude that these decision “anomalies” constitute a reason for governmental intervention, aiming to regulate the behaviour. Some scholars frankly claim that behavioural deficiencies e.g. like time-inconsistencies require paternalistic corrections by the government (Thaler and Sunstein (2008), O’Donoghue and Rabin (2003), see Sugden (2008) for critical arguments). Such claims can hardly be reconciled with the notion of rule-rationality, because paternalism is always justified by the costs of deviations from individual act-rationality (Trout (2005)). Since the collective outcome is determined by the interaction of agents which are characterized by ecological rationality or rule-rationality, it is by no means clear whether this decreases (or even improves) collective efficiency (Berg and Gigerenzer (2007)).

2.2 Bounded self-interest – what pro-social and pro-environmental preferences explain

Another very important domain of BE, especially Experimental Game Theory, is the observation that people do not only respond to their own material outcomes. They are also concerned about the outcomes of others, their relative position in the group, the degree of inequality etc. Effects like altruism, envy, and fairness have been investigated extensively. Moreover, not only the resulting allocation itself but also the procedure how it has been achieved, plays an important role. Furthermore, it can be observed that people are able to trust each other and to behave trustworthy, and are able to cooperate by contributing voluntarily to public goods (for a broad overview over this literature see the sources mentioned in the introduction). Generally, the standard approach that players follow incentives, given by their payoffs, has to be re-interpreted in order to cope with

a broad range of psychological motivations (Fehr and Falk (2002)), making preferences dependent on the context and state of the game (see Geneakoplos et al. (1989) on psychological games).

Since voluntary contributions to environmental protection can be interpreted as a public good, the results from BE are very appealing to environmental economists and policy-makers. The topic to be discussed here is, whether the standard interpretation of such behaviour as a result of other-regarding, pro-social, or pro-environmental preferences delivers a proper explanation of these effects. The concept of rationality does not imply anything about the content of preferences, it only requires some consistency conditions. Neoclassical economics presumes that agents are purely self-interested - an assumption which is very convenient and common. But in fact, it does not belong to the explanatory “hard core” of neoclassical economics but to the “belt” (with the words of Lakatos). If we incorporate envy, altruism, inequality aversion, reciprocity concerns and other so-called intrinsic motivations into a utility function (such like Fehr and Schmidt (1999), Bolton and Ockenfels (2000), Rabin (1993)), the resulting behaviour is still characterized by expected utility maximization. As I have argued elsewhere (Pasche (2008)), there are methodological doubts whether other-regarding (or in this context: pro-environmental) preferences really “explain” something. There are at least two problems:

(a) The preference function is now enriched with more structure, more parameters, more degrees of freedom. We have much more unobservable variables in the explanans which we can arbitrarily fit to any data. If the data is still not close enough to the theory, we can easily introduce further parameters. The theory becomes “fat” because more and more behavioural patterns can now be reconciled with this preference function - even patterns which are not observed, which decreases its predictive power. The most important objection is that we are quickly reaching the limits of falsifiability: since we are allowed to construct any preference function, the hypothesis that the agent is in fact maximizing something cannot be rejected anymore. While traditional neoclassical theory was based on intuitive convictions about given simple self-interested valuations of observable material outcomes, we are now fitting the black box of intrinsic motivations to any set of stimuli-response data. We can be sure always to find a structure and parametrization which allows to interpret the observed behavioural patterns as consistent, i.e. as an outcome of expected utility maximization.

(b) Preference-based explanations confuse the explanans with the explanandum. We take the empirical regularity, interpret it as a part of the preferences which then - via the rational decision making approach - surprisingly “explains” the empirical regularity again. Shortly, utility functions are constructed by “backward engineering”: we explain voluntary cooperation by preferences for cooperation, and fair behaviour by fairness preferences. In textbooks about epistemology we find the classroom example that the deduction “A smoke producing event produces smoke. We observe smoke. Conclusion: There must be a smoke-producing event.” follows the Hempel-Oppenheim scheme of deduction but is nevertheless not an explanation (Chalmers (1999)). The numerous contributions to other-regarding preferences in the BE literature seem not to be too far away from this example.

