

Northumbria Research Link

Citation: Karimo, Aasa, Wagner, Paul, Delicado, Ana, Goodman, James, Gronow, Antti, Lahsen, Myanna, Lin, Tze-Luen, Schneider, Volker, Satoh, Keiichi, Schmidt, Luisa, Yun, Sun-Jin and Ylä-Anttila, Tuomas (2023) Shared Positions on Divisive Beliefs Explain Interorganizational Collaboration: Evidence from Climate Change Policy Subsystems in 11 Countries. *Journal of Public Administration Research and Theory*, 33 (3). pp. 421-433. ISSN 1053-1858

Published by: Oxford University Press

URL: <https://doi.org/10.1093/jopart/muac031> <<https://doi.org/10.1093/jopart/muac031>>

This version was downloaded from Northumbria Research Link: <https://nrl.northumbria.ac.uk/id/eprint/49755/>

Northumbria University has developed Northumbria Research Link (NRL) to enable users to access the University's research output. Copyright © and moral rights for items on NRL are retained by the individual author(s) and/or other copyright owners. Single copies of full items can be reproduced, displayed or performed, and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided the authors, title and full bibliographic details are given, as well as a hyperlink and/or URL to the original metadata page. The content must not be changed in any way. Full items must not be sold commercially in any format or medium without formal permission of the copyright holder. The full policy is available online: <http://nrl.northumbria.ac.uk/policies.html>

This document may differ from the final, published version of the research and has been made available online in accordance with publisher policies. To read and/or cite from the published version of the research, please visit the publisher's website (a subscription may be required.)

Shared positions on divisive beliefs explain interorganizational collaboration: Evidence from climate change policy subsystems in eleven countries

Corresponding author:

Aasa Karimo, Faculty of Social Sciences, University of Helsinki, P.o. Box 54, Unioninkatu 37, 00014 University of Helsinki, Finland. Email: aasa.karimo@helsinki.fi

Co-

Paul M. Wagner, Lecturer in Leadership and Management, Newcastle Business School, Northumbria University, Newcastle, NE1 8ST, UK. Email: paul.wagner@northumbria.ac.uk.
ORCID: <https://orcid.org/0000-0001-7020-3952>, Twitter: @mpaulwagner

Ana Delicado, Instituto de Ciências Sociais da Universidade de Lisboa, Av. Prof. Aníbal de Bettencourt, 9, 1600-189 Lisboa, Portugal, ana.delicado@ics.ulisboa.pt

James Goodman, Social and Political Sciences, Faculty of Arts and Social Sciences, University of Technology Sydney, Broadway, NSW 2007, Email: james.goodman@uts.edu.au

Antti Gronow, Research Fellow, Faculty of Social Sciences, Unioninkatu 35, 00014 University of Helsinki, Finland. antti.gronow@helsinki.fi

Myanna Lahsen. Associate Professor. Department of Thematic Studies, Environmental Change. Linköping University. s-581 83, Linköping, Sweden. Email: myannal@gmail.com

Tze-Luen Lin, Department of Political Science, National Taiwan University, No.1, Section 4, Roosevelt Road, Taipei, Taiwan. Email: tllin@ntu.edu.tw

Volker Schneider, Emeritus, University of Konstanz | Home Alter Ortsweg 10, D-88709 Meersburg, Germany. Email: volker.schneider@uni-konstanz.de

Keiichi Satoh, Hitotsubashi University, Japan; Naka 2-1, Kunitachi-City, Tokyo, Japan; keiichi.satoh@r.hit-u.ac.jp

Luisa Schmidt, Instituto de Ciências Sociais da Universidade de Lisboa, Av. Prof. Aníbal de Bettencourt, 9, 1600-189 Lisboa, Portugal, mlschmidt@ics.ulisboa.pt

Sun-Jin Yun, Graduate School of Environmental Studies, Seoul National University, Gwanak-ro, Gwanak-gu, Seoul [08826], Korea, ecodemo@snu.ac.kr.

Tuomas Ylä-Anttila, Associate Professor of Political Science, Faculty of Social Sciences, P.o. Box 54, Unioninkatu 35, 00014 University of Helsinki, Finland. tuomas.yla-anttila@helsinki.fi, http://bit.ly/tuomas_y

Accepted Manuscript

Abstract

Collaboration between public administration organizations and various stakeholders is often prescribed as a potential solution to the current complex problems of governance, such as climate change. According to the Advocacy Coalition Framework, shared beliefs are one of the most important drivers of collaboration. However, studies investigating the role of beliefs in collaboration show mixed results. Some argue that similarity of general normative and empirical policy beliefs elicits collaboration, while others focus on beliefs concerning policy instruments. Proposing a new divisive beliefs hypothesis, we suggest that agreeing on those beliefs over which there is substantial disagreement in the policy subsystem is what matters for collaboration. Testing our hypotheses using policy network analysis and data on climate policy subsystems in eleven countries (Australia, Brazil, the Czech Republic, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan), we find belief similarity to be a stronger predictor of collaboration when the focus is divisive beliefs rather than normative and empirical policy beliefs or beliefs concerning policy instruments. This knowledge can be useful for managing collaborative governance networks because it helps to identify potential competing coalitions and to broker compromises between them.

Keywords: policy collaboration – belief homophily – climate change policy – policy network analysis – Advocacy Coalition Framework

Introduction

Collaboration between organizations has become an increasingly important part of public administration. In particular, collaboration between public organizations and various stakeholder organizations, such as businesses, trade unions, nongovernmental organizations (NGOs), and scientific organizations, is often prescribed as a potential solution to the current complex problems of governance (Innes and Booher 2010; Mullin and Daley 2010; Bardach 2001; Calanni et al. 2014; Lubell 2004). This is especially true concerning problems like climate change, that cut across multiple policy sectors and levels of government and call for solutions that have effects on multiple stakeholders. Interorganizational collaboration in such settings potentially leads to greater efficiency, increased government accountability, resolution of conflicts and higher levels of program success (Fung and Wright 2001; Hicks et al. 2008; Johnston et al 2011; Leach 2006).

It is not surprising, then, that public administration scholars have studied collaboration from various perspectives, using concepts like collaborative governance (Ansell & Gash 2008; 2018; Emerson 2012; Johnston et al 2011), collaborative public management (Leach 2006; O'Leary, Gerard, and Bingham 2006), collaborative partnerships (Leach et al. 2014; Calanni et al 2015), collaborative institutions and collaborative resource management (Heikkila and Gerlak 2015). The literature has examined several factors that explain why organizations choose particular collaboration partners: institutional roles (Ingold and Leifeld 2016), competencies (Weible et al. 2018), expertise (Schneider et al. 2003) trust (Berardo and Scholz 2010), reputational power (Leifeld and Schneider 2012), and similarity of beliefs (Henry 2011; Calanni et al. 2014).

In this paper, we seek to better understand the role of beliefs in the formation of collaboration relationships. Our endeavour is motivated by the Advocacy Coalition Framework (ACF, Sabatier 1998; Sabatier and Weible 2007). The ACF argues that organizations predominantly collaborate with those whose beliefs are similar to their own (Weible et al. 2019). This tendency often leads to the formation of

competing advocacy coalitions. When organizations holding a given set of beliefs - for example beliefs supporting ambitious climate change policies - forge collaboration relationships with each other, those holding opposite beliefs react by collaborating with each other, creating an opposing group of like-minded actors (Ingold and Fischer 2014; Sabatier 1998; Fischer, M. and Sciarini 2016; Heaney and Leifeld 2018). Thus, while the collaborative governance literature has explored the many benefits of collaboration, including the management of conflict, the ACF literature has shown that collaboration does not always lessen conflicts. When collaboration relationships are formed selectively with like-minded actors, coalitions are formed and conflict lines may become stronger. While healthy competition between different viewpoints is an integral part of the making of public policy, in extreme situations this tendency can result in a stalemate that blocks sometimes much-needed policy change (Ingold 2011).

From the point of view of public administration organizations and scholars seeking to develop forms of collaborative governance that are capable of pushing forward policy change, knowing what drives the formation of collaboration ties is crucial. This knowledge can be useful for managing collaborative governance networks because it helps, for example, to identify potential competing coalitions and to broker compromises between them.

Many studies have found support for the ACF's belief homophily hypothesis which argues that belief congruence is associated with collaboration (Ingold and Fischer 2014; Weible 2005; Weible and Sabatier 2005; Matti and Sandström 2013). But it is not clear exactly what kinds of beliefs elicit collaboration. The ACF argues that the kind of beliefs that do so are policy core beliefs – beliefs concerning the nature of policy problems and basic ideas about the solutions to those problems (Sabatier and Weible 2007). But, as we will show, definitions and operationalizations of belief categories in different studies have varied, leading to inconsistent results concerning the association between beliefs and collaboration (Jenkins-Smith et al. 2014; Kukkonen, Ylä-Anttila, and Broadbent 2017; Matti and Sandström 2013; Weible et al. 2019).

In this paper we propose and test the *divisive beliefs hypothesis*. We hypothesize that agreement between two organizations over divisive beliefs—those beliefs that cause the most disagreement in the policy subsystem at large—contribute the most to the likelihood of a collaborative relationship forming between these two organizations. We thus test the idea that the beliefs that drive collaboration in a policy subsystem at a given time cannot be defined theoretically a priori; which beliefs do so is an empirical question. This is because when organizations see that there are others who disagree with their own position, they seek to collaborate with those who hold beliefs similar to their own to counter that opposition. Consequently, agreement on beliefs over which there is disagreement in the policy subsystem is what matters the most to the formation of collaboration relationships. To give an example, beliefs regarding nuclear power as means to reduce greenhouse gas emissions are among the most divisive beliefs in most of our case countries.

We test our *divisive beliefs hypothesis* against the following two competing hypotheses derived from the literature on policy collaboration: the *normative and empirical policy beliefs hypothesis*, which expects collaboration to be driven by agreement over normative and empirical policy beliefs that can be defined theoretically (Sabatier and Weible 2007), and the *policy instrument beliefs hypothesis*, which expects belief similarity concerning policy instruments to be a key driver of collaboration (Ingold 2011; Leifeld 2013). We do so by estimating exponential random graph models (ERGMs) using data on collaborative relationships in national climate change policy subsystems in the following eleven countries: Australia, Brazil, the Czech Republic, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan. We find evidence that divisive beliefs, indeed, play a stronger role in policy collaboration than do either theoretically defined normative and empirical policy beliefs or beliefs concerning policy instruments. In conclusion, we discuss how our findings can inform scholars of collaborative governance (Ansell & Gash 2008) and public organizations that seek to engage in effective management of governance networks (Provan & Kenis 2008; Sørensen & Torfing 2009) so that the networks remain responsive and capable of driving policy change.

Theoretical approach and hypotheses

Among the many factors that have been hypothesized to drive interorganizational collaboration, belief similarity has attracted considerable attention, especially among scholars applying the Advocacy Coalition Framework. In the ACF, beliefs are divided into deep core, policy core, and secondary beliefs ranging from general to more specific beliefs (Weible et al. 2019), and it is the middle tier, policy core beliefs, that is hypothesized to elicit collaboration between organizations. *Deep core beliefs* are the most fundamental and general level of beliefs as they relate to many policy subsystems (Sabatier and Weible 2007). These are, for example, beliefs about the fundamental nature of human beings, the ordering of various ultimate values, the basic criteria of distributive justice, and sociocultural identity. Deep core beliefs also include the traditional left/right scale of the political spectrum. Deep core beliefs are very resistant to change. *Policy core beliefs*, instead, apply to a specific policy subsystem only, and they represent the basic normative commitments and causal perceptions across an entire subsystem. They include beliefs about the priority of different policy-related values, such as economic development or environmental protection. Policy core beliefs also include beliefs about the distribution of welfare; how authority should be divided between governments and markets; the roles of different parties involved, including the general public and elected officials; and the overall seriousness and causes of policy problems (Sabatier and Jenkins-Smith 1999). Policy core beliefs are also presumed to be quite resistant to change, but they might still change over a long period of time with new experiences or information (Sabatier and Weible 2007). *Secondary beliefs* are the most specific type of beliefs and include instrumental preferences and beliefs necessary to implement policy core beliefs, such as the appropriateness and efficacy of specific tactics or detailed rules or budgetary issues within a specific program. Secondary beliefs are usually defined to be relevant only for a subset of the policy subsystem and are thus narrower in scope than policy core beliefs (Jenkins-Smith et al. 2014; Weible et al. 2019).

The ACF posits that policy core beliefs – not deep core beliefs or secondary beliefs – contribute the most to the formation of collaboration relationships. Deep core beliefs are too general to elicit collaboration, secondary beliefs are too specific. But, like Goldilocks’ porridge, policy core beliefs are just right—in terms of their level of generality—to make organizations collaborate (Jenkins-Smith et al. 2014; Weible et al. 2019). This collaboration with like-minded others makes it more likely that the collaborating organizations get to translate their beliefs into policies (Matti and Sandström 2013).

However, according to Weible et al. (2019), empirical results concerning the role of beliefs as drivers of collaboration are mixed, and systematic evidence about the effect of different belief types on collaboration is lacking. Many studies have found beliefs to influence collaboration (Ingold and Fischer 2014; Weible 2005; Weible and Sabatier 2005; Matti and Sandström 2013). Some scholars have qualified these findings by arguing that beliefs are relevant for explaining collaboration only in conflictual policy subsystems (Gronow, Wagner, and Ylä-Anttila 2019). Henry, Lubell, and McCoy (2011), in turn, argue that although belief similarity predicts collaboration, the effect does not seem to be driven primarily by policy core beliefs but rather by aggregated belief systems. Yet, others have found that not just policy core beliefs, but also secondary beliefs explain collaboration (Matti and Sandström 2013; Ingold 2011). Although Sabatier (1998) had already recognized this inconsistency, no principled solution has been proposed thus far.

We believe that an important reason for these mixed results is that the way the association between beliefs and collaboration has been studied thus far lacks an important part of the mechanism connecting the two. We suggest that the main assumption of the ACF, which states that actors within advocacy coalitions share policy core beliefs, has been incorrectly interpreted to mean that agreement over policy core beliefs would on its own lead to collaboration. This interpretation misses the conflict part of the story. The ACF literature has always assumed that some level of conflict within a subsystem is a prerequisite for the emergence of collaboration. Collaboration relationships begin to form *when there is*

dispute over policy core beliefs in the policy subsystem (Weible et al. 2019). This means that organizations seek to collaborate with likeminded others especially when they observe opposition to their own policy goals. Thus, what lacks from the previous formulation of the belief homophily hypothesis is that for belief similarity to elicit collaboration, there also needs to be enough incongruence in beliefs within the given policy subsystem.

Sabatier (1998, 109–110) argues that differences in beliefs produce distrust in opponents and eventually lead to a “devil shift”, a tendency to overestimate opponents’ bad intentions and capacities. Distrust based on disagreement over beliefs can act as a mechanism behind decisions the actors make about their relations to others. Lee and Lee (2018) and Lee and Dodge (2019) have studied how belief and policy goal incongruence lead to distrust between policy organizations. According to their results, diverse visions over sustainability and preferred policy goals lead to distrust between organizations involved in environmental policymaking (Lee and Lee 2018).

However, Lee and Dodge (2019) also found that distrust can motivate actors to maintain contacts with their opponents. Their results show that organizations may communicate with distrusted others for multiple reasons. Most organizations in their study of a fracking policy network in the US maintained some communication ties with distrusted actors to monitor and compare their opponents’ views and actions, to convince distrusted actors to change their beliefs, to discourage their opponents, or to confirm their existing negative attitudes towards distrusted organizations (Lee & Dodge, 2019). Some organizations even collaborate with distrusted actors to balance competing viewpoints, but this kind of collaboration was reported only by public agencies and legal organizations as an attempt to remain in neutral positions (Lee & Dodge, 2019). Even though distrust based on disagreement over policy goals can motivate actors to communicate with their opponents to some extent, it is likely that distrust causes most organizations to avoid long-term collaboration with opponents.

It is also possible that a mechanism called avoidance bias is at work, where belief differences contribute more to avoiding collaboration than belief similarities contribute to incentivizing collaboration

(Henry, Lubell, and McCoy 2011). According to theories of network formation, even a small tendency to avoid link formation between different types of actors can alone lead to heavily segregated network structures (Henry, Pralat, and Zhang 2011). It is also likely that in addition to avoiding collaboration with actors holding different beliefs, organizations actively choose to collaborate with likeminded others as a strategic choice to resist the opposition they observe and to increase their own influence in the policymaking process. Similarly, studies on negative partisanship have found that support for political parties is based more on negative attitudes towards one party than actual affiliation with another (Abramowitz and Webster 2016) and that this mechanism becomes more important as differences between political parties increase (Abramowitz and Webster 2018). This suggests that there may be common mechanisms that affect both electoral and policy processes.

The divisive beliefs hypothesis

Reviewing the mixed results of earlier research, Henry, Lubell, and McCoy (2011) and Weible et al. (2019) have suggested that the relative influence of different types of beliefs on collaboration may vary according to contextual factors. “Contextual factors”, however, can mean many different things, ranging from the structures of national political institutions to the current phase of the policy process and the policy funding context (Lee, Rethemeyer and Park 2018; Kammerer et al. 2021). How then, and why, should the context matter when studying the role of belief similarity in the formation of collaborative relationships? If disputes over beliefs are assumed to drive organizations to collaborate with likeminded others and avoid collaboration with opponents, the study of the association between beliefs and collaboration should focus on those beliefs over which disagreement exists in the policy subsystem. We suggest that this is a way to take the policy context into account, as it is context dependent which beliefs cause the most disagreement.

Previous research on the belief homophily hypothesis has resulted in mixed evidence as a result of both (1) neglecting the role of conflict in the policy subsystem and (2) the lack of a systematic way of

defining which beliefs are important and why. We propose the concept of *divisive beliefs* as a potential solution to both problems. We define divisive beliefs as *those beliefs over which there is empirically measurable substantial disagreement among the actors in the policy subsystem*. Furthermore, we argue that agreement over those particular beliefs that are in dispute is what matters for collaboration, rather than belief similarity as such. On the flipside, this means that the beliefs on which there is a wide consensus in the policy subsystem are not that relevant when it comes to the formation of collaboration relationships.

Importantly, what constitutes divisive beliefs may vary between policy subsystems and over time and is not limited to specific belief categories. We argue that when policy actors perceive that there is prominent disagreement on their own beliefs, they seek to collaborate with like-minded others to counter that opposition regardless of whether the conflict is over normative or instrumental beliefs. For example, if consensus has been reached on the severity of a given problem, more instrumental concerns, such as those concerning the choice between policy instruments to solve the problem, may become the divisive beliefs that make actors collaborate with those they agree with and avoid collaboration with actors holding opposing beliefs. Previously contested issues might also become less divisive if perceptions of the policy issue shift. According to Markard, Suter, and Ingold (2016), this has been the case in Swiss energy policy as renewable energy sources have become more mature and economically viable.

To give an example from our data, there is considerable disagreement in most of our case countries over the statement "My country should take a leading international role in greenhouse gas reduction". The divisive beliefs hypothesis leads us to expect that those organizations agreeing with this statement tend to collaborate with one another, and those disagreeing with it with one another, which potentially contributes to the formation of two competing coalitions. In other countries or at another time the beliefs that are divisive could be different. Thus, we test the following hypothesis:

H1: Organizations tend to collaborate with those other organizations who they agree with regarding divisive beliefs.

Alternative hypotheses

Our goal is to clarify exactly what kinds of beliefs contribute to the formation of collaborative relationships between policy actors. To test whether our divisive beliefs hypothesis is an improvement over the traditional belief homophily hypothesis, we also study the effect of belief similarity on collaboration with two pre-defined belief categories: normative and empirical policy beliefs (H2) and beliefs concerning policy instruments (H3).

Henry, Lubell, and McCoy (2011) and Weible et al. (2019) suggest that mixed findings regarding the role of beliefs in collaboration may result from the variety of ways in which beliefs are conceptualized and measured in different studies. This is because there can be a lack of a consistent logic and method for assigning beliefs to different levels of the ACF belief hierarchy. Thus, the same sort of beliefs could be defined as deep core beliefs, policy core beliefs, or secondary beliefs depending on the study or the policy subsystem. In particular, scholars disagree on which kind of beliefs should be counted as policy core beliefs that elicit collaboration and which kind of beliefs are secondary and thus, according to the ACF, should not matter for the formation of collaboration relationships.

To give a few examples of the divergence in what constitutes policy core beliefs, Weible and Sabatier (2005) and Weible (2005) define policy core beliefs as beliefs concerning the specific policy studied as well as beliefs about the role of science, the economic consequences, and the benefits for people affected by the policy in question. Lubell (2007) defines policy core beliefs in the agricultural water policy subsystem as economic conservatism and environmentalism. Leach and Sabatier (2005) measure policy

core beliefs by asking respondents to evaluate the relative seriousness of thirteen problems in relation to the specific policy studied. Henry, Lubell, and McCoy (2011) define inclusiveness and adherence to smart growth principles as policy core beliefs and beliefs regarding the severity of problems in the planning region as secondary aspects. Ingold (2011), in turn, includes environmental effectiveness, economic effectiveness, competitiveness, and equity in the category of policy core beliefs, and treats policy instruments, which include voluntary agreements, a CO2 tax, a so-called climate penny, and tradable permits as secondary aspects. Contrary to ACF expectations, she finds that both policy core beliefs and beliefs concerning policy instruments, defined as secondary aspects, contribute to the formation of collaborative relationships.

Leifeld (2013), in contrast, argues that beliefs concerning policy instruments are in fact not secondary but, on the contrary, exactly the type of beliefs that makes policy actors collaborate. He finds that in German pension politics, belief similarity regarding policy instruments, such as increased immigration or increased female labor participation as solutions to the problems of the current pension system, are what draws policy actors together. Kukkonen, Ylä-Anttila, and Broadbent (2017) argue that beliefs concerning policy instruments cannot be a priori defined either as policy core or as secondary beliefs. In their view, beliefs concerning policy instruments have a different role in coalition formation depending on the policy subsystem and can thus be classified as policy core beliefs in some contexts but not in others.

Because scholars tend to disagree, particularly on whether beliefs concerning policy instruments drive the formation of collaboration relationships or whether they are secondary, we test the following two alternative hypotheses:

H2: Organizations tend to collaborate with those other organizations who share their normative and empirical policy beliefs.

H3: Organizations tend to collaborate with those other organizations who share their beliefs regarding specific policy instruments.

Methods and material

We tested our hypotheses using survey data on climate change policy subsystems in eleven countries, including information on the collaboration network within each subsystem. A number of studies have looked at environmental and, specifically, at climate policy subsystems in the ACF context (Fisher, Leifeld, and Iwaki 2013; Ingold and Fischer 2014; Ingold 2011; Kukkonen, Ylä-Anttila, and Broadbent 2017; Wagner and Ylä-Anttila 2018). Although most ACF applications are qualitative case studies (Pierce et al. 2017), a growing number of researchers use social network analysis techniques (Fisher, Leifeld, and Iwaki 2013; Gronow, Wagner, and Ylä-Anttila 2019; Ingold 2011; Kukkonen, Ylä-Anttila, and Broadbent 2017; Wagner and Ylä-Anttila 2018). Most of these studies, however, are single-country cases. While comparative research on policy networks is often called for (Ingold and Varone 2012; Weible et al. 2019), it is rarely carried out in practice.

Case countries and data collection

Our data were collected by eleven country teams of the Comparing Climate Change Policy Networks (COMPON) project in Australia, Brazil, the Czech Republic, Germany, Finland, Ireland, Japan, Korea,

Portugal, Sweden, and Taiwan. The country case selection is intended to maximize diversity, the idea being that if our hypotheses find support in a wide range of different cases, they can be considered quite robust. The countries exhibit diversity in terms of their political institutions, including both unitary (e.g. Finland, South Korea) and federal (e.g. Germany, Brazil) countries as well as corporatist (e.g. Japan) and pluralist (e.g. Australia) political systems. They also include countries that have enacted highly ambitious climate change policies (e.g. Sweden) and those that have done so to a much lesser degree (e.g. the Czech Republic). Furthermore, the countries are located in different regions of the world and differ in terms of economic development.

Network boundary specification is a key task of any network study (Borgatti, Everett & Johnson 2013; Laumann, Marsden and Prensky 1989). Specifying the network boundary refers to determining which actors are a part of the network. In our case, each country network includes those key actors that have the most influence over the formation of national climate change policies across different sectors of society: governmental organizations, NGO's, business organizations, and scientific organizations. The first step of our boundary specification, thus, was to ensure that these different societal sectors are well represented. Second, the data in each country were collected by a team of local researchers who used their case knowledge, the existing academic literature, and reviews of media coverage to identify the most influential actors involved in domestic climate policy. Third, the final list of respondents in each country was refined by consulting national climate policy experts from different sectors who were not otherwise associated with our research project. Because we are interested in the networks that contribute to the formulation of national climate policies, we only selected organizations that have a national reach. Some of these organizations do operate also at the international or sub-national levels, but organizations focusing their efforts solely above or below the national level were excluded from the sample.

The surveys were administered in different ways depending on the country: face-to-face, online, or on paper. In cases where online surveys were used, the respondents were contacted in advance by telephone. The individual to respond within each organization was the person responsible for climate

policy or environmental policy. In the (rare) organizations where such positions did not exist, we targeted a person in a leading position who was comfortable with answering on behalf of the whole organization. The list of responding organizations was the same as the roster presented to the respondents, from which the respondents indicated their collaboration partners. The respondents could also name additional organizations not included in the roster. For a more thorough description of the country selection and the process of specifying the network boundary in each country, see Authors (2018).

Survey datasets like ours are never perfect, as some nonresponse inevitably occurs. On the other hand, getting the data needed to address our research question - information on collaboration, beliefs and relevant controls for hundreds of organizations across eleven countries - would hardly be feasible by any other means. In fact, collecting such data even through surveys is so labor intensive that network data sets covering so many countries are extremely rare. Our response rates overall are similar, and in many countries significantly higher, than other studies of political elite networks published in leading journals (e.g. Henry, Lubell, and McCoy 2011; Jasny and Fisher 2019; Leach and Sabatier 2005). Nevertheless, it is necessary to consider the potential effects of response rates on our results. There is some controversy in the literature over how well ERGMs handle missing data. While ERGMs are generally considered robust to some missing data (Lusher, Koskinen & Robins 2013, 14), it has also been argued that biased results due to missing data are certainly possible (Koskinen & Snijders 2013, 162-163). In this light, it seems reasonable to look more closely at the quality of our sample in those countries where response rates are considerably below the 65 per cent range that is often – but not always – achieved by studies of elite political networks such as those we refer to above. Appendix 6 provides additional information on the quality of our sample in these three countries, namely Australia (response rate 45%), Brazil (46%) and Japan (57%). In Brazil and Japan, the data seems to be of high quality. The most important indicator here is the makeup of the sample as regards our dependent variable, the collaboration network indegree (i.e. how many collaboration links each actor “receives”). In both countries the mean indegree of respondents is clearly higher than that of nonrespondents, and the majority of the ten most central actors are among the respondents. Our sample, thus, covers well the most central actors in the network that is our main object of analysis. Looking at

reputational power yields a similar result: in both countries the respondents are more influential than nonrespondents, and the majority of the ten most influential actors in the network are among the respondents. The case of Australia is somewhat more problematic. Even here, our sample does capture the most central actors in the collaboration network; the mean indegree of respondents is higher than that of nonrespondents, and seven out of the ten most central actors have responded. However, the reputational power of the nonrespondents in Australia is higher than that of the respondents and seven of the ten most influential actors have not responded. We take this limitation into account by conducting the analyses also without Australia as a robustness check.

Accepted Manuscript

Table 1. Case countries

	Number of respondents	Governmental (n)	Science (n)	Business (n)	NGO (n)	Response rate (%)	Year
Australia	43	5	6	13	19	45 %	2015
Brazil	62	9	1	21	31	46 %	2013
The Czech Republic	91	32	18	9	32	69 %	2016
Germany	51	10	10	21	10	73 %	2012
Finland	82	20	14	32	16	85 %	2014
Ireland	52	20	3	16	13	91 %	2013
Japan	72	14	6	34	15	58 %	2012
Korea	87	26	12	26	16	82 %	2010
Portugal	57	19	17	9	12	68 %	2016
Sweden	69	21	9	22	17	70 %	2015
Taiwan	87	22	n/a*	17	43	82 %	2011

*included in governmental organizations

Models and key variables

We analyzed the formation of collaboration ties between actors with exponential random graph models (ERGMs) designed to take into account interdependencies between actors in the network (Robins et al. 2007; Cranmer and Desmarais 2017). An ERGM provides a researcher with the possibility to model exogenous covariates and structural dependencies at the same time. The main assumption of an ERGM is that network formation is a stochastic process where the presence or absence of other ties and actor- or edge-level attributes can influence tie formation (Robins et al. 2007). A shortcoming of ERGMs is that they

assume every relevant feature of the network to be present in the model specification. Therefore, misspecification can lead to biased parameter estimates (Cranmer and Desmarais 2017), and a careful assessment of the model fit is especially important. We conducted the analyses using the *ergm* package in the statistical computing environment R (Hunter et al. 2008).

The dependent variable in our analysis was the collaboration network in each country.

Information about collaboration was gathered by asking each organization: “*With which of the listed organizations does your organization have a long-term and mutually collaborative relationship in relation to climate change policy?*”

The key independent variables were policy beliefs, classified into three categories, to test which kinds are the strongest predictor of policy collaboration—normative and empirical policy beliefs, beliefs concerning policy instruments, and divisive beliefs. Data on beliefs were collected in terms of actors’ climate policy beliefs by asking each respondent to indicate their beliefs about a varying number of questions on a five-point Likert scale (1 = “Strongly disagree,” 5 = “Strongly agree”). The number of questions varies between 30 in the Czech Republic and Finland and 67 in Brazil. Following the ACF, we measured *normative and empirical policy beliefs* using survey questions on moderately general, policy subsystem-wide beliefs. These questions include, for example, beliefs about climate change as a problem and the ambitiousness of the current climate policy in the respondent’s own country as well as questions about global equity related to climate change mitigation. In addition, beliefs about the importance of economic values in relation to climate change and the general attitude toward renewable energies are defined as normative and empirical policy beliefs. We measured *beliefs concerning policy instruments* with questions on the importance of specific policy measures. These included both technical measures, such as different energy sources, and political measures, such as national and international agreements and laws. To measure *divisive beliefs*, we identified the top ten most divisive issues in each country by looking at the standard deviation of all variables measuring normative and empirical policy beliefs and beliefs concerning policy instruments. The ten most divisive beliefs were used as their own category, but they were not

excluded from the other two belief categories. In other words, all belief variables used in these analyses belong to either the category of (1) normative and empirical policy beliefs, or (2) instrumental policy beliefs.

To compute the belief similarity variables, we followed Leifeld and Schneider (2012). For each country, three dissimilarity matrices using all belief variables in the particular category were constructed using Euclidean distance. The dissimilarity matrices were converted into similarity matrices by subtracting each dissimilarity value from the maximum dissimilarity value. The similarity matrices were normalized between zero and one to make sure the number of variables used in their construction has no effect on their scale. The resulting matrices are used as edge covariates in network models.

We model the effect of belief similarity on collaboration ties in three different models for each country. To avoid problems of multicollinearity between the belief similarity variables, we include them in the models separately. These variables are in part calculated using the same beliefs, and thus belief similarity regarding divisive beliefs correlates quite strongly with the other two belief similarity variables in some countries. We excluded all actors from the models that had missing values for more than half of the variables in any of the belief categories (normative and empirical policy beliefs, beliefs regarding policy instruments, or divisive beliefs) because for those actors it was not possible to fully calculate the similarity matrices. These data are comparable between countries although there are some differences in the policy beliefs included in the surveys. A comprehensive list of the belief questions for each country is included as Appendix 1.

Control variables

Actors with formal decision-making power can attract collaboration ties from other actors that try to influence decision making (Stokman and Van den Bos 1992). In addition, previous studies have found that, in some contexts, public authorities are named as collaborative partners more often, and in others, less than would be expected by chance (Gronow, Wagner, and Ylä-Anttila 2019). Therefore, we controlled for the effect of public authorities by adding a nodal covariate for incoming ties to public authorities. We defined public authorities as governmental organizations (ministries or governmental agencies) and political parties.

Reputational power, or the perceived influence of an organization, can also have an effect on how often they are named as collaborative partners (Weible 2005). For example, resource dependence theory suggests that actors seek to collaborate with powerful actors (Pfeffer and Salancik 2003). We measured reputational power by adding how many times each actor was named as influential by other actors, and we used this measure as a nodal covariate in the models. This measure was obtained by presenting the respondents with a roster of all organizations in the policy subsystem and asking: *“Which of the listed organizations are especially influential in domestic climate change politics?”* Perceived influence was measured using the same matrix as an edge covariate in the models.

We include several endogenous network terms in each of our models that have been found in other studies to explain the formation of collaboration ties in policy networks (Gronow, Wagner, and Ylä-Anttila 2019; Fischer and Sciarini 2016). The first of these is the edge term, which is comparable to the constant term in other statistical models. Second, we include the mutual term to capture the tendency for actors to reciprocate ties, which, when positive and significant is indicative of mutually supportive and trusting relationships. Third, the two-path term is included to control for the number of actors that are connected via a third actor. These third actors tend to be both named as a collaboration partner and to name others as their collaboration partners. Their presence and the patterns of their network ties increases

the potential for coordination between non-collaborating actors. Next, we include the *gwidegree* and the *gwodegree* terms to account for the distribution of incoming and outgoing collaboration ties in the networks. The *gwidegree* term enables us to check for the tendency for actors to collaborate with already popular actors, analogous to the Matthew Effect (Merton, 1968) and known as preferential attachment in the network literature (Barabási and Albert, 1999). Preferential attachment can occur in collaboration networks where there are some actors that are perceived to have particularly useful information or other resources by many others (Lee et al. 2012). The *gwodegree* term allows us to investigate if there is a small number of actors in any of the networks who are particularly active creators of collaboration ties. This may occur when an actor, such as a government agency or department, is mandated or obliged to engage with a broad range of stakeholders. Finally, we include two terms to model transitive configurations. The first of these, *GWESP*, captures how frequently two directly connected actors i, j are also indirectly connected to one another through a third actor k . The second term, *GDWSP*, models the presence of configurations where two actors are both connected to the same third actor regardless of whether or not they collaborate with one another. Transitive configurations have been argued to form in networks as they allow actors to build trust with other actors, as well as to monitor, reward and sanction the actions and behaviours of other actors (Nisar and Maroulis, 2017). Each of the four geometrically weighted terms requires the modeller to include a decay parameter to control for the impact of additional counts of the same network structure to the corresponding network statistics. In each case, we use the decay parameter that produced the best model fit in each country.

To find the best fitting model for each country, we ran the models with different sets of endogenous variables and different decay parameters. From among these models, the best fitting three based on the Akaike information criterion (AIC) were further compared using other goodness-of-fit diagnostics and Markov chain Monte Carlo (MCMC) trace plots. Because all three best-fitting models showed reasonably similar fit based on all measures, and the results were robust across different model specifications, we chose the model to be presented in the results based on AIC.

Results: belief divisiveness

We begin by reporting the overall divisiveness of climate change-related beliefs in our case countries. Appendix 1 lists the beliefs that are the most divisive in each country. In all countries, some beliefs classified as normative and empirical policy beliefs and some beliefs regarding policy instruments are among the most divisive. The range of the most divisive beliefs is large, confirming the assumption that climate policy subsystems in different countries are divided based on different beliefs. In all the countries combined, 52 different statements belong to the most divisive ones. Still, there are some similarities between these contexts. The most fundamental normative and empirical policy beliefs, such as *“Climate change is currently occurring”* and *“Human activities are an important driver of climate change,”* are among the least divisive ones in all these countries. Most respondents in our case countries thus believe that climate change is real and that human activities play an important role, confirming the conclusion of international comparative analyses of national media coverage of climate change, according to which climate science skepticism is mostly confined to the U.S. (Painter 2011; Painter and Ashe 2012). However, there is no such consensus for other normative and empirical policy beliefs. This means that the policy debate on climate change has largely moved beyond disagreement on the reality and seriousness of the problem, and the questions that are now divisive relate to who should act and by what means. For example, the statements *“My country should take a leading international role in GHG reduction”*, *“Climate change cannot be contained as long as developed countries continue their current level of consumption”* and *“The transition to a renewable energy supply is too costly”* are all among the most divisive beliefs in six out of eleven countries. Among the questions on policy instruments, whether the expansion of nuclear energy makes a sensible contribution to tackling climate change is among the most divisive beliefs in nine out of eleven countries.

The example of nuclear power shows how issue divisiveness is linked to the differing contexts of the case countries and the agenda of the public and policy debates. The only two countries where nuclear

power is not a divisive issue are Germany and Portugal. In Germany, the decision to phase out nuclear energy in the wake of the Fukushima accident was just made the year before our data collection and the public opinion was very strongly against nuclear power, so there was not much room for contestation over this issue (Schneider, 2011). Portugal does not have any nuclear reactors and public opinion is against them (Khalip, Rodriguez and MacSwan, 2017), so suggesting new ones is hardly a policy option, making nuclear power a non-divisive issue among policy actors. In all the other countries we studied, there is some controversy over whether nuclear power is a viable means for reducing GHG emissions, making this belief divisive in our data.

A closer look at individual countries provides additional support for the idea that the divisiveness of policy beliefs among the surveyed organizations reflects the economic and political context and the public and policy agenda. For example, in the Czech Republic, carbon taxes and renewable energies are among the most divisive issues because of the country's strong coal industry and its proponents are often successful in contesting these ideas in public and policy debates (Ocelík et al 2019). In Finland, the issue of a national law that requires the reduction of GHG gases was among the most divisive, because such a law was being prepared by the government at the time of data collection and was a topic of much political contestation (Gronow and Ylä-Anttila, 2019). In Ireland, to give a third example, sector specific legal limits to GHG emissions is a divisive issue, because the agricultural sector is the major emitter, agricultural lobby organizations are influential players and ministries and political parties were, at the time of data collection, divided on this issue (Wagner and Ylä-Anttila, 2018).

Based on the standard deviations of the variables, there are no clear differences between countries in the divisiveness of climate change-related beliefs in general. Also, the distributions of the ten most divisive beliefs show that in all countries there are issues that clearly divide the actors into two camps¹.

¹ We measure divisiveness using standard deviation (SD) because it is a simple indicator that captures very well what can intuitively be understood as belief divisiveness. The idea that SD captures divisiveness well is supported by the fact that the beliefs we found to be divisive using this measure reflect well those issues that earlier research has identified as

Results: The effect of belief similarity on collaboration

In Table 2, we present the estimates for the belief similarity variables in the ERGMs that explain collaboration with the similarity of normative and empirical policy beliefs (Model 1), the similarity of beliefs concerning policy instruments (Model 2), and the similarity of divisive beliefs (Model 3). The tables present coefficients and standard errors only for the belief similarity variables; the full models are presented in Appendix 3. Note that the belief similarity variables are included in the models separately and that the parameter estimates presented in Table 2 are combined from three different models.² To make it easier to compare the parameter estimates of different belief similarity variables, the highest estimate for a country is colored red.

contested ones in the public and policy debates in each country case (see the main text above). It could of course be argued that from a political viewpoint, a situation in a hypothetical two actor policy subsystem where one actor strongly agrees with a belief statement (and gets the value 1 on our Likert scale) and another one is neutral (and gets the value 3) is different from a situation where one somewhat agrees (2) and the other somewhat disagrees (4), while the SD, and by our definition divisiveness, in these two situations is identical. To enable the reader to evaluate whether such differences might be meaningful in our data, Appendix 2 provides the exact distributions of the responses to all divisive issue questions in our survey in each country. Judging by those figures and considering the reasons described above we think SD is an appropriate indicator of divisiveness.

² Belief similarity variables are included in the models separately due to multicollinearity issues. However, we present the results of models including all belief similarity variables in the same model in Appendix 3, Table A3T4 as a robustness check. The results of those models are in line with the results presented here.

Table 2. Estimates for belief similarity variables in the ERGMs of all countries

		AU	BR	CZ	DE	FI	IE	JP	KR	PT	SE	TW
Model 1: belief similarity regarding normative and empirical policy beliefs	Estimate				0.90	0.61	0.65	1.80	1.58	0.48	1.08	0.48
	P	1.587 0.000	0.951 0.000	0.736 0.000	3 0	2 0	3 6	4 0	4 0	9 2	1 3	2 0
	SE	0.389	0.261	0.168	0.25 9	0.16 9	0.27 1	0.37 2	0.31 0	0.38 3	0.35 8	0.22 2
Model 2: belief similarity regarding policy instruments	Estimate				1.13	0.64	0.67	1.41	1.53	1.09	0.99	0.35
	P	0.382 0.341	1.364 0.000	0.350 0.048	7 0	2 0	7 5	9 0	9 0	1 7	7 1	1 2
	SE	0.391	0.304	0.176	0.30 1	0.15 3	0.27 9	0.38 7	0.28 4	0.40 8	0.39 1	0.20 9
Model 3: belief similarity regarding divisive issues	Estimate				0.71	0.97	0.52	2.71	1.71	0.83	0.98	0.40
	P	1.586 0.001	1.673 0.000	0.845 0.000	7 9	1 0	9 9	0 0	8 0	3 6	3 0	0 0
	SE	0.459	0.282	0.191	0.27 6	0.16 5	0.26 9	0.43 4	0.30 8	0.41 8	0.26 9	0.22 8

Belief similarity regarding divisive issues is a significant predictor of collaboration in ten out of eleven countries: Australia, Brazil, the Czech Republic, Germany, Finland, Ireland, Japan, Korea, Portugal, and Sweden but not in Taiwan (Table 2). Belief similarity regarding normative and empirical policy beliefs is associated with a larger probability of collaboration in ten out of eleven countries, namely Australia, Brazil, the Czech Republic, Germany, Finland, Ireland, Japan, Korea, Sweden, and Taiwan but not in Portugal (Table 2). Belief similarity in terms of policy instruments is related with a larger probability of collaboration in eight out of eleven countries, namely Brazil, Germany, Finland, Ireland, Japan, Korea, Portugal, and Sweden but not in Australia, the Czech Republic, or Taiwan (Table 2). In five of these countries, namely Brazil, the Czech Republic, Finland, Japan, and Korea, the parameter estimate for belief similarity concerning divisive

issues is larger than the estimates for the other two belief similarity measures. In two countries, namely Sweden and Taiwan, the parameter estimate for belief similarity regarding normative and empirical policy beliefs is larger than the estimates for the other two belief similarity measures. In Germany and Portugal, the same is true for belief similarity regarding policy instruments. In Australia, the parameter estimates for belief similarity regarding normative and empirical policy beliefs and belief similarity concerning divisive issues, and in Ireland, the parameter estimates for belief similarity regarding normative and empirical policy beliefs and belief similarity regarding policy instruments, are equally large. Overall, all three hypotheses are thus supported in most of these case countries. However, our divisive beliefs hypothesis is more strongly supported by the parameter estimates than the two alternative hypotheses.

The models testing our divisive beliefs hypotheses also fare slightly better in terms of fit than the models testing the other two hypotheses. The variation in the goodness of fit within a country is quite small according to the AICs presented in Table 3 below. In six countries, the model fit is best when belief similarity concerning divisive issues is included in the model. These countries are Brazil, the Czech Republic, Finland, Japan, Korea, and Sweden. In two countries, Australia and Taiwan, the model including belief similarity regarding normative and empirical policy beliefs fits the data slightly better than the other models; and in Germany, Ireland, and Portugal, the same is true when belief similarity regarding policy instruments is included. A more thorough evaluation of the model fit using goodness-of-fit plots and MCMC trace plots is presented in Appendix 4 for the best-fitting model in each country.

We also tested for the possibility that there is an interaction between the effects of divisive belief similarity and policy core belief similarity. In other words, it could be that what matters for collaboration is not agreement on divisive issues or on policy core beliefs in itself, but the intersection of the two. To test for this possibility, we re-ran the models so that they included an interaction term for policy core belief similarity and divisive issue belief similarity. We found, however, that the effect of divisive beliefs is not related to the level of agreement over policy core beliefs in nine out of the eleven countries. Appendix 5

reports the model results and plots for the interaction effects, using the approach developed by Heaney and Leifeld (2018).

Table 3. Model comparison based on the AIC

	AU	BR	CZ	DE	FI	IE	JP	KR	PT	SE	TW
AIC M1	820.96	2184.36	2599.35	1392.43	4962.39	1161.56	1165.64	2455.37	1257.77	1552.28	3577.98
AIC M2	843.52	2172.16	2614.45	1390.71	4954.48	1160.87	1181.26	2456.86	1252.58	1555.37	3580.20
AIC M3	830.47	2161.78	2599.12	1397.99	4936.94	1164.06	1134.79	2450.93	1255.29	1549.93	3580.16
Best fit	M1	M3	M3	M2	M3	M2	M3	M3	M2	M3	M1

As stated before, the low response rate and high reputational power of the non-respondents in Australia make it reasonable to explore whether our results change if Australia is left out of the analysis. Our results remain very similar without Australia; belief similarity in general is associated with a higher likelihood of collaboration, and divisive beliefs are more strongly associated with collaboration than the other two types of beliefs we tested for. Excluding Australia from the sample, we find that belief similarity regarding divisive issues is a significant predictor of collaboration in nine out of ten countries, belief similarity regarding normative and empirical policy beliefs in nine out of ten, and belief similarity regarding policy instruments in eight out of ten countries. In five of these countries, the parameter estimate for belief similarity concerning divisive issues is higher than the estimates for the other two belief similarity measures; the same is true for beliefs concerning normative and empirical policy beliefs as well as for beliefs concerning policy instruments in two countries. In one country, the parameter estimates for belief similarity regarding normative and empirical policy beliefs and belief similarity regarding policy instruments are equal.

Results: Control and endogenous variables

In this section, we report the main results regarding the control and endogenous variables included in the ERGMs. More detailed results of the control and endogenous variables are presented in Appendix 3 (Tables A3T1, A3T2, and A3T3). In line with previous findings, public authorities can either be more or less popular collaboration partners than other types of actors depending on the context (Gronow, Wagner, and Ylä-Anttila 2019). In our models, public authorities receive more collaboration ties in Sweden and Taiwan than would be expected by chance but fewer in Korea and Portugal. In Australia, Brazil, the Czech Republic, Germany, Finland, Ireland, and Japan, being a public authority does not have an effect on the probability of being a popular collaboration partner. As expected, perceived influence makes actors more popular collaboration partners than would be expected by chance in all the countries. This is in line with the assumptions of resource dependence theory (Pfeffer and Salancik 2003). Reputational power, however, is significantly associated with collaboration only in five countries, namely Finland, Ireland, Japan, Korea, and Portugal.

We now turn to the results for the endogenous terms. The two-path statistic is negative and significant in all countries, indicating the presence of bridging actors in the networks. These are actors who collaborate with pairs of actors who do not collaborate with one another and who could potentially play a role in managing conflict and facilitating knowledge exchange (Crona and Parker, 2011; Levy and Lubell, 2017; Sabatier and Jenkins-Smith 1993). We also find that actors in all countries except Czech Republic and Germany reciprocate collaboration ties. Their presence is the basis upon which larger groups of collaborating actors depends. The combination of the geometrically weighted terms that we use in our models varies slightly across countries to maximize model fit for each case. The in/significance of the results for the terms used in each country are the same across the three models. A negative and significant coefficient for the *gwidegree* statistic indicates that most of the actors in a network have a similar number of incoming ties (*TW*), whereas a positive coefficient indicates that a small number of actors are particularly popular collaboration partners (CZE, DE, IE, KR). Conversely, a negative coefficient for the *gwodegree*

indicates that most of the actors in a network have a similar number of outgoing ties (BR, FIN, JP, KR, PT, SE, TW), while a positive coefficient indicates that a small number of actors are more active in creating collaboration ties (IE). The positive coefficient for triadic closure (GWESP) in all countries signifies that collaboration ties that close triads are more likely to occur in the networks than collaboration ties that do not close them. A positive GWDSP statistic signifies that those actors who already share collaboration partners are less likely to collaborate with one another (BR, FIN, KR).

Discussion and conclusions

Collaboration between public organizations and various stakeholder organizations is often prescribed as a potential solution to the current complex problems of governance, such as climate change. Belief similarity has been hypothesized to be one of the significant drivers of collaboration, but the evidence concerning the association between beliefs and collaboration has been mixed (Henry, Lubell, and McCoy 2011; Weible et al. 2019).

In this paper, we argued that one reason for the mixed results is that different scholars have focused on different kinds of beliefs. We further argued that the kind of beliefs that elicit collaboration is context-dependent; different kinds of beliefs may do so in different policy subsystems and at different times. Consequently, we proposed and tested the *divisive beliefs hypothesis*: Organizations tend to collaborate with those other organizations who they agree with regarding divisive beliefs – those beliefs over which there is substantial disagreement in the policy subsystem. The rationale behind this expectation is that when organizations perceive prominent disagreement over their own beliefs, they seek to collaborate with like-minded others to counter their opposition. Furthermore, avoidance bias (Henry, Lubell, and McCoy 2011) and distrust (Lee & Lee 2018; Sabatier 1998) may make organizations avoid collaboration with those whose beliefs are different from their own. This is akin to the tendency of negative partisanship in party politics, where support for parties is based as much or more on negative attitudes towards other parties (Abramowitz and Webster 2016; 2018).

Fitting ERG models on data on climate change policy subsystems in eleven countries, we found that inductively selected divisive beliefs are, as we expected, the strongest predictor of collaboration relationships, although theoretically pre-defined normative and empirical beliefs and beliefs concerning policy instruments also predict collaboration quite well.

These findings show that collaboration is more likely among like-minded organizations, especially when disagreement is present. According to ACF theory, such collaboration of the like-minded likely leads to the formation of competing coalitions and in extreme cases, to stalemates blocking policy change (Ingold 2011). These findings can be useful to scholars and practitioners seeking to develop arrangements of collaborative governance (Ansell & Gash 2008) and manage governance networks (Provan & Kenis 2008; Sørensen & Torfing 2009) in a way that makes networks capable of generating policy change. Recent research has suggested that public administration organizations may alleviate conflicts between competing coalitions by seeking to broker relationships between them (Gronow, Wagner and Ylä-Anttila 2019). As Elizabeth Koebele (2019) has pointed out, such brokerage aims at creating collaborative policy subsystems containing “cooperative coalitions who continue to disagree...but negotiate and work together” (Weible 2008, 625). Our findings suggest that a useful first step of such brokerage efforts is to map the beliefs that are particularly divisive in the given context and the collaboration relationships formed around taking the same side on these divisive issues. Public organizations may then Findings by Lee and Lee (2019) suggest that by mapping these beliefs and relationships and by seeking to collaborate with organizations across distrust created by belief differences, public administration organizations can potentially balance between divergent perspectives, maintain objectivity, and increase their responsiveness to citizens.

Our approach has focussed on the formation of collaboration relationships between pairs of organizations. These relationships are the building blocks of advocacy coalitions, but it is worth noting that we have not analyzed the coalition structures present in the different policy subsystems we study. In other words we do not know whether one of these subsystems has, for example, two competing coalitions that are equally strong, but less connected; another one two competing coalitions that are equally strong, but

better connected across coalitions; and yet another one one dominant coalition and one weak opposing coalition. Whether such differences in coalition structures affect the relationship between beliefs and collaboration remains an area for further research.

This study is the first to investigate the effect of belief similarity on interorganizational collaboration using an extensive and comparable dataset from multiple countries around the world. Our results contribute to the literature on the drivers of collaboration by showing that divisive beliefs influence collaboration between organizations and by demonstrating that what beliefs are divisive is context-dependent. This knowledge can be useful for managing collaborative governance networks because it helps in identifying potential competing coalitions and to broker compromises between them.

Accepted Manuscript

Data availability

The data and code underlying this article can be found for replication purposes in the Harvard Dataverse online repository <https://doi.org/10.7910/DVN/SBGETC>

Acknowledgments

This research was financially supported by the following institutions and grants:

1. Australia: The Social and Political Sciences Discipline, University of Technology Sydney
2. Brazil: The US National Science Foundation (grant no. 1544589) and the Brazilian Council of Technological and Scientific Development (CNPq) grant for the project “Science, Technology and Policy Studies” (CNPq 483099/2009-0) under the Brazilian National Institute for Science and Technology—Climate Change (INCT-MC).
3. Czech Republic: “Perspektivy evropské integrace v kontextu globální politiky” (MUNI/A/1240/2021)
4. Germany: The US National Science Foundation (grant no. 1544589)
5. Finland: Academy of Finland (Grant Nos. 332916 and 298819), the Kone Foundation (Grant No. 201805496)
6. Ireland: The Structured PhD in Simulation Science, Programme for Research in Third Level Institutions (PRTL) Cycle 5 and European Regional Development Fund.
7. Japan: Japan Society for the Promotion of Science [grant Nr. 22243036; 15H03406; 18H00919; 21H0077]
8. South Korea: National Research Foundation (NRF) Grant funded by the Korean Government (Ministry of Education, MOE) (NRF-2008-220-B00013)
9. Portugal: no external funding
10. Sweden: Swedish Research Council (Grant No. 2007-2363)
11. Taiwan: National Science Council of Taiwan (NSC 98-2621-M-002-022)

The survey instrument used in this research was developed based on the work in the US National Science Foundation project 0827006 led by Professor Jeffrey Broadbent, University of Minnesota.

References

- Ansell, Chris and Alison Gash. 2018. "Collaborative Platforms as a Governance Strategy." *Journal of Public Administration Research and Theory* 28:1, 16–32. <https://doi.org/10.1093/jopart/mux030>
- Barabási, A.L. and Albert, R., 1999. "Emergence of scaling in random networks". *Science*, 286:5439, 509-512.
- Bardach, Eugene. 2001. "Developmental Dynamics: Interagency Collaboration as an Emergent Phenomenon." *Journal of Public Administration Research and Theory* 11 (2): 149–164. <https://doi-org.libproxy.helsinki.fi/10.1093/oxfordjournals.jpart.a003497>.
- Calanni, John C., Saba N. Siddiki, Christopher M. Weible, and William D. Leach. 2014. "Explaining Coordination in Collaborative Partnerships and Clarifying the Scope of the Belief Homophily Hypothesis." *Journal of Public Administration Research and Theory* 25 (3): 901–927. <https://doi.org/10.1093/jopart/mut080>.
- Cranmer, Skyler J., and Bruce A. Desmarais. 2017. "Statistical Inference in Political Networks Research." In *The Oxford Handbook of Political Networks*. 1st ed. Oxford: Oxford University Press.
- Crona, B.I. and Parker, J.N., 2011. Network determinants of knowledge utilization: preliminary lessons from a boundary organization. *Science Communication*, 33(4), pp.448-471.
- Emerson, Kirk, Tina Nabatchi and Stephen Balogh. 2011. "An Integrative Framework for Collaborative Governance." *Journal of Public Administration Research and Theory* 22:1, 1–29. <https://doi.org/10.1093/jopart/mur011>
- Fischer, Frank. 2003. *Reframing Public Policy: Discursive Politics and Deliberative Practices*. Oxford: Oxford University Press.
- Fischer, Manuel and Pascal Sciarini. 2016. "Drivers of Collaboration in Political Decision Making: A Cross-Sector Perspective." *The Journal of Politics* 78 (1): 63–74. doi: 10.1086/683061. <https://www.journals.uchicago.edu/doi/abs/10.1086/683061>.
- Fisher, Dana, Philip Leifeld, and Yoko Iwaki. 2013. "Mapping the Ideological Networks of American Climate Politics." *Climatic Change* 116 (3): 523–545. doi: 10.1007/s10584-012-0512-7. <https://search.proquest.com/docview/1271885885>.
- Fung, A., & Wright, E. O. (2001). "Deepening democracy: Innovations in empowered participatory governance." *Politics & society*, 29(1), 5-41.
- Gronow, Antti & Ylä-Anttila, Tuomas. (2019). "Cooptation of ENGOs or treadmill of production? Advocacy coalitions and climate change policy in Finland." *Policy Studies Journal*, 47(4), 860-881.
- Gronow, Antti, Paul Wagner, and Tuomas Ylä-Anttila. 2019. "Explaining Collaboration in Consensual and Conflictual Governance Networks." *Public Administration*. <https://doi.org/10.1111/padm.12641>.

- Heaney, Michael T., and Philip Leifeld. 2018. "Contributions by Interest Groups to Lobbying Coalitions." *The Journal of Politics* 80 (2): 494–509. doi: 10.1086/694545. <https://www.journals.uchicago.edu/doi/abs/10.1086/694545>.
- Henry, Adam Douglas, Mark Lubell, and Michael McCoy. 2011. "Belief Systems and Social Capital as Drivers of Policy Network Structure: The Case of California Regional Planning." *Journal of Public Administration Research and Theory: J-PART* 21 (3): 419–444. doi: 10.1093/jopart/muq042. <https://www.jstor.org/stable/25836114>.
- Hicks, D., Larson, C., Nelson, C., Olds, D. L., & Johnston, E. 2008. "The influence of collaboration on program outcomes: The Colorado nurse—family partnership." *Evaluation Review* 32(5), 453-477.
- Hunter, David R., Mark S. Handcock, Carter T. Butts, Steven M. Goodreau, and Martina Morris. 2008. "Ergm: A Package to Fit, Simulate and Diagnose Exponential-Family Models for Networks." *Journal of Statistical Software* 24 (3): nihpa54860. doi: 10.18637/jss.v024.i03. <https://www.ncbi.nlm.nih.gov/pubmed/19756229>.
- Ingold, Karin. 2011. "Network Structures within Policy Processes: Coalitions, Power, and Brokerage in Swiss Climate Policy." *Policy Studies Journal* 39 (3): 435–459. doi: 10.1111/j.1541-0072.2011.00416.x. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1541-0072.2011.00416.x>.
- Ingold, Karin, and Manuel Fischer. 2014. "Drivers of Collaboration to Mitigate Climate Change: An Illustration of Swiss Climate Policy Over 15 Years." *Global Environmental Change* 24: 88–98. doi: 10.1016/j.gloenvcha.2013.11.021. <https://www.sciencedirect.com/science/article/pii/S095937801300229X>.
- Ingold, Karin, and Frédéric Varone. 2012. "Treating Policy Brokers Seriously: Evidence from the Climate Policy." *Journal of Public Administration Research and Theory* 22 (2): 319–346. doi: 10.1093/jopart/mur035. <https://boris.unibe.ch/8833/>.
- Innes, Judith E., and David E. Booher. 2010. *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. London: Routledge.
- Jasny, Lorien, Joseph Waggle, and Dana R. Fisher. 2015. "An empirical examination of echo chambers in US climate policy networks." *Nature Climate Change* 5(8): 782–786.
- Jasny, Lorien and Dana R. Fisher. 2019. "Echo Chambers in Climate Science." *Environmental Research Communications* 1 (10): 101003. doi: 10.1088/2515-7620/ab491c.
- Jenkins-Smith, Hank C., Daniel Nohrstedt, Christopher M. Weible, and Paul A. Sabatier. 2014. "The Advocacy Coalition Framework: Foundations, Evolution, and Ongoing Research." In *Theories of the Policy Process*, edited by Paul A. Sabatier and Christopher M. Weible, 183–223. Boulder, CO: Westview Press.
- Johnston, Erik W., Darrin Hicks, Ning Nan and Jennifer C. Auer. 2011. "Managing the Inclusion Process in Collaborative Governance." *Journal of Public Administration Research and Theory* 21:4, 699–721. <https://doi.org/10.1093/jopart/muq045>

- Kammerer, Marlene, Paul M. Wagner, Antti Gronow, Tuomas Ylä-Anttila, Dana R. Fisher and Sun-Jin Yun. 2021. "What Explains Collaboration in High and Low Conflict Contexts? Comparing Climate Change Policy Networks in Four Countries." *Policy Studies Journal* 49: 1065-1086. <https://doi.org/10.1111/psj.12422>
- Kenis Patrick N. and Provan Keith G. 2009. "Towards an exogenous theory of public network performance." *Public Administration* 87 (3):440–56.
- Khalip, Andrei, Jose Elias Rodriguez and Agnus MacSwan. 2017. "Portugal to complain to EU over Spain's planned nuclear dump site." Available at <https://www.reuters.com/article/portugal-nuclearpower-spain-idUSL5N1F24MN>
- Koebele, Elizabeth A. "Integrating collaborative governance theory with the Advocacy Coalition Framework." *Journal of Public Policy* 39, no. 1 (2019): 35-64.
- Kukkonen, Anna, Tuomas Ylä-Anttila, and Jeffrey Broadbent. 2017. "Advocacy Coalitions, Beliefs and Climate Change Policy in the United States." *Public Administration* 95 (3): 713–729. doi: 10.1111/padm.12321.
- Laumann, Edward O., Peter V. Marsden, and David Prensky. 1989. "The boundary specification problem in network analysis." *Research methods in social network analysis* 61: 87.
- Leach, William D. 2006. "Collaborative public management and democracy: Evidence from western watershed partnerships." *Public administration review* 66, 100-110.
- Leach, William D., and Paul A. Sabatier. 2005. "To Trust an Adversary: Integrating Rational and Psychological Models of Collaborative Policymaking." *American Political Science Review* 99 (4): 491–503. <https://doi.org/10.1017/S000305540505183X>.
- Leach, W. D., Weible, C. M., Vince, S. R., Siddiki, S. N., & Calanni, J. C. 2014. "Fostering learning through collaboration: Knowledge acquisition and belief change in marine aquaculture partnerships." *Journal of Public Administration Research and Theory*, 24(3), 591-622. <https://doi.org/10.1093/jopart/mut011>
- Lee, Jeongyoon, R Karl Rethemeyer and Hyun Hee Park. 2018. "How Does Policy Funding Context Matter to Networks? Resource Dependence, Advocacy Mobilization, and Network Structures." *Journal of Public Administration Research and Theory* 28:3, 388–405. <https://doi.org/10.1093/jopart/muy016>
- Lee, Y., Lee, I.W. and Feiock, R.C., 2012. "Interorganizational collaboration networks in economic development policy: An exponential random graph model analysis". *Policy Studies Journal*, 40:3, 547-573.
- Leifeld, Philip. 2013. "Reconceptualizing Major Policy Change in the Advocacy Coalition Framework: A Discourse Network Analysis of German Pension Politics." *Policy Studies Journal* 41 (1): 169–198. doi: 10.1111/psj.12007. <https://onlinelibrary.wiley.com/doi/abs/10.1111/psj.12007>.

- Leifeld, Philip, and Volker Schneider. 2012. "Information Exchange in Policy Networks." *American Journal of Political Science* 56 (3): 731–744. doi: 10.1111/j.1540-5907.2011.00580.x. <https://www.jstor.org/stable/23316017>.
- Levy, M.A. and Lubell, M.N., 2018. "Innovation, cooperation, and the structure of three regional sustainable agriculture networks in California." *Regional Environmental Change*, 18(4), pp.1235-1246.
- Lubell, Mark. 2004. "Collaborative Watershed Management: A View from the Grassroots." *Policy Studies Journal* 32 (3): 341–361. <https://doi.org/10.1111/j.1541-0072.2004.00069.x>.
- Lubell, Mark. 2007. "Familiarity Breeds Trust: Collective Action in a Policy Domain." *The Journal of Politics* 69 (1): 237–250. doi: 10.1111/j.1468-2508.2007.00507.x. <https://dx.doi.org/10.1111/j.1468-2508.2007.00507.x>.
- Markard, Jochen, Marco Suter, and Karin Ingold. 2016. "Socio-Technical Transitions and Policy Change – Advocacy Coalitions in Swiss Energy Policy." *Environmental Innovation and Societal Transitions* 18: 215–237. doi: <https://doi-org.libproxy.helsinki.fi/10.1016/j.eist.2015.05.003>. <http://www.sciencedirect.com.libproxy.helsinki.fi/science/article/pii/S2210422415000313>.
- Matti, Simon, and Annica Sandström. 2013. "The Defining Elements of Advocacy Coalitions: Continuing the Search for Explanations for Coordination and Coalition Structures." *Review of Policy Research* 30 (2): 240–257. doi: 10.1111/ropr.12011. <https://onlinelibrary.wiley.com/doi/abs/10.1111/ropr.12011>.
- McGee, Zachary A., and Jones, Bryan D. 2019. "Reconceptualizing the Policy Subsystem: Integration with Complexity Theory and Social Network Analysis." *Policy Studies Journal* 47 (S1): S138–S158. <https://doi.org/10.1111/psj.12319>.
- Merton, R.K., 1968. The Matthew Effect in Science: "The reward and communication systems of science are considered". *Science*, 159:3810, 56-63.
- Milward, H.B. and Provan, K., 2003. "Managing the hollow state Collaboration and contracting." *Public Management Review*, 5(1), pp.1-18.
- Mullin, Megan and Dorothy M. Daley. 2010. "Working with the State: Exploring Interagency Collaboration within a Federalist System." *Journal of Public Administration Research and Theory* 20 (4): 757–778. <https://doi-org.libproxy.helsinki.fi/10.1093/jopart/mup029>.
- Nisar, M.A. and Maroulis, S., 2017. "Foundations of relating: Theory and evidence on the formation of street- level bureaucrats' workplace networks". *Public Administration Review*, 77:6, 829-839.
- Ocelík, Petr, Kamila Svobodová, Markéta Hendrychová, Lukáš Lehotský, Jo-Anne Everingham, Saleem Ali, Jaroslav Badera, and Alex Lechner. 2019. "A contested transition toward a coal-free future: Advocacy coalitions and coal policy in the Czech Republic." *Energy Research & Social Science* 58 (2019): 101283.

- Painter, James. 2011. *Poles Apart*. Oxford: Reuters Institute for the Study of Journalism.
- Painter, James, and Ashe, Teresa. 2012. "Cross-National Comparison of the Presence of Climate Scