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Coping with Creeping Catastrophes: National Political Systems and the Challenge of Slow-Moving Policy Problems

Volker Schneider, Philip Leifeld and Thomas Malang

Introduction

Catastrophes are usually associated with phenomena like tsunamis, earthquakes or asteroid impacts – disasters that happen rapidly with immediately visible impacts. A different logic is involved when problems and challenges evolve incrementally, in slow-motion, and when they only become visible over long periods (Pierson 2004). Jared Diamond recently referred to such changes as “creeping normalcy” (Diamond 2005). Changes are perceived as normality if they happen in unnoticed increments. This concept was used to explain the varying adaptation capacities of human societies to long-term environmental changes.

A powerful metaphor illustrating the inherent dangers of such processes is the boiling-frog allegory. Al Gore was using it in his movie “An Inconvenient Truth”. If a frog is thrown into a pan of boiling water, it will immediately jump out, but if you put a frog in a jar of warm water and gradually heat it to boiling, the frog will stay until it boils to death. The frog’s nervous system is apparently impervious to changes in temperature until their fatal consequence because it happens piecemeal-incrementally. Anthony Giddens was quick to

baptize this temporal dilemma as the “Giddens’s Paradox”, stating that, “since the dangers posed by global warming aren’t tangible, immediate or visible in the course of day-to-day-life, however awesome they appear, many will sit on their hands and do nothing of a concrete nature about them. Yet waiting until they become visible and acute before stirred to serious action will, by definition, be too late” (Giddens 2009: 99).

In the evolution of human societies, there are a number of processes that exhibit this pattern of “creepiness”. The above-mentioned climate change is just the most broadly discussed social and political problem of this kind. Other examples of creeping catastrophes are increasing social stress produced by aging societies, the slow accumulation of toxic chemicals in the environment and food chain, or global pandemics like SARS and AIDS combined with increasing antibiotics resistance. All these processes have in common that they evolve bit by bit, are cumulative, and possibly result in disastrous long-term consequences.

In this paper, we are not interested in the material side of this process pattern, but rather in its political and social consequences. We try to determine if and how societies and their political systems differ in the capacity to detect such creeping problems early. We suppose that these differences are related to variations in their “nervous systems of governance”, which control perception and adaptive behavior (Ashby 1956; Deutsch 1963). We are interested in how this social cybernetics is generated by internal differentiation and integration of societal mechanisms and how these “neuronal networks” perceive, communicate, and act. A key question is: Do democratic political systems, where political power is dispersed and shared among many, perform better with the perception of creeping challenges, or do we find examples of effective “eco-dictatorships”? Does decentralization and multilevel differentiation show adaptive advantages, as it is not only claimed by recent management tracts (Brafman & Beckstrom 2006), but also by collective action scholars such as Ostrom (2010)?

Based on a comparison of national policies related to global warming, the paper will discuss and then develop some hypotheses detailing how, why, and under which conditions differently structured policy systems show varying performance. We will first outline an analytical framework how political systems deal with this kind of long-term risks, and how differently structured systems have adaptive advantages and disadvantages. In the subsequent section, we will test some of these hypotheses related to the climate change topic empirically in a macro-quantitative model. We argue that internal structures and external factors both contribute to the varying pace and degree of governmental reaction. We will conclude with a

list of weaknesses and limits these macro-quantitative models exhibit and propose some complementary research strategies.

Societal development and adaptation

The issue of political adaptation to environmental changes is a rediscovery within the last decade. During the 1960s, it was an important concept within the developmental theory of political systems (Almond 1965; Parsons 1964). In the last decade, it reentered the discussion with respect to the adaption of political systems to significant economic and political transformations (Grote, Lang & Schneider 2008), and it became a particularly powerful concept with respect to the impact ecological transformations have on political systems (Folke, Hahn, Olsson & Norberg 2005).

Traditional social theory strongly focused on the construction and maintenance of order. The question of how societies successfully overcome structural and behavioral changes in order to cope with critical problems was only raised in a few “grand theories”. One of these theories is Marxism, which holds the optimistic belief of a teleological sequence of changes in economic systems and forces of production. These are ultimately driven by social conflict, where the whole process leads to an increasingly powerful mastery of nature and society. The other approach with a similar teleological content is systems theory. It emphasizes general adaptive capacities and openness of social and political systems, the latter of which are based on increasing structural and functional differentiation (Almond 1965; Deutsch 1963; Parsons 1964).

A serious problem with traditional systems theory is that systems and systemic processes, for the most part, remain “black boxes” in which actors, relations and mechanisms are opaque (Bunge 1996). In this respect, we use basic ideas of governance theory to identify varieties of actors with different functions and institutional structures enabling communication, integration and long-term adaptation (for an overview see Schneider & Bauer 2007).

A fundamental problem from this point of view is to understand under which conditions societies attain complete adaptive failures, i.e. “collapse”. Historical analysis has demonstrated that there are many reasons for the collapse of past societies. External factors threatening the existence of a society are, for example: climate change, hostile neighbors, depletion of vital resources, natural catastrophes and a variety of economic factors (Diamond 2005; Tainter 1988). In addition to these environmental challenges, internal societal tensions

such as class conflict and elite misbehavior may also lead to collapse. Since we are not interested in all reasons for failure but rather in socio-political ones, we concentrate on typical social processes that are related to *societies' perception and responses to critical problems*.

Complex societies develop differentiated political and cultural rule systems to cope with critical threats and problems. Why can a society fail in this respect? When we think of which essential parts of the problem-solving process can go wrong, we can separate the factors in a sequence of four phases (Diamond 2005). Some of these phases are well known in the “policy cycle” literature of political science (May & Wildavsky 1979).

First, a society can *anticipate* a problem. But anticipation can fail for several reasons: a society may have no prior experience of a given problem and cannot imagine the possibility of its occurrence. Another cause is reasoning by false analogy (Diamond 2005). While analogy is a well-known technique for the solving ill-structured problems (Simon 1973), such constructions may be false and consequently suggest inappropriate strategies.

At the second stage, a society has to *perceive* a problem when it occurs. Once having anticipated a phenomenon, perception can still fail because the anticipated phenomenon is not recognized as a problem, or the dimensions of the problem are not fully understood. There are several reasons for a failure of perception. 1/ The material origins of a problem can be imperceptible; 2/ cultural and political factors can be responsible that an objective problem is subjectively not perceived as such; 3/ a failure to perceive a problem may be implied in its temporal pattern: if it grows incrementally, bit by bit, and if these changes are concealed by continual fluctuations, even if there is an exponential growth during the first stages, societies may conceive this as “normalcy”.

The third step is the *actual solving* process through collective action. Many societies fail at this stage, often due to conflicts of interest based on distributive effects of problem-solving, due to incompatible problem-solving philosophies, or due to coordination problems. Other possible reasons are described in models on social traps and dilemmas like the prisoners' dilemma or the logic of collective action. Finally, failure can also emerge from irrational behavior based on non-adaptive norms and values (Diamond 2005).

Even if a society has anticipated, perceived, and communicated the problem and controls the relevant resources, failure is still possible because the problem can be *beyond the solving capacities*. It could simply be too expensive to solve, efforts could be “too little, too late”, or the solution could “disimprove” the situation.

Modern societies are differentiated and many heterogeneous agents and rule systems contribute to the problem solving process. Following the “Nerves of Government” analogy introduced by Deutsch, the various parts of a society are integrated in a central nervous system, communicating observations and perceptions between the components and controlling its collective behavior, which should contribute to problem-solving and adaptation (Deutsch 1963). But to avoid the functionalist blind alley of thinking society as super organism with a centralized brain, a more suitable concept is the “policy network” as outlined by Kenis/Schneider (1991: 24): “The core of this perspective is a decentralized concept of social organization and governance: society is no longer exclusively controlled by a central intelligence (e.g. the State); rather, controlling devices are dispersed and intelligence is distributed among a multiplicity of action (or "processing") units. The coordination of these action units is no longer the result of "central steering" (...) but emerges through the purposeful interactions of individual actors, who themselves are enabled for parallel action by exchanging information and other relevant resources” (an overview give Lang & Leifeld 2007; Schneider, Janning, Leifeld & Malang 2009).

Capacities of problem-solving: hypotheses and conjectures

Which roles and functions do the various societal agents – government, science, the media, and NGOs – have in the above-mentioned stages of problem-solving? Is it possible to relate the varying capacities to cope with creeping problems to their structural features (e.g. relational patterns and resource distributions)? In the following section, we apply the policy network perspective and derive some hypotheses associated to varying capacities of national political systems when coping with this specific type of policy problems.

Anticipation

There are only two ways of anticipating a problem which has not yet become manifest. The first is to rely on introspection or a kind of supra-natural “revelation knowledge”. The other is predictive knowledge based on empirical evidence. Problems can frequently be anticipated through scientific forecasts, and science then works as an early warning system. In this instance, science as a cultural subsystem of society is considered to be a crucial part of the perceptual apparatus. However, as we will argue, scientific anticipation alone is not a decisive factor for an effective start to societies’ problem-solving process: it must be considered in conjunction with the importance a given society attributes to scientific knowledge. Even if we assume that science is able to predict the slowly emerging problem correctly, the early

anticipation of a problem will fail to become socially relevant if a society does not consider science to be an authoritative and credible tool for at least approximately true “knowledge-making”.

We can therefore conjecture that reputation and status of the national science systems depend on how advanced they are in scientific terms. Moreover, the higher the reputation and status of a national science system, the more likely it then is that problems get correctly anticipated because decision-makers are more likely to hear their voice. The issue, however, is how to measure these differences in a macro-comparative perspective. While the measurement of reputation is difficult in all respects, two straight measures would be the number of researchers in a country and expenditures for research and development.

Perception

Perception is the core around which cybernetic metaphors such as nerves and neurons gravitate. Two crucial aspects are considered: First, we analyze conditions for the *scientific* perception of a given problem. Second, we emphasize *societal* perception of facts and analyze mechanisms through which they become socially relevant. The first is primarily a scientific task whereas the second refers to how sensitively mass media, social movements and interest groups function as societal “neurotransmitters” that link a change in environmental conditions to a credible threat. Aside from the above-mentioned channels of interest intermediation transforming scientific findings into generalized knowledge, science may also be directly drawn into policy networks: Science may be an influential agent by producing and communicating relevant knowledge (Leifeld & Schneider 2010). If the network operates effectively, relevant information may diffuse faster among political actors, and the politicization of a given problem should be easier than in tightly controlled autocratic or hierarchical systems. Assuming that this network argument is true, we expect a government to be more sensitive to climate change problems when there are more possibilities of getting access to the political agenda via decentralized policy networks.

This argument is also valid at the global level. In the contemporary “global society”, science is part of the world polity in which information exchange cannot be restricted to national boundaries (Drori, Meyer, Ramirez & Schofer 2003; Fisher 2003). Problem perception in one national science system quickly diffuses to other regions and countries, and this diffusion is particularly strong if countries are members of intergovernmental organizations such as the OECD, European Union, or specialized organizations such as the

IPCC. These organizations not only facilitate but also sponsor exchange and cooperation in scientific knowledge-making and diffusion (Beck 2010; Haas 2005).

Various studies have shown that countries vary greatly in the way their scientists perceive the problem of climate change (Bray & Krück 2001; Grundmann 2007). However, these differences do not fully capture the national variations in perception. The latter has to be related to socio-political communication by intermediaries like social movements, interest groups, political parties and mass media, but also to the general cultural background in which a given problem such as climate change emerges (Verweij et al 2006). Social movements are not just “problem communicators”, they also help to frame and crystallize issues, making them socially relevant (Moser 2007). In the case of global warming, green NGOs are of particular importance (Carpenter 2001; Fisher 2003; Keohane 2002). Since major impacts of climate change will not occur in the near future, the topic is less tangible to the public and various stakeholders. Green NGOs therefore have to work for a sustained problem perception. Compared to single issue campaigning generally associated with the approaches of NGOs to environmental and public risks, climate change “ushers in a new era of engagement” (Gough & Shackley 2001).

It is not surprising that green social movements are closely linked with green parties. Since environmental problems and, in particular, global warming imply long-lasting and high-risk problems, the emergence of green parties from social movements can be understood as a consolidation of this issue area. In line with our neural model, we assume that the more numerous and politically integrated social movements and green parties are in a given society, the better and more stable the societal perception of global warming will be.

Another risk transmitter is the media. It has a crucial function as a source of information and opinion about scientific findings for citizens (Carvalho 2007; Weingart, Engels & Pansegrau 2000). Public perception of this domain is significantly influenced by the representation of scientific knowledge transmitted through various means of mass communication (Corbett & Durfee 2004; Krosnick, Holbrook & Visser 2000). In this respect mass media are also important for the understanding of perceived risks, and it is obvious that only individuals who understand the complex relation between causes and effects are willing to take action to impede the risk (Stamm, Clark & Eblacas 2000).

The ways in which people think about environmental problems is not necessarily accurate or complete. Nevertheless, these cognitive processes are likely to influence both the willingness and ability of societal agents to participate in problem-solving. We consequently

assume that uncensored media coverage has two effects on problem perception: It transforms scientific perception of a problem into a general societal perception, and it also contributes to the understanding of the nature of the problem and thereby motivates collective action. The relation between these factors can be expressed in the following hypothesis: The better the understanding of the issue of global warming, the more likely it is that a society will take action to prevent the problem, and without a free press, the step from scientific perception to social perception is less likely. Therefore we believe that the greater the freedom of press in a society is, the more likely the societal perception of a creeping problem will be.

Agenda setting

The intermediate step between societal perception and a policy solution is the shift from the social to the political realm in problem-processing. A first stage in this process is the transformation of the issue to a topic on the priority list of a political system. Communication science and policy research call this process “agenda-setting” (Kingdon 2003). A jump on the political agenda may be triggered through communication by non-governmental actors and mass media. But agenda-setting may also originate from the inside of politics – the bureaucratic or parliamentary arena. Another powerful trigger is the environment of a political system, as it is emphasized in the literature on policy transfer, diffusion, and convergence (Holzinger & Knill 2005).

There are several dimensions where political systems can differ with respect to the openness and permeability of their policy-agendas. One important factor is the access of social movements and NGOs to participation in policy networks. Political systems vary widely in terms of their degree to which they integrate new and rather weak interests (Kriesi 1995). In this respect, it seems reasonable to assume that inclusion-prone or consensus-oriented political systems incorporating all actors concerned in policy processes are likely to perform better in the political perception of societal problems (Dryzek 2009; Jost & Jacob 2004; Scruggs 2003). While this “openness” is difficult to measure in a quantitative perspective, a proxy measure could be Lijphart’s index on consensus democracy (Lijphart 1999).

Problem-solving

Once a problem is on the political agenda, the struggle for a policy solution is often a process which is driven by conflicting interests and the quest for power. Accordingly, it seems to be appropriate to take the institutional structures of governmental systems (in the narrow sense) into account. A classical political question is if the dispersion and sharing of political power

enhances or reduces the capacity for collective action (Norris 2008). In the political science literature, there are two contrasting hypotheses: 1\ Tsebelis' veto player model states that an increasing number of veto players in a political system reduces its capacity to change the status quo by collective action (Tsebelis 2002). 2/ Lijpharts studies on democratic systems point to performance advantages of decentralized political systems where power is shared among many actors and different levels (Lijphart 1999; Wälti 2004). Power dispersion sums up the arrangement of executive power, party systems and electoral regimes, interest group structures, but also the vertical division of power in federal systems. From this perspective, there are two major streams of argumentation: On the one hand, it is conceivable that "majoritarian systems" with only one real center of power are able to produce policy solutions faster and more radical than consensus models. On the other hand, governments in more consensus-oriented democracies, which have to look at several different actor positions when designing a policy in a deliberative way, could be affiliated with more encompassing, mature, and long-term policy solutions. In such arrangements, electoral cycles and pressures have less impact than in majoritarian democracies, which are more short-term oriented. For instance, a minority party like the Greens in Germany can be considered more influential in consensus systems because they, at the very least, must be integrated in policy-making, whereas in majority systems environmental problems could be ignored.

The case of climate change: Applying macro-quantitative analysis

The previous sections sketched a theoretical framework for system analysis. We argued that different political and social systems structures contribute to both the varying pace and degree of governmental reaction in coping with long-term risks. To illustrate our point, we will now discuss the case of climate change and show some analytical results. After presenting our findings and discussing weaknesses of this approach, we conclude with a prospect to complementary research strategies.

The issue of anthropogenic global warming was first hypothesized by the Swedish physicist and chemist Svante Arrhenius about 100 years ago. But only during the last two or three decades, climate change has been perceived as a pressing global risk to be tackled both at the national and the global level of world society. However, various countries react rather differently to this common challenge. We will try to test whether this variation is caused by political characteristics of these countries.

Hypotheses and Operationalizations

Successful coping - our explanandum - is measured by two dependent variables: The first is the duration between the agreement on the Kyoto protocol, initially adopted on 11 December 1997, and the date of ratification, acceptance, accession or approval of the protocol by countries measured in days. The second is the countries' ratification time span of the 'Montreal Protocol on Substances That Deplete the Ozone Layer' which was opened for signature on September 16, 1987. These time spans show which countries are early adopters and which countries are laggards.

Our assumption is that governments are willing and able to control the level of CO₂ emissions only if they assign a high priority to this risk. Following our theoretical framework, we identify four different ways how the national level of risk awareness is affected. These four hypothesized connections and their respective operationalizations are outlined in the following.

The first dimension which should have an influence on the urgency national governments assign to the climate change question is the *level of risk-exposure* of each country. Risk exposure can be measured by dividing the length of the coast lines of a country by the country's area. Countries with a high coast/area ratio are often directly threatened by extreme weather conditions and especially by rising sea levels.

The second aspect captures the effect of research and education on the national capacity of *problem anticipation*. On a very basic level, our indicators of Research & Development (R&D) expenditures and the number of researchers working in the R&D sector simply measure the quantitative importance of the scientific sector in a country, e.g. how much money and manpower is put into research. This leads to the hypothesis that the bigger the R&D share in a country, the higher the possibility that a creeping problem is anticipated. However, since science and research is very much a *globalized* undertaking, the crucial role of national researchers is in fact the transformation of scientific inference into public knowledge: It is not about which national scientific system has first discovered that there is a phenomenon like climate change and which problems this could spur for mankind. It is rather the question which national scientific system is credible in forecasting global development. Hence, R&D expenditures and the number of researchers also capture the qualitative credibility a society attributes to science in delivering expertise, and the institutionalized position science has in a national political system. We assume that the higher the shares of

these indicators, the more scientific inference is considered as a basis for societal and political action, hence the faster a country will anticipate the dangers of global warming.

The possibility to obtain and publish diverse information and opinion is the third aspect which is hypothesized to make governments consider global warming as a pressing problem. The possibility to communicate societal problems is a necessary condition for public discourse, which we assume to increase the chances of perceiving climate change as a threat. We operationalize this by the number of newspapers in a country, the percentage of internet users and the Freedom House Index, which measures the political rights in a country, such as freedom of speech and freedom of assembly.

Our last dimension departs from the discourse argument but additionally considers the possibilities of *organized collective action* in a country. It is hypothesized that the better the legal and factual possibilities for organizing political claims, the more likely the emergence of organized interests concerning the mitigation of climate change. We use readily available measures of good governance (Kaufmann et al 1999), electoral participation (Vanhanen 2000), and the Polity III Index as indicators of the nation states' capacity to serve as the arena of extensive public discourse and the possibility of public claims to be transformed into political programs. We expect democratic countries to actively engage in climate protection policy while authoritarian countries rather shy away from becoming very active.

Why are countries early adopters or laggards? The pace of government activity can be assessed by looking at the Kyoto Protocol and Montreal Protocol survival data. More specifically, we analyze the ratification dates as a function of our indicators presented above. Survival analysis, which is also known as event history analysis, is an econometric method which allows to analyze durations as a function of time by fitting parametric distributions (e.g., the exponential or the Weibull distribution), or as a function of covariates (such as risk-exposure). In the case of the Kyoto Protocol, there is obviously no distribution that could reasonably well be fitted to the ratification durations because the hazard rate is bimodal. A survival model which is capable of estimating the effect of country-level variables on the time to ratification is the Cox Proportional Hazard Model. The assumption of this model, however, is that the hazard ratios are constant, i.e. the survival curves in the figures 12.1 and 12.2 should not cross each other. As this is clearly not the case, the proportional hazard assumption is violated. In such a case, Tableman & Kim (2004: 136) propose to use a non-parametric survival model. Moreover, the data is right-censored because not all countries have ratified the protocol. We therefore use the non-parametric Kaplan-Meier approach for each covariate

separately and report the survival curves in figures 12.1 and 12.2 (see Efron 1988: with further references to survival analysis).

What factors – besides diffusion – are responsible for early versus late adoption? We include several of the above-mentioned covariates in our model and estimate their effect one by one. The black survival rate represents the value 0 of a dummy variable, while the gray line is the value 1 of the same dichotomous variable. If an explanatory variable is continuous, we dichotomize the values at the median value.

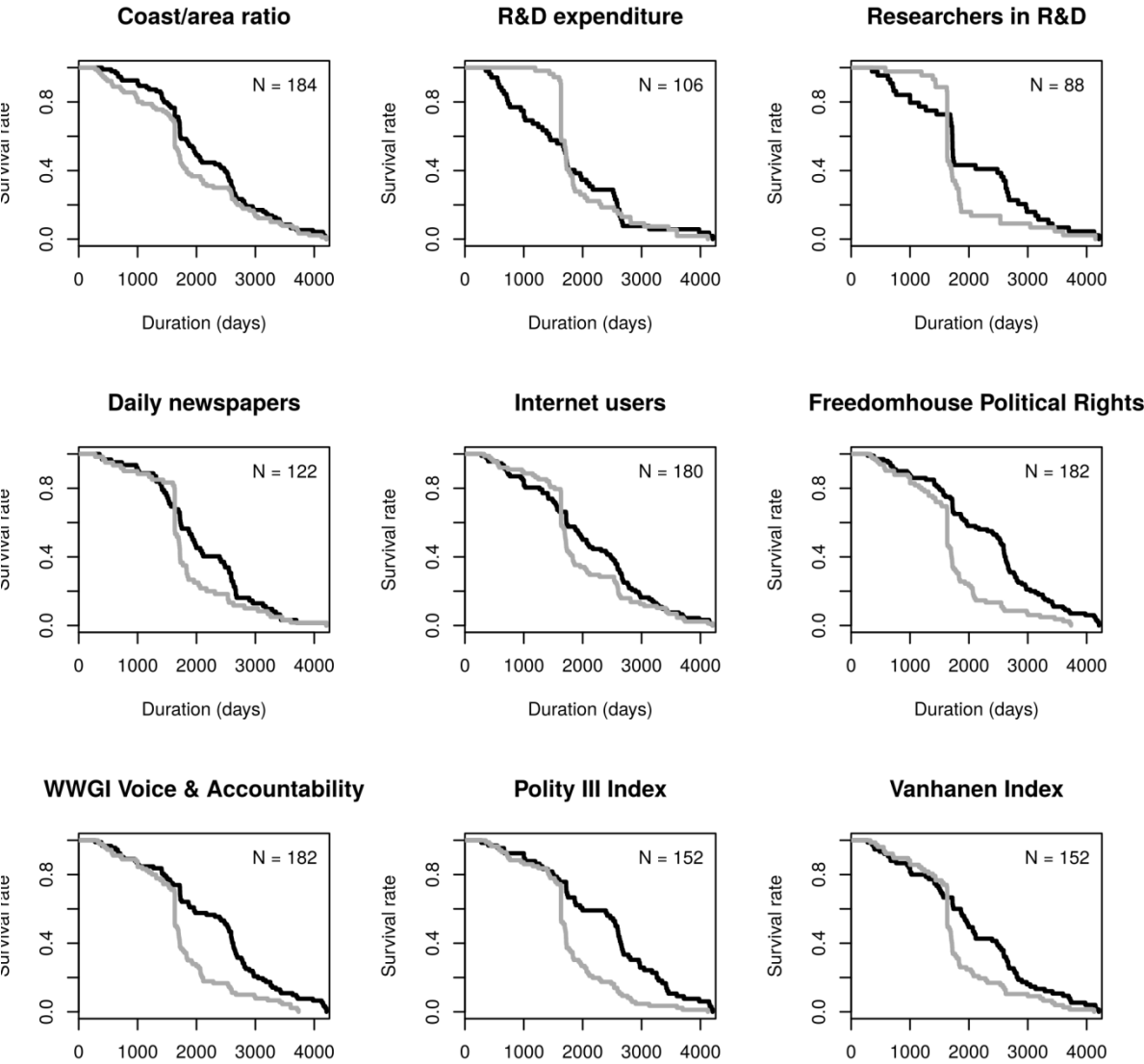


Figure 12.1: The Ratification of the Kyoto Protocol

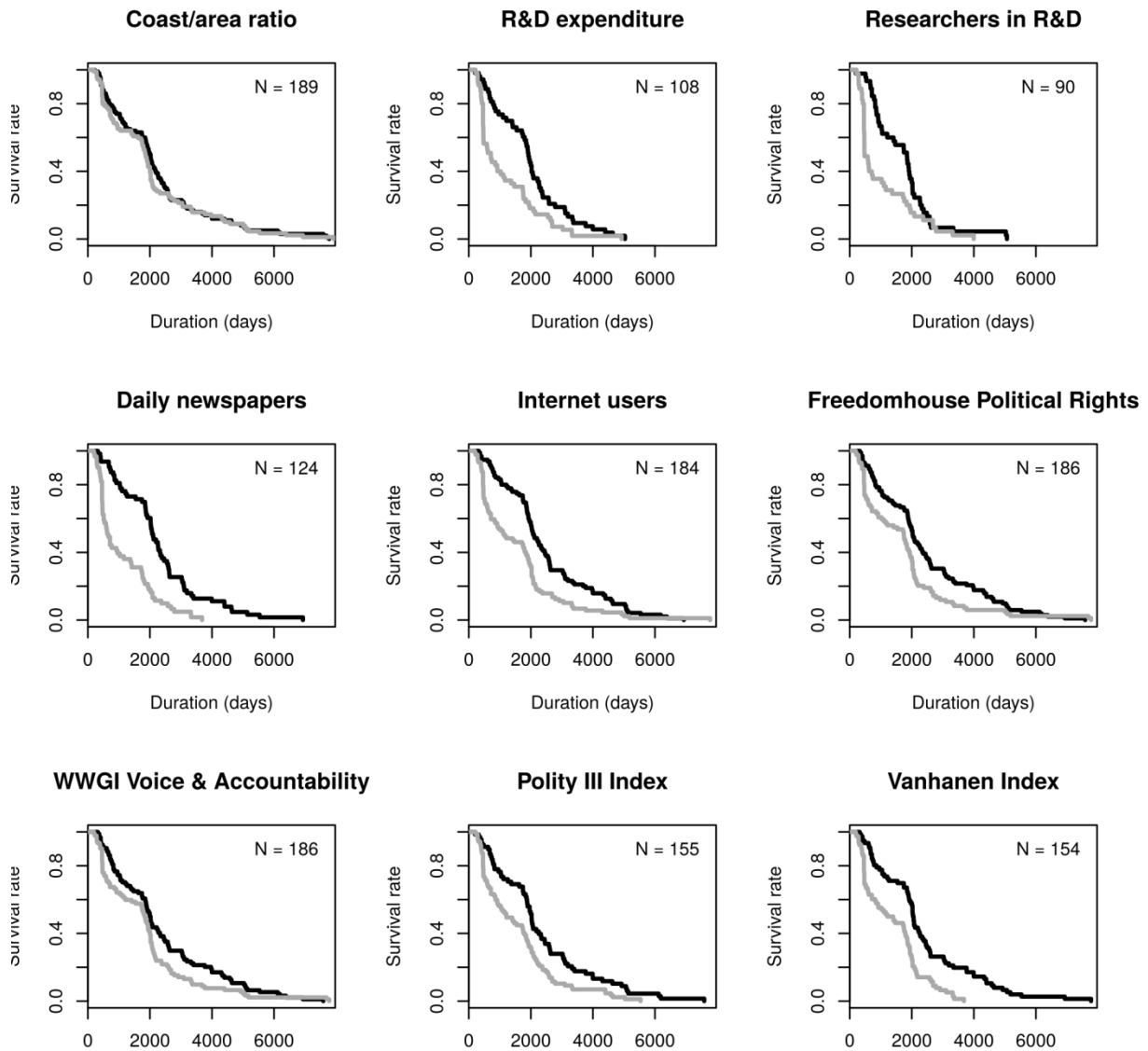


Figure 12.2: The Ratification of the Montreal Protocol

In the first plot, the level of risk-exposure is analyzed. The cost/area ratio is dichotomized at the median value of the distribution in order to partition countries into a group of strongly exposed (value 1) and less exposed countries (value 0). There is a clear difference in the survival rates of the two groups: After the first few ratifications of the Kyoto protocol, exposed countries ratify the protocols faster than less exposed countries. However, in this respect the Montreal data show a much the weaker effect on the pace of ratification. The gray and the black line are almost identical, but more risk-exposed countries are still consistently faster at reacting.

Social and political explanatory factors are more interesting in the context of our theory. In the following graphs we test the effect of the scientific system on the ratification

speed. In the case of the Montreal Protocol, it is evident that nations with higher R&D expenditures and more research staff are faster in adopting the protocol at any time. For the Kyoto Protocol, we find the same pattern as for the risk exposure analysis. Since almost all countries of the EU exhibit high values on the two measurement items, up to the date of the collective European ratification, countries with lower importance of the scientific system adopt the protocol faster, but once the European states sign, the same pattern as in the Montreal analysis can be observed. Hence, countries with a strong scientific system, which enjoy high public and political reputation in problem anticipation, react faster to the long-term threat of global warming than countries where the sciences have a weaker position.

The second line of our plots shows the variables measuring the information and communication infrastructures necessary for a free public debate. In the case of Kyoto, there is obviously a correlation between ratification pace and the number of newspapers in a country, the share of internet access per 1000 inhabitants, and the Freedom House Political Rights Index. Besides the delay due to the European coordination, nations that have the possibilities of a free public discourse adopt the protocols faster than countries where freedom of speech is restricted. The Montreal analysis draws an even clearer picture: Countries which enable a vivid and diverse political discourse are faster in signing agreements that are designed to correct dangerous societal behavior like the destruction of the ozone layer.

The last part of the figure shows the influence of political institutions on the pace of treaty ratification. The Worldwide Governance Indicator (WWGI) “Voice and Accountability”, the Polity III index, and the Vanhanen index of democracy, all again dichotomized at the median value, are considered. These indices capture different aspects of whether a country is democratic or autocratic. For Kyoto, during the first third of the process, democratic (gray curve) and autocratic countries (black curve) perform identically, but then the democratic countries appear to have reached a certain critical mass (the joint European adoption). The process is then slowed down again. This pattern is strongly consistent over all democracy measures we have tested. The finding generally suggests that the more stable, participatory and effective a political system is, the more likely it is that the Kyoto protocol is ratified rapidly, particularly after the initial spin-off after about 1,550 days. The Montreal analysis confirms the Kyoto result. Here, democracies are faster in signing the protocol throughout the whole period. Apparently, not only the free communication of political views is of significance for the perception of a long-term problem; it also takes free democratic systems for the transformation of political views into political programs and political action.

Our analysis shows that democracies perform better – which means faster in our case – in responding with political claims to newly perceived incremental problems (for this observation see also Bättig & Bernauer 2009). The possibility of political mobilization is supportive for the translation of perceived societal problems into political outputs.

The analysis has provided some clues of how political systems cope with long-term risks. Important factors promoting governmental activity seem to be a high extent of the problem for the country at risk, an important role of the scientific system for the credible anticipation of the problem, free and diverse channels of information distribution and communication for perceiving the problem and debating in the public, as well as a democratic and open political system that allows collective action on emerging societal problems. Note, however, that these findings are merely correlations, and we do not know in how far each effect is persistent if all other proposed variables are held constant.

Limits and Drawbacks

A general problem in this analysis, however, is that the independent variables not only explain the dependent variables, but also explain each other (i.e. *multicollinearity*). In this respect it is difficult to differentiate between democracy and economy. Supporting the famous Lipset hypothesis (Lipset 1959), recent studies have shown that democracy and economic development are closely related (Norris 2008; Przeworski 2000). In the cross-sectional analysis above, a separate model was therefore estimated for every indicator, showing that a democratic and economic effect is indeed at work.

A further limitation is associated with the *independence of cases* problem. In inferential statistics, observations are assumed to be independent from each other. Not only in the context of globalization, such *independence* between political systems is highly doubtful. Great powers have the ability to create and enforce international norms. Globalization and Europeanization make this even more problematic, since inter- and supranational organizations can harmonize policies by collective decision mechanisms. In this context, developed countries offer other countries development assistance and expect their compliance in the international arena (e.g. the “adaptation fund” initiated at the Bali summit or the “forest carbon partnership” offered by the German government and the World Bank). Russia’s ratification of the Kyoto protocol in November 2004 was tied to the issue of Russian WTO accession as a package deal. Once such incentives are offered to less wealthy and less democratic countries, the variance between countries cannot be reliably explained anymore on the grounds of democratic and economic mechanisms in a simple cross-sectional design. It

might be possible to solve this problem of autocorrelation, which is also known as Galton's problem, by identifying and incorporating the underlying mechanisms of diffusion (Jahn 2006).

Another type of problem is related to the operationalization of some variables: even when we are able to measure outputs or reaction speed as a form of "policy commitment", the varying effectiveness of policy instruments (e.g. emission trading) is not taken into account. As for the independent variables, we cannot ascertain whether GDP per capita, for instance, has an effect on voters' values, i.e. post-materialism, and on the possibility to assert these values in a participatory political system (since democracy and wealth are correlated), or whether it is just a proxy for development, i.e. fewer competing societal risks promote a higher priority of climate change in governmental policy-making. This leads to the multicollinearity issue again, which in the last instance is a theoretical rather than a methodological problem.

A final difficulty is that countries are exposed to a variety of simultaneous challenges. Some of these have a global scope like environmental issues, and some do not or hardly exceed state boundaries, e.g. civil wars, economic decline or demographic change. The role of these *competing risks* in causing governments to act has largely been neglected. Governments face tradeoffs when anticipating and fighting risks, i.e. they will only see the most pressing problems and neglect others (Jones & Baumgartner 2005). If a government has to suppress upcoming ethnic tensions, for instance, it will assign a very low priority to climate change, given the time, staff and budget constraint. Climate change is only one of these risks. If one tries to infer more abstract mechanisms from this single case, one might face an extreme small-n problem. In other words, we cannot be sure that our theory and our findings equally apply to other creeping catastrophes.

Conclusion

Better data and more advanced methods undoubtedly lead to advancements in the social sciences to explain why some institutional structures produce better results or why some policy instruments have a better effect. Macro-quantitative analysis in our context supposes that we are able to find "quasi laws" in societies of the kind "an increment of x in democracy leads to an increment of y in reaction time". The problem is first, that this macro-relationship is intermediated by so many additional variables inside the black box of national political systems. From a pure macro perspective, one can only guess some internal mechanisms, such

as: wealthy voters have post-materialist attitudes and promote green policy, or wealthy countries usually have fewer competing societal risks and can prioritize less urgent matters like climate change, etc. The second problem is that countries at the same democracy level might have quite different party systems, interest group structures, and various ways of integrating science and social movements in policy formulation. With respect to the assumption that countries are homogeneous, there might actually be big differences between policy sectors. This was emphasized already in the debate on meso-corporatism in the late 80s. A recent study shows that findings in one sector can be very different from findings in another sector (Grote, Lang & Schneider 2008).

In this respect it might be hasty to transfer macro-quantitative findings on general environmental policy to the climate change policy domain (cf. Dryzek 2009), since the issue at stake, actor constellations and communication structures between major components of the political system are quite diverse. For this reason, we argue that qualitative or quantitative case studies can provide more accurate insights into domestic processes and lead to a better qualitative foundation of the mechanisms. Macro-quantitative studies should be triangulated with meso-level studies using “nested analysis” (Lieberman 2005): After conducting a preliminary large-n analysis, one should go down to the level of “on- and off-the-line” individual cases, refine the model, develop implications and then test them again on the macro level in a large-n analysis.

Such case studies may concentrate on some of the following aspects, which cannot be included in a pure macro-comparative analysis. 1\ What role does policy coordination between the countries play from the perspective of national states? 2\What is the role of specific institutions like the parliament, the executive government, direct participation of the electorate, or the integration of scientific consulting, social movements, interest groups and the media in agenda-setting and policy-making? 3\ How does the public discourse about risk evolve, and what organizations have an interest in promoting a given position? Can this be aggregated to an across-country pattern? 4\What different interest or discourse configurations can we identify in the countries? Policy network analysis might be a valuable tool for the investigation of this question. Do certain configurations or the intensity of cleavage lines affect the policy outcome if compared on a macro scale?

Many of these questions can be answered by analyzing the actor constellations and networks in the formulation and implementation of these policies (Schneider, Janning, Leifeld

& Malang 2009). Although this method is increasingly used in policy analysis, its analytical power is still not fully tapped.

Table 12.1: Description of Data and Sources

Variable	Variable code	Description	Unit and value range	Source
<i>Dependent variables</i>				
Montreal Protocol ratification dates			days; from 16 September 1987 to 01 May 2010	http://ozone.unep.org/Ratification_status/
Kyoto Protocol ratification dates			days; from 11 December 1997 to 01 May 2010	http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php
<i>Independent variables</i>				
Freedom House Index	FHI	Freedom house Index of political rights and civil liberties	+1 to +7	http://www.freedomhouse.org/
Polity III index	Polity	Polity III Index; always the latest polity ending in 1994	-88 to +10	http://www.systemicpeace.org/polity/
Failed States Index	Failed S.	Failed States Index 2007	+17.1 to +113.7	http://www.fundforpeace.org/
Vanhanen Index: Electoral Participation	VH Part.	the Vanhanen Index of electoral participation 2000	+2.27 to +70.16	http://www.prio.no/CSCW/Datasets/Governance/Vanhanens-index-of-democracy/

World Wide Governance Indicators: Government effectiveness	WWGI GE	World Bank: World Wide Governance Indicators 2007; government effectiveness in 2006	-2.19 to + 2.29	http://info.worldbank.org/governance/wgi/
World Wide Governance Indicators: Regulatory quality	WWGI RQ	World Bank: World Wide Governance Indicators 2007; regulatory quality in 2006	-2.70 to + 1.95	http://info.worldbank.org/governance/wgi/
World Development Indicators	WDI	Number of internet users per 100 inhabitants; number of daily newspapers per 1,000 people; number of researchers in R&D per million inhabitants; R&D expenditure (% GDP;	Energy use: change from 1996 to 2005. Other variables: mean value 1996-2005	http://data.worldbank.org/data-catalog
Coast/area ratio		Total length of the boundary between the land area (including islands) and the sea in km, divided by the sum of all land and water areas delimited by international boundaries and/or coastlines in square km	0 to +8.71	https://www.cia.gov/library/publications/the-world-factbook/fields/2060.html https://www.cia.gov/library/publications/the-world-factbook/fields/2147.html

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