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Proportionate and disproportionate policy responses to climate change: core concepts and empirical applications

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ABSTRACT

A fresh perspective on policy-making and planning has emerged which views disproportionate policy as an intentional policy response. A disproportionate policy response is understood to be a lack of 'fit' or balance between the costs of a public policy and the benefits that are derived from this policy, and between policy ends and means. This paper applies this new perspective on the proportionality of policy-making to the area of climate change. The first part of the paper discusses the underlying causes of disproportionate policy responses in broad terms and then applies the theoretical reasoning to understand the conditions in which they are likely to appear in relation to climate change. These conditions are hypothesized to relate to four main factors: economic considerations; levels of public demand; focusing events; and strategic considerations. It concludes with the suggestion that societal actors may be able to manipulate these four factors to encourage politicians to adopt policies that mitigate climate change more rapidly than is currently the case in most countries.

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Introduction

Recently, a fresh and exciting perspective on policy-making has emerged which differentiates between proportionate and disproportionate responses to policy problems. In a nutshell, a policy response is proportionate if there is a 'fit' (or balance) between its costs and the benefits that are derived from it, as well as between policy ends and means. A policy response is disproportionate if there is no such balance (Maor, in press-a, in press-b). Disproportionate policy responses have two manifestations, namely policy over- and under-reaction. Policy over-reaction can be conceived of as a situation in which the policy measures adopted by decision-makers impose costs that are too high given the benefits (Maor, 2012, p. 235). One manifestation of policy over-reaction is policy over-investment by governments which occurs when they over-invest in a policy tool beyond its instrumental value in attaining a given goal (Jones, Thomas, & Wolfe, 2014, p. 149). By contrast, policy under-reaction can be understood as a situation in which the policy adopted by decision-makers provides net utility (i.e. the difference between benefits and costs) which is smaller than the one that would have been obtained had a different policy been enacted (Maor, 2014a).

This paper represents a first attempt to elaborate on the concept of disproportionate policy and then apply it – as an *intentional and strategic* policy response – to the area of climate change. In recent years, climate change has moved very rapidly up national and international policy agendas as scientific knowledge of human contributions to climate change has accumulated. This scientific knowledge has been summarized in the work of the

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Intergovernmental Panel on Climate Change (IPCC), which in turn has informed the activities of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC).

Despite the agreement (in Paris, in late 2015) among policy-makers that the world needs to do much more to 'pursue efforts to limit the [global] temperature increase to 1.5°C above pre-industrial levels' (Hulme, 2016 p. 222), there is still a great deal of disagreement about which climate policies should be adopted and how they should be designed and/or calibrated. Should the focus be on avoiding damage by reducing emissions (mitigation) or on responding and building greater resilience to cope with the effects of climate change (adaptation)? Much of the disagreement over what should be done, by whom and when centres on the perceived costs and benefits of acting for different groups and to society at large. In these debates, which have recurred since climate change was first recognized as a global challenge in the late 1970s, the proportionality or otherwise of policy responses has been absolutely centre stage, but has rarely been studied as such. Given the well-known 'gap' between current emission trajectories and those that keep warming within 2 degrees (or even 1.5 degrees) (see Spash, 2016), one could follow the IPCC and argue (in a very broad sense) that the overall policy response to date has been one very large under-reaction. However, adopting such a broad perspective does not really engage with the (dis)proportionality of specific policies and policy instruments, which are centre stage in everyday politics.

In what follows we seek to illustrate that, at times, specific policy responses are guided by what could be termed disproportionate policy incentives, and therefore, should not be considered as 'erroneous' policy responses derived from mistakes of omission or commission in the diagnosis and the prescription stages of decision-making (Walker & Malici, 2011). Furthermore (and given that climate change is an especially long-term issue), we emphasize its temporal dimension, that is, what is perceived as a disproportionate policy response at time t may be perceived as proportionate at time $t + 1$, and vice versa. The same goes for different levels of disproportionality, which can range from the broad type of policy (e.g. mitigate, adapt or both?) through to the setting and scope of specific policy instruments.