Hence we arrive at the question why people have preferences for fairness and why they behave in a reciprocal way. One route to answer this question is the Indirect Evolutionary Approach (Güth and Kliemt (2000), Güth, Berninghaus and Kliemt (2004)). It considers agents which are motivated by any preferential function, irrespective whether it contains intrinsic and other-regarding motives or not. The decision behaviour is guided by the traditional rationality approach. But the material outcome of the decision making is now the starting point for an evolutionary adaptation process which selects the agents according to their material (observable) success. Therefore, the process selects indirectly for different preference types. The evolutionary dynamic results in an Evolutionary Stable Strategy (ESS) which can be characterized as a distribution on the set of possible preference types. Applying this approach to the trust game, the authors can show why, to which extent, and under which conditions we can expect that agents behave trustworthy and trust each other. Thus, this approach helps to escape from the problem of non-falsifiability because now the theory is not able to justify any preferential pattern as rational (for a critical assessment cf. Pasche (2008)).

Although its status as an explanatory approach is questionable, the insights from BE about other-regarding preferences, trust, and voluntary cooperation are important for policy design. As extensively discussed in the literature, monetary incentives and intrinsic motives may interact in a complex way (Frey and Stutzer (2008)), especially in case of environmental taxes (Kallbekken and Sælen (2011), Bazin et al. (2004)). On the one hand, intrinsic motivations might help to establish pro-environmental behaviour, this

effect can either be enforced or also crowded-out by monetary rewards.

2.3 What does BE say about the goals?

The literature primarily discusses how BE can help to better understand the transmission of environmental policy measures to the behaviour of the people. Insights from BE should be used for a better policy design. If we take BE as a positive explanatory approach which substantially modifies or replaces - depending on the point of view - the neoclassical paradigm in environmental economics, then we have also to discuss the operating or intermediate goals to be achieved. Consider, for example, that an externality should be internalized by a tax in order to correct a market failure. Now we have learned from BE that the endowment effect influences the willingness-to-pay answers which are necessary to construct a proper Pigouvian tax. Should we expect that the design is substantially improved by considering this behavioural effect? If taking the idea of other-regarding preferences seriously, then the agents do not value their own situation (before and after the policy measure), they are evaluating the complete allocation, i.e. the vector of outcomes and also the procedure how it was achieved. Thus, the system of relative prices is inherently incomplete. As a matter of principle it is impossible to derive welfare implications in the same way as neoclassical economics is doing. Thus, we are forced to rethink about the question how to define an efficient state or an collective optimum. When distributional concerns become a part of individual preferences, then allocation efficiency and distribution cannot be defined independently. This includes also the inter-generational distribution.

3 Behaviour based Environmental Policy and the Missing Public Choice Perspective

The behavioural-environmental economics literature typically claims that BE informs us about empirical specifications of decision behaviour and preferences, and that this knowledge is useful or necessary to develop proper policy tools and strategies. This is the social planner perspective. It is important and valuable, but in a representative democracy, environmental policy needs support of voters, it has to be designed by politicians, and to be implemented by the administration. Or more general: transforming the economy in favor

of sustainable production and consumption patterns requires mechanisms of collective action. The Public Choice perspective, however, plays a negligible role in behavioural-environmental economics. This may have the reason that Public Choice (hereafter: PC) is still primarily based on a traditional rationality concept. I argue that nevertheless the PC perspective is still necessary:

(a) The insights from BE cannot be translated immediately into an improved environmental policy. The social planner might be informed better now, but the institutional setting and the features of political mechanisms are still in place and will shape the decisions. If, for example, environmental tax rates are determined by political negotiations and lobbying, improvements in the monetarisation of external effects by accounting for “behavioural anomalies” will not really help. Another example: the social planner is informed that agents have problems to adopt their behaviour to a long-run perspective because of hyperbolic discounting. Does this help for a policy which has to be made by policy makers who have a much shorter time-horizon due to elections? Moreover, politicians and other agents in the political process are also characterized by the discussed deviations from perfect rationality. Biased perceptions, framing, failures in Bayesian inferencing, heuristic decision making etc. - one could have the impression that deviations from rationality are particularly prevalent in the political system. A possible explanation might be that these effects are normally interpretable as a sort of rule-rationality, guiding the behaviour in a successful direction. However, “success” means for a politician that his public reputation increases and he is re-elected. This is not the environment, to which the evolution has adapted rule-rationality to. Moreover, intrinsic motivation and pro-social or pro-environmental preferences of politicians do not necessarily trigger their behaviour towards sustainability. Since they need power in order to implement decisions according to their preferences, the logic of political competition forces them to opportunism. We have to account for these mechanisms.

(b) The PC perspective has explanatory power which is not sufficiently exploited in environmental economics and policy design. Why are some market-based instruments like emission certificates not as effectively as expected? One can think about “innovative” explanations like crowding-out effects on intrinsic motivation. Or one can consider that the initial issuing of emission rights by grandfathering rather than by auctioneering (due to political lobbying, rent-seeking, and interest to be re-elected) created inefficiencies (An-

thoff and Hahn (2010), Brand and Svendsen (2004), literature overview in Kollmann and Schneider (2010)). I argue that in many cases there exist some straightforward self-evident arguments from PC which help to explain the deficiencies of environmental policy in an convincing way. The shortcomings of the neoclassical approach is not only its ill-defined behavioural basis, but also its blindness for the impact of institutions.

(c) Behavioural Economics can help to enrich Public Choice as a positive theory of collective decision making mechanisms. It could not only contribute to a better understanding of politician's motivations, or of how environmental lobbying depends on intrinsic motivations. It could also help to clarify whether environmental policy goals are properly assigned to institutions, and whether sustainability requires significantly different governance structures which are more conform with insights from BE. This will be briefly discussed in section 5 by an example.

4 Are there new policy conclusions “derived” from Behavioural Economics?

While the neoclassical approach is characterized by its generality and universal adaptability, behavioural approaches are more “local” theories. Framing effects with a reference point describe the behaviour in lottery choice experiments or willingness-to-pay studies, but do they play a role in the dictator or public good game? We observe trustworthiness in trust games, but does this play a role for understanding lottery choices? Does fairness explain something in simulated anonymous markets? If a preference function with a certain parametrization which is fitted to data from an ultimatum game has a good predictive power there, does it also describe the behaviour of the same agent when he is involved in a bargaining game or in an auction?

In most cases the answer is No. Behavioural concepts apply to specific contexts. We cannot expect to observe the same effect (at least not quantitatively) in a different context where it may be compensated, enforced, or modified by many other motivations or behavioural anomalies. Especially the estimated parameters e.g. of a preference function need not to be valid in even slightly different situations (see e.g. Neilson and Stowe (2002) on the Prospect Theory).

Since one important goal of experimental economics is to test rival hypothesis, it is important to design the experiments in a way which allows to discriminate between similar, but different effects, e.g. between altruism and fairness, between conditional cooperation and selfish behaviour which aims to trigger the partner towards cooperation, or between following an internalized norm or the fear to be punished when violating the other's norm. Although this might be done successfully in a controlled experiment with few alternative hypothesis, it is a hopeless task in case of uncontrolled field data where multiple effects of boundedly rational and socially interacting players are present. Moreover, results from experimental investigations can generally not be applied one-to-one to real-world situations.

To summarize, we have a lot of interesting and relevant insights into decision making processes, but one has to be very careful to “derive” direct qualitative results for other contexts and for real-world situations. And quantitative conclusions are even more problematic.

Nevertheless, it seems to be very attractive to advocat for BE in order to draw innovative conclusions. In many cases the relationship between behavioural approaches and its alleged consequences for environmental policy is more or less vague and narrative. As an example, Gowdy (2008) refers to a couple of insights from BE in order to derive far-reaching global consequences for climate policy (see also Brekke and Johansson-Stenman (2008) on this topic): (i) human well-being or happiness does not only depend on consumption, therefore material growth should not be the goal, (ii) human beings are able to (volunarily) cooperate. Cooperation is more likely when the result is seen as being “fair”, and if it is enforced by the possibility of punishment. Hence it would be better to equip climate policy negotiations with some sanction mechanism. Especially the latter implication is really surprising and innovative for a neoclassical economist!

One could have the impression that many intuitive solutions and broadly accepted pathways in environmental policy or sustainability policy are now intellectually ennobled by referring to Behavioural Economics (with concurrently bashing neoclassical economics). It is very interesting and important to learn from BE about the determinants of voluntary cooperation. But that sanctions for free-riding enforce cooperation is a wisdom which could also be found in undergraduate textbooks in microeconomics. And it is also interesting and important to see why and under which conditions people develop behavioural habits

which might be resistant against price signals. But do we need an elaborated innovative economic theory to draw the conclusion that the government should send consultants to the households in order to explain them how to save electricity by accustoming them to switch off devices from the stand-by mode? Although it is valuable that BE inspires new ideas in environmental policy, it is in many cases too far-reaching to claim that new policy conclusions are derived from it or could be founded by a behavioural theory.

Since BE seems to be a more fragmented concept, leading to numerous context-dependent local approaches, it is perhaps not possible any longer to derive policy goals, concepts, and measures from one clear theoretical foundation. Perhaps theory and policy are now connected more by “telling reasonable stories” rather than by econometric models. But actually because of this, one should avoid to draw too quickly too far-reaching conclusions from results which might sometimes be not robust.

5 Contributions to Public Environmental Goods – an Example

Since I am also convinced that BE provides a lot of valuable insights to understand choice behaviour from an economic perspective, the paper ends with a prominent example. The aim is not to summarize well-known results from the literature, but also to show that the results can go hand-in-hand with a Public Choice perspective.

Any project which aims to reduce the negative impact on the biosphere (e.g. pollution reduction) has a specific form of positive externality: other agents benefit from it and nobody can be excluded from these benefits. Such an externality is often described as a Public Good (hereafter: PG). The standard textbook wisdom is that individual rationality implies an incentive to free-ride which leads to Pareto inefficiency. The standard result from Behavioral Economics, however, is that real people voluntarily contribute to a PG to a significant extent. PG games are one of the most investigated prototype games in experimental game theory, and there is a large body of evidence regarding the specific conditions which shape the level of cooperation. This attracted a lot of attention in environmental economics because the textbook results suggests that a PG requires governmental regulation via taxes or other incentive structures enforcing cooperation. However, there are a lot of limitations, especially in cases where such enforcement mechanisms are

not available, e.g. in case of global negotiations about reduction of greenhouse gases. BE now opens new routes of overcoming or alleviating this problem. Below I discuss some determinants of voluntary cooperation which are often considered as important:

(a) There is no clear evidence that group size has a monotonous impact on the level of cooperation. The cooperation differences of large and small groups depend crucially on factors like the marginal revenues from the PG (Isaac and Walker (1988b)), communication (Isaac and Walker (1988a)), or the ability of monitoring and punishing free-riders. As Carpenter (2007) argues, large groups can discipline free-riders in a similar way than small groups do. It could be argued that small groups might have an advantage because group members are more likely to know each other, to communicate, and to enable stricter “social control” of individual behaviour. This means, however, that it is the personal relationship, communication, and controllability rather than the group size itself which fosters cooperation (see also Isaac et al. (1994)).

(b) Direct interaction induces higher cooperation rates than anonymous interaction. Face-to-face interaction, preferably with communication, is better than only seeing a picture or hearing the voice of others, and the latter is better than completely anonymous interaction (Isaac and Walker (1988a), Brosig et al. (2003)). This seems to be important in order to build up personal reputation, feelings of responsibility, and inducing shame in case of (potentially) violating social cooperation norms.

(c) The possibility of sanctions or punishment has a significant impact on the level of cooperation which also leads to vanishing “end-round effects” where the cooperation level decreases sharply in the last iterations of the game (Bochet et al. (2006), Fehr and Gächter (2002), Sefton et al. (2007)). While the disciplinating effect on potential free-riders is also obvious from a neoclassical perspective, it is more interesting to observe that agents are willing to punish costly which is also a contribution to a public good: all other group members benefit from the induced disciplinating effect without carrying the costs. Nevertheless, players are willing to punish as long as they believe in a significant effect (which requires that also other cooperators are willing to punish as well), and to feel responsible for it. Each sanctioning mechanism requires that the agents are able to discriminate other agents. It must be able to detect free-riders which requires some detailed information, e.g. that past decisions are observable.

(d) The level of cooperation is higher when it is suitable to build up reputation (Reinstein

and Riener (2012)). This requires that own contributions are visible to the others. They feel proud if others appreciate his/her cooperativeness, and they fear to feel shame in case of that own free-riding would be recognized by others. People who are in fact free-riders seem not to be too interested in reputation. Reputation also means that people know that other people expect him/her to behave according to this cooperative image. This points to a bi-directional causality: in partner-selection treatments it was shown that the players who have been selected by others in order to play the PG game exhibit a higher level of cooperation (Coricelli et al. (2004), Keser and van Winden (1997)).

(e) Composition of the group and group identity matters (Smith (2011)). Most PG experiments operate with randomly chosen groups. Allowing for the selection of group members (partner-selection, see above), and especially allowing for communication and pre-play interaction which creates a kind of “group identity” increases the contribution levels.

Almost every determinant can be related to a fundamental underlying pattern of human behavior: reciprocity. The specific form of reciprocity in PG games can be characterized as conditional cooperation (Fischbacher et al. (2001)). Agents are willing to cooperate to a certain extent if they have reason to expect that other players will also cooperate, and they will cooperate only with those people who are cooperative, and not with others (or the others are punished if it is not possible to prevent them from exploiting the cooperators). Everything which makes reciprocity more likely - information, communication, ability to discriminate, building up reputation - will help to stabilize and enforce cooperation.

Conventional solutions of PG problems and henceforth a large part of conventional environmental policy do not consider intrinsic motivations or social reciprocity norms which would help to direct behaviour in the right direction. Those solutions are based either on command-and-control or on individual incentives which shapes individual behaviour as if the individual is not a group member. BE now shows that monetary incentives are not additive to intrinsic motivation, but may lead to crowding-out effects which makes the policy tool less effective. People have the impression that the responsibility shifts from the individual to the government, reputation and reciprocity now play a minor role because the own voluntary effort does not affect the results anymore. Example: consider that an individual reduces emissions voluntarily by reducing the use of cars. Now eco-taxes on fuel are introduced, making car-driving more expensive. Since the individual has already

contributed to emission reduction, it feels “punished” because the low use of the car is now much more expensive. As a result, he/she will use the car to the same extent as before, but now due to the increased price, not due to intrinsic motivation (see, again, Bazin et al. (2004)).

How can BE contribute to environmental policy design in the context of PGs? There are only few examples, where traditional environmental policy utilizes cooperative behaviour, e.g. the willingness to separate different types of waste to make recycling easier. In most contexts it is unfortunately unlikely to promote the determinants of conditional cooperation like direct interaction, reputation, communication, group identity, ability to punish etc. In case of global problems where the “group members” are countries rather than individuals, the psychological and emotional basis for reciprocity is missing (or difficult to establish), and the abilities to punish are very limited.

Nevertheless, BE seems to point into the direction that environmental policy should be less global but more project-oriented, more related to regions or cities, and with much more participative elements. People want to see that their behaviour matters, they want to see which people contribute to which extent, they want to feel some responsibility which is only possible with some abilities to influence the result. This is in a sharp contrast to abstract incentive schemes like taxes or market prices for emission rights. The enforcement mechanisms seem to work better on the level of social networks or local groups, and they are crowded out when global enforcement mechanisms by centralized governments are in work.

Interestingly, Public Choice analysis comes to similar conclusions, but arguing in a very different way (see Kollmann and Schneider (2010)): the public administration prefers command-and-control policies which are less efficient than market-based instruments, the lobbying system systematically favors industry interests rather than green interests. The former have an incentive to manipulate politicians to implement weak (insufficiently designed) market-based instruments. As a possible solution, the authors suggest to give the voter more power. Voters which are assumed to have more or less pro-environmental preferences, should decide about environmental policy measures in (local) referenda. These participatory elements enable them to directly express their preferences and to decide about the agenda setting. Public Choice theory, however, does not favor participatory elements because of their ability to enforce voluntary cooperation, but to reduce the power

of rent-seeking groups. A second clue by Kollmann and Schneider (2010) is also in line with the results from BE: an obstacle to efficient solutions in environmental policy is information asymmetry about environmental impact of products. The authors argue that instruments like eco-labelling might help to overcome these problems. This is also confirmed by the fact that consumers are motivated by many other things beyond their own material payoff, e.g. distributional or environmental concerns. Thus, the price system is inherently incomplete and does not reflect what a neoclassical economist would call “marginal willingness to pay”. More information about the conditions of production or the environmental impact would improve the allocation mechanism.

6 Conclusion

The results from Behavioural Economics are very appealing for environmental economics and policy. They promise a better understanding of unsustainable behavioural patterns, and will help for designing more proper environmental policies. The paper discusses some critical issues: behavioural-environmental economics does not necessarily provide a better understanding as long as the explanatory power of underlying concepts in Behavioural Economics is under critical debate. Moreover, a misinterpretation of “behavioural deficits” or “preference anomalies” can lead to misleading policy conclusions. It is argued, that many innovative approaches in ecological policy might be inspired by behavioural concepts but cannot be derived from them in a logical sense as it can be said for neoclassical economics. Since behavioural models are very context-sensitive and its parameter estimations are not robust, such a “derivation” of general policy recommendations is questionable. It is suggested not to draw too quickly, too far-reaching conclusions from concepts with limited predictive power. A further point is that many new insights are valuable from a social planner perspective. For implementing a sustainability policy, however, the Public Choice perspective is missing. It is shown by the example of contributions to public goods (cooperation), that the Behavioural Economics perspective and the Public Choice perspective come to similar solutions.

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