We argue that while identifying specific examples of both types of disproportionate response is a worthy endeavour, it is equally important to identify the underlying conditions in which either policy response is most or least likely. The aim of this paper is first of all, to shed new light on these conditions and incentives, and secondly to illustrate the causal mechanisms by applying them to actually existing climate policies. Our original contribution to the literature on disproportionate policy responses consists in: (1) treating disproportionality as possibly the product of strategic/intentional action; and (2) applying what have, until now, been largely conceptual arguments to a whole policy area – climate change. Finally, we draw on the findings of this application to prepare the ground for future studies of policy disproportionality in other policy areas.

The rest of this paper proceeds as follows. We first offer a general discussion of the underlying causes of disproportionate policy responses. Then, we provide the empirical assessment of disproportionate policy responses. Next, we apply this conceptual perspective to climate change policy. Because of space constraints, we limit our empirical illustrations to national policies that aim to mitigate climate change, thus excluding climate change adaptation policies (but see Dupuis & Biesbroek, 2013). In the final section we formulate some hypotheses, offer some concluding thoughts and discuss the value added of our new approach.

The causes of disproportionate policy responses

The study of disproportionality in policy-making was inspired by the recognition that there can be mismatch between the adaptive strategies people devise and the information they receive, resulting in people reacting disproportionately to information (Jones, 2001). This mismatch is expected to affect the costs and benefits of policy action. Costs and benefits are, of course, the stock in trade of economic analysts. The costs and benefits of particular policy interventions have also provided rich material for political scientists since the dawn of policy analysis in the 1960s (Leone, 1986). They speak to the broader puzzle of 'who gets what, when and how' in social life (Lasswell, 1936). The specific issue of proportionality in public policy-making was, however, first addressed by Phillips (1954), who elaborated on how governments should react to move effective demand for labour toward the desired employment level (typically full employment). Proportionality has also been a central topic in studies of policy evaluation (Sanderson, 2000). Public health research has paid particular attention

to quantifying disease burdens and costs to evaluate whether or not a particular policy response is proportionate (e.g. Magliano et al., 2009). Thus, disproportionate policies are those that impose costs on the regulatees and the wider public that are too strict and hence entail considerable burdens (see also Bernauer & Caduff, 2004). The basic question of whether particular policy responses are proportionate given the severity of a policy problem and the costs associated with them has since migrated into the study of other policy areas, including environmental protection (Goulder & Parry, 2008).

Most attempts to explain the underlying causes of disproportionate policy responses are anchored in the notion of bounded rationality. This implies that decision-makers are intendedly goal-oriented and adaptive, but because of human cognitive and emotional limitations and the sheer abundance of information that is directed at them (Walgrave & Dejaeghere, 2016), they sometimes fail. Jones and Baumgartner (2005) focus on the disproportionate allocation of attention by political actors relative to the severity of policy problems. They find that disproportionate information processing is key to explaining policy oscillations over time. Similarly, Sunstein and Zeckhauser (2011) stress the difficulties individuals have in dealing with probabilities, which leads to over-estimating the probability of specific hazards. In such situations, individuals tend to base their decisions on emotions and simplifying heuristics rather than 'rational' cost-benefit analysis. As a result individuals tend to demand excessively precautionary or preventive actions (Tosun, 2013), which policy-makers are all too willing to deliver if it secures them an electoral advantage.

Maor (2012) complements this line reasoning by introducing the idea of over-confidence by policy-makers as another explanatory factor. Scholars have also focused on constitutional rules and institutional procedures (Maor, 2014a) and flawed decision-making processes such as groupthink (Janis, 1982) and polythink (Mintz & Wayne, 2016) as determinants of disproportionate policy responses. We find the notion of policy over-reaction more appropriate than the notion of policy over-investment developed by Jones et al. (2014), because it covers broad areas of national interest such as economic efficiency, social welfare, social justice, sustainability, and individual well-being, rather than being restricted to narrow considerations of economic efficiency.

Crucially, proportionate policy responses have been viewed as an *unintentional* policy mistake of omission or commission in the formulation and adoption stages of the policy process (Walker & Malici, 2011; see also Howlett & Kemmerling, in review). The inefficiency of disproportionate policy responses combined with their supposedly unintentional causes and erroneous aspects have, however, led scholars to ignore the conditions and incentives which may encourage policy-makers to deliberately over- or under-react.

An example of policy over-reaction from the climate policy area might be the EU Emissions Trading System which has witnessed several setbacks including the repeated over-allocation of allowances to target groups (specifically electricity generators and large, intensive users of energy). These over-allocations eventually triggered a significant price crash; some companies also generated windfall profits by passing through the costs of the allowances to their customers (see Branger, Lecuyer, & Quirion, 2015). Despite these and other setbacks, the system is still in place. In fact it represents the world's only supranational trading scheme and is the single most-important climate policy instrument in the EU (Wettestad, 2014).

Maor (2014a, pp. 426–428) identifies *policy under-reaction* as a distinct type of disproportionate policy response. It is characterized by a slow, insufficient or non-response by policy-makers to a situation of increased risk or opportunity, thereby reducing the actual net utility of a policy to a level below its counterfactual. For example, climate change adaptation policies are justified on the basis of a 'no regrets' approach (see, e.g. Heltberg, Siegel, & Jorgensen, 2009), according to which measures taken ostensibly to reduce climate uncertainty should also realize other policy objectives (see, e.g. Cheng & Berry, 2013). This approach implies that any climate adaptation measure that yields benefits even in the absence of climate change is considered viable. In the area of flood preparedness, for instance, the practices adopted have often failed to deliver when projected climate change predictions regarding floods materialized (see Heltberg et al., 2009; for an overview on adaptation policies, see Massey, Biesbroek, Huitema, & Jordan, 2014).

Deliberate policy over-reaction may be inferred from a policy decision that is backed by a credibly large amount of committed resources, is perceived by policy-makers as overwhelming response, and is executed as planned (Maor, in press-a, in press-b). In times of crisis involving panic and popular fears, deliberate policy over-reaction may arise from top political executives wishing to restore confidence in government in a matter of

days (see De Francesco & Maggetti, 2016). In non-crisis times, it may arise from top political executives wishing to have an overwhelming effect on their surroundings as an act of leadership; to apply a grand strategy to policy problems in support of the wider public interest; to create and secure their long term legacy, and to respond to public pressures to act disproportionally. Motivations for engaging in policy under-reaction may include the wish to respond to uncertain risk projections in a way that creates net social benefits under all future risk projections, with no or low costs and committed resources, and without involving hard trade-offs with other policy objectives (Maor, 2017, in press-a, in press-b).

While we acknowledge that disproportionate policy responses may stem from different types of limitation and bias, we take on board Maor's (in press-a) perspective that, at times, policy over-reactions and under-reactions may also be calculated and strategic decisions aimed at pursuing specific policy goals. A policy decision is strategic when a government or an equivalent authority takes a calculated decision to act in order to advance long-term goals. In a nutshell, the disproportionate policy perspective argues that under certain conditions:

- policy-makers may face incentives to design and implement disproportionate policy options, and that, at times, the implementation of these options may be successful in achieving a policy goal;
- policy-makers may prioritize policy effectiveness over policy costs, leading to policy over-reactions, and under other conditions, a cost-conscious response over an effective one leading to the design and implementation of policy under-reactions;
- disproportionate policy options may be designed to be used as signalling devices, as context-setters, or for purposes other than policy implementation 'on the ground';
- the emotional dimension of policy may be equally, if not more, important than the substantive one (i.e. the one directly related to the policy problem).

Such disproportionate responses may also be sustained for an extended period by positive feedbacks (Jones et al., 2014; Maor, 2014b, 2016).

We now need to identify the more specific conditions under which policy-makers operating in the area of climate change are likely to develop such motivations. First of all, economic considerations may lead to both types of disproportionate policy response. As Bernauer and Caduff (2004) argue, policy-makers may decide to deliberately enact stricter than necessary regulation to protect certain economic actors. One possible benefit of stricter regulation is that it shields domestic firms from foreign competition. Thus policy-makers could adopt standards which still incur some costs to their domestic economy, but which at the same time create higher costs for foreign competitors. Likewise, policy-makers could also over-react and adopt very strict regulatory standards to overcome trade restrictions imposed on their industries (Tosun & de Moraes Marcondes, 2016).

Policy under-reactions, by contrast, may be driven by the equally strategic goal of protecting certain economic actors. In environmental policy, the impact of economic interests on the definition of regulatory standards has been thoroughly discussed in relation to 'races to the bottom' or 'regulatory chills'. Here, the underlying mechanism is that footloose investors relocate their polluting industries to 'pollution havens' in parts of the world where the environmental standards are less strict. This can induce governments to deliberately lower their standards to a level below what is possible given the available technology ('race to the bottom'), or to maintain their standards and not to increase them further ('regulatory chill') (Bernauer & Caduff, 2004; Burns & Tobin, 2016; Dong, Gong, & Zhao, 2012). In these circumstances, we expect economic considerations to be the main driver of disproportionate policy responses, which are primarily motivated by the desire of policy-makers to attain other (in our case, 'non' climate) policy goals.

The second condition arises from one of the basic rationales underlying disproportionate policy responses: the wish to address public demands. Policy over-reactions are more likely if the public's risk perception forces policy-makers to come up with policy solutions (see Shackley & Deanwood, 2002; Urwin & Jordan, 2008), which are disproportionate to the severity of the policy problem at hand. In countries where the public is critical or fearful of a given risk, non-governmental organizations may relatively easily mobilize their membership and demand stricter policy arrangements (Bernauer & Caduff, 2004). In addition, changes in classic cleavage structures (Lipset & Rokkan, 1967) and/or the emergence of new cleavages which lead to citizens' demands over this

issue (Carter, 2013; Kitschelt, 1988), may induce policy-makers to over-react. These individuals and organized interests may make it politically costly for policy-makers to delay policy responses, which in turn encourages policy-makers to be highly responsive.

Being highly responsive to public demand, that is doing something as swiftly as possible to satisfy citizens, makes sense politically, especially if the pressures are applied at an electorally significant point in time (e.g. during a by-election or immediately prior to a general election). A good case in point is the ban that the French government has imposed on horizontal drilling to extract shale gas. Facing a massive societal mobilization, the French government instituted a ban even though the country possesses considerable shale gas reserves (see Chailleux & Moyson, 2016).

By the same token, policy under-reactions may arise if public attention to an issue is low and/or non-existent. Given that the ability of policy-makers to process new information is limited (Walgrave & Dejaeghere, 2016), rational policy-makers will tend to prioritize problems that are visible to a large share of the population. Therefore, when the public pays low or no attention to an issue, policy under-reactions are the most likely outcome. This point is illustrated by the issue of drug residue cocktails in water bodies, which were found to pose a risk to aquatic organisms and may even harm human health (Heath, Filipič, Kosjek, & Isidori, 2016). Nonetheless, there have been limited calls from the public to regulate this risk. Public demand is associated with policy-makers' wish to prioritize policy effectiveness over policy costs and the importance they attach to the emotional component of a policy decision. With regard to the latter, Sunstein (2005) has argued that fear is the main driver of policy over-reactions, which are facilitated by the use of policy-making principles such as precaution (Tosun, 2013).

The third condition that may lead policy-makers to adopt a disproportionate response is related to their desire to swiftly switch the terms of the debate to their advantage. Politicians typically respond in this way when confronted with a sudden 'triggering' or 'focusing' event (Birkland, 2006). The decision to close down all nuclear reactors in Germany following the Fukushima disaster provides a classic example of this (Rinscheid, 2015). Policy over-reaction is a particularly desirable strategy when the focusing events arrive at a time when public attention is already high and is then pushed to an even higher level (see, e.g. De Francesco & Maggetti, 2016; Tosun & de Moraes Marcondes, 2016). Deliberately over-reacting may thus appear as an effective policy move – at least for a limited period of time – if it insulates policy-makers from short term electoral losses.

A fourth condition is when elected officials seek to produce a disproportionate effect by taking the lead in national or international policy arenas. In the national policy arena, policy over-reactions are the most likely outcome of political considerations since policy-makers compete against each other to offer policy options that are easily observed and appreciated by voters. In this regard, policy over-reactions are a better political tool than under-reactions. To give an example, Green-Pedersen and Mortensen (2010) have shown that members of the parliamentary opposition in Denmark made a greater attempt to bring environmental issues onto the agenda than members of the governing parties.

Policy-makers may have an especially powerful motive to do this. For example, they may wish to voluntarily initiate policy, even if it does not produce offsetting benefits, in response to a global problem that may heavily impact national economic performance. In the international arena, governments may wish to be perceived as an environmental leader or pioneer. Héritier (1996, p. 150) has argued that the strategic 'first move' by one country to reap political or economic gains subsequently entails a 'unilateral adjustment' by the rest as they seek to catch up. Veenman and Liefferink (2012) offer a detailed analysis of how Denmark, the Netherlands, and the United Kingdom influenced EU climate policy.

To sum up, we argue that policy over-reactions and under-reactions are not necessarily 'erroneous' policy responses, but rather may be guided by careful, strategic calculations made by decision-makers. Policy over-reactions might be motivated by economic considerations, public demand, focusing events, and strategic considerations. Policy under-reactions may stem from economic considerations and the lack of public demand. Thinking about disproportionality as an *intentional* outcome provides a way of getting to grips with the fact that whether a given set of policy effects are proportionate or not, often comes down to a matter of judgement – that is, disproportionality has an inescapably *evaluative* character. One way to measure disproportionate policy responses relies on experts using cost-benefit analysis to compare national standards with (national or international) standards. In contrast, our new strategic–intentional conception suggests that disproportionality can

also be understood as being the outcome of a *political* process through which elite and public perceptions of proportionality come together to shape a particular policy.

The other thing to bear in mind is that the understanding of the proportionality of a policy response is always time-specific. Thus what is perceived as a policy over-reaction at time *t* may be perceived as a proportionate response policy at time *t* + 1 (see Haynes, 2008: 405), or even as an under-reaction. Policy preferences, in other words, are not invariant in politics. Over time, for example, (scientific) evidence and hence public and elite understanding may change. For example, in the late 1980s, the nature of climate change and humans' role in affecting it, was not as fully appreciated or scientifically established as it is now. This view changed when the IPCC reported in 2007 that 'the consistency across different lines of evidence makes a strong case for a significant human influence on observed warming at the surface' (IPCC Working Group I, 2007).

Time plays another important role in the assessment of policy responses. Following Phillips' (1954) logic, proportionality would entail a constant adjustment of policy responses to the nature or severity of problem it seeks to address, in much the same way as levels of social security are automatically pegged to changes in the rate of inflation. Weaver (1988) refers to this process as 'automatic government'. Therefore, a disproportionate response might not only result from deliberately taking a decision, but also when politicians deliberately decide not to take one – that is, 'non-decision'-making (Bachrach & Baratz, 1963). Therefore, we should not simply read policy over-reactions as being equal to (too much) action and vice versa. Instead, a more refined conceptualization (and theorizing) is needed to grasp the phenomenon of disproportionate policy responses.

Disproportionate climate policy responses: some empirical characteristics

The existing literature on disproportionality has tended to be more conceptual than empirical. In this paper we make one of the first attempts to assess disproportionate policy responses empirically. In doing so, we first unpack 'policy' into its component parts, and then outline our understanding of climate policy (chiefly in relation to mitigation – see above). As the seminal literature on policy design tells us, the nature (and hence the dynamics) of policy design vary a lot – for example, the selection of broad policy goals vs. selection of policy instruments vs. the calibration of those instruments (Howlett, 2010).

This line of thinking builds on the influential work of Hall (1993), who differentiated between the objectives, instruments, and calibration of a particular policy. At the first level of policy are the specific objectives in place. The second level relates to the instruments used to realize them. The third level corresponds to the concrete setting or calibration of particular policy instruments. Knill, Schulze, and Tosun (2012) added a fourth category which denotes the scope of a policy instrument, that is, how it governs its target groups. These four categories have been used to empirically assess how policies – in terms of their density and intensity – have expanded and/or contracted over time (Bauer, Green-Pedersen, Héritier, & Jordan, 2012; Jordan, Bauer, & Green-Pedersen, 2013; Knill et al., 2012; Schaffrin, Sewerin, & Seubert, 2014).

Disproportionate policy responses can, in principle, refer to any of these four dimensions. First, a policy may set out an objective that is overtly or insufficiently ambitious. Second, a policy may prescribe the adoption of policy instruments that are too strict or too lax given a problem. Third, the calibration of the policy instruments may be too strict or loo lax. Fourth, the policy may target a group that is too wide or too restricted given the scope or magnitude of the problem.

For example, climate policy, could be seen as an over-reaction at the first level of *policy objectives* if it pursues the immediate objective of reducing emissions of greenhouse gases (GHGs) to zero within the next decade. On the other hand, it could be perceived as an under-reaction if it simply reduces the rate of growth in emissions over time. Similarly, a policy may institute a ban on the production of all new gas- and diesel-powered cars (potential over-reaction) – note that such a resolution was adopted by the upper house of Germany's parliament in October 2016 – or just require new passenger cars to produce less emissions per kilometre travelled (as required by prevailing EU rules; see Jordan & Matt, 2014) (potential under-reaction).

Turning now to the second level, subsidies (a specific type of *policy instrument*) are often used to steer the behaviour of consumers. However, these could be *calibrated* (Hall's third level) in such a fashion that they either support one very specific purchasing decision or a range of such decisions. For example, a subsidy might be

provided to purchasers of lower emission diesel cars (a potential under-reaction, given the contribution they make to local air pollution) (European Environment Agency, 2015) or to those of ultra-low emission electric cars (a potential over-reaction). In similar vein, limit values for GHG emissions can be defined in such a fashion that they either represent an over-reaction or an under-reaction.

Turning finally to the *scope* of the policy instrument (Hall's fourth level), emission standards can be adopted that may either be binding on all industries (even those that do not pollute GHG emissions) (a potential over-reaction) or very few (leaving out some sources of GHG emissions (a potential under-reaction) (see, e.g. Studer, Tsang, Welford, & Hills, 2008).

What are the main types of actually existing climate policies? A systematic answer to this question has been offered by Fankhauser, Hepburn, and Park (2010), who differentiate between the following main types of policy instrument: carbon taxes, permit trading schemes, technology-specific subsidies, and regulatory standards. Carbon taxes are directly connected with the level of carbon dioxide emissions and put a price on the volume of these emissions with a view to create an incentive to users to reduce their consumption of fossil-fuel energy sources. Carbon taxes are typically applied to diffuse sources of carbon dioxide emissions such as the road transport, residential, and commercial sectors.

Emissions trading systems set a limit or a cap on the level of GHG emissions released. The basic idea is that each polluter has a quantity of allowances to release GHG emissions, which are auctioned or allocated for free to liable entities. For every emitted quantity of GHG emissions allowances must be redeemed. If the quantities at the disposition of the individual polluters are unused, they have the possibility to trade them. The emission cap is set by the sum of the allowances available. In 2005, the EU established its Emissions Trading Scheme (see above).

One of the most popular types of subsidy are feed-in-tariffs (FITs) which are targeted at boosting renewable energy generation (see, e.g. Jacobs, 2014; Lechtenböhmer & Luhmann, 2013; Stadelmann & Castro, 2014). FITs set long-term minimum guaranteed prices for the electricity produced from renewable sources (e.g. wind) which, in turn, should accelerate investment in renewable energy technologies. Finally, regulatory standards mandate a specific type of clean technology or force a specific target group to lower its carbon emissions. The example that Fankhauser et al. (2010) give are the mandates asking electricity producers to generate a certain proportion of their electricity using renewables.

Formulation of hypotheses

These policy measures possess different potentials for being the subject of disproportionate policy responses. This section connects the policy instrument types with the four conditions of disproportionate policy responses identified above. The existing literature adopts a broad perspective on the issue of disproportionality. It suggests that mitigation politics are likely to generate disproportionate policy responses in certain conditions. The characteristics of climate change policy-making identified by Levin, Cashore, Bernstein, and Auld (2012) – the weakness/absence of a central authority, the tendency to discount future costs – implies that most policy responses will be under-reactions. On the other hand, economists such as Fankhauser et al. (2010) argue that governments are likely to adopt too many policy instruments to mitigate climate change, which implies that policy over-reactions are more likely.

What does our strategic–intentional approach add to these broad brush accounts? It seeks to identify the conditions under which either policy response is most likely to appear. As explained above, economic considerations can induce decision-makers to engage in both a policy over-reaction and an under-reaction. Whether a government will opt for the first or the second of these will depend on the costs incurred by their respective domestic industries. The government of a country that has a large 'green' industry will have an economic interest in adopting policy over-reactions to benefit it (see Jänicke, 2012). The policy over-reaction is likely to concern tax systems, technology-specific subsidies, and regulatory standards; it could refer to the adoption of policy instruments, or to their settings and scope. Likewise, Colenbrander, Gouldson, Sudmant, and Papargyropoulou (2015, 2016) argue that economic considerations may trigger climate policy over-reactions in middle-income countries.

Denmark and Germany, for example, have adopted FITs, which have helped to kick start large renewable energy industries (see, e.g. Jacobs, 2014; Lipp, 2007). In Germany, the revisions to the Renewable Energy Sources Act adopted in 2012 have, however, changed the calibration of the FITs, reducing the rates paid to generators of renewable energy (with the exception of biomass, geothermal, and offshore wind energy). A further reduction in 2014 marked another shift towards mandatory direct marketing of renewable energy by means of market premiums (Lang & Lang, 2015).

By the same token, countries with more carbon-intensive industries (coal producers, for example, or large intensive users of electricity such as aluminium smelters) are more likely to seek to protect them by means of policy under-reactions. This can be achieved by abstaining from adopting taxes, providing subsidies or keeping regulatory standards at a low level or even dismantling them (see, e.g. Stadelmann & Castro, 2014). Poland, for instance, had been remarkably inactive in adopting national climate policies. For a while, it passively followed the EU's lead, but in the last few years it has sought to weaken EU climate policies – with which the country has to comply – to lower economic losses incurring from them (Jankowska, 2010; Marcinkiewicz & Tosun, 2015).

This line of reasoning culminates in our first hypothesis:

H1a: Higher expected benefits for the domestic economy increase the chances of an over-reaction in climate change mitigation policy.

H1b: Higher expected costs imposed on the domestic economy increase the chances of an under-reaction in climate change mitigation policy.

The second cause of disproportionate policy responses is public demand. When public demand is high, it is more likely that policy-makers will seek to capture votes by over-reacting. This logic is noted by Fankhauser et al. (2010, p. 210) who claim that policy-makers are driven 'more by politics than by economic considerations'. However, they do not specify the underlying causal mechanism. It is the case that policy-makers in virtually all EU member states have some incentive to engage in policy over-reactions. In the past, Greece was among the EU member states where the share of people expressing their concern about climate change was highest (Lorenzoni & Pidgeon, 2006). At the same time, Greece is one of the countries with many policy instruments (see, e.g. Lekakis & Kousis, 2013), which can be interpreted as a possible case of over-reaction. Lachapelle, Borick, and Rabe (2012, p. 348) reveal the low acceptance of the American and Canadian public for costs incurring from climate change mitigation policies, which resulted in the failure to introduce a carbon tax.

This line of reasoning culminates in two more hypotheses:

H2a: Higher public demand for political action increases the chances of an over-reaction in climate change mitigation policy.

H2b: Lower public demand for political action increases the chances of an under-reaction in climate change mitigation policy.

The third condition relates to the role of focusing events. As noted above, focusing events are likely to result in more policy over-reactions, since policy-makers are more likely to find themselves under pressure to demonstrate immediate and 'visible' action (De Francesco & Maggetti, 2016; Tosun & de Moraes Marcondes, 2016). To illustrate this line of reasoning, the United Kingdom serves as an apt example. Climate change moved up the political agenda after a series of hot summers and flood events (Carter & Jacobs, 2014; Owens, 2010). In response, in 2008 the government passed the Climate Change Act, 'a first-of-its-kind legislation legally binding the UK to an ambitious greenhouse gas emission reduction target of 80% of 1990 levels by 2050' (Gillard, 2016, p. 26). This policy could be perceived as an over-reaction as the reduction levels specified exceeded those of other EU member states. Gillard and Lock (2016) go a step further in claiming that it can be conceived as a 'policy bubble' (Maor, 2014b), that is a sustained policy over-reaction. At EU level, climate mitigation and adaptation policies proliferated after key focusing events, namely the Gazprom energy crisis and significant river flooding in Central Europe, respectively (Jordan, Huitema, van Asselt, Rayner, & Berkhout, 2010; Rayner & Jordan, 2010). These examples suggest one more hypothesis:

H3: Focusing events increase the chances of an over-reaction in climate change mitigation policy.

The fourth condition is related to the policy-makers' wish to set the national or international policy agenda with a view to demonstrate their political power or to benefit from a first-mover advantage. Again, this condition is expected to result in policy over-reactions only. For example, Finland was the first country to adopt an explicit carbon tax in 1990, followed by the other Nordic and European countries in the 1990s (see Daugbjerg & Pedersen, 2004). The introduction of the carbon tax in Finland must be seen against the backdrop of the Brundtland report (published in 1987, which called for sustainable development) and the Toronto climate conference in June 1988 which kick started international action on climate change (Jordan et al., 2010). The Toronto Conference acknowledged that climate change was a serious problem and that industrialized countries should reduce their GHG emissions by 20% in 2005 with respect to 1988 levels. Following Vehmas (2005), the introduction of the carbon tax in Finland was motivated by an expectation that other countries would follow; Finnish politicians hoped to seize a first-mover advantage in a global race to the top. This line of reasoning culminates in our final hypothesis:

H4: The presence of strategic interests increases the chances of an over-reaction in climate change mitigation policy.

Conclusion

Policy responses that attempt to mitigate climate change have recently received greater attention. In this context, the politics concerning the sources, patterns and effects of climate policy innovations have been discussed and yielded important insights (see Jordan and Huitema, 2014a, 2014b). This article seeks to contribute to this body of literature by making a plea for adopting a sharper focus on the behaviour of policy-makers (and in particular politicians), who engage in developing and spreading policy innovations (see also Jacobs, 2014; Schaffrin et al., 2014; Stadelmann & Castro, 2014). In particular, it calls for more attention to be paid to the calculus underlying their decisions.

To that end, we have greatly refined the concept of policy disproportionality, which until now has mostly led to economy wide comparisons of the costs and benefits of particular policy options. The existing literature suggests that economic considerations along with public demand, focusing events and strategic considerations may induce policy-makers to opt for disproportionate policy responses, which can either constitute policy over- or under-reactions. Once we open up these possibilities, it is possible to conceive of disproportionate climate change mitigation policies as not simply being the result of unintended decision 'errors', but the result of strategic political thinking. In other words, under certain conditions, some disproportionate policy responses may be the outcome of deliberate decision-making.

Of course, this argument is just a starting point. The empirical examples provided here have simply offered an initial plausibility probe. There are three ways in which it could be further developed. First, we invite other analysts to empirically test the hypotheses presented here by using appropriate methods, including quantitative and qualitative analysis as well as mixed-methods designs. Second, our theoretical model did not elaborate on the interaction between the four variables and neither did it discuss whether or not there is a hierarchy between the variables. It could also be that the relative explanatory power of the variables changes over time. Therefore, it seems promising to continue the theoretical discussion we started here and to pay attention to interactions and hierarchical structures.

Third, we explained that disproportionality in policy responses is an evaluative concept, which requires careful operationalization. As the primary objective of this paper was to introduce the concept and to connect it to empirical illustrations, the evaluation criteria used for the individual examples varied. In a next step, however, it would be useful to develop a set of criteria to compare how decision-makers evaluate across a range of different cases. Fourth, treating disproportionality as an outcome of deliberate decision-making has a potentially important implication for those social actors who seek to accelerate decarbonization: the behaviour of policy-makers could conceivably be steered by the four variables discussed above (see, e.g. Drews & van den Bergh, 2016). This prospect is an encouraging one for climate activists as it means that society may be able to mitigate climate change more rapidly if politicians are provided with the 'right' mix of incentives and enabling conditions.

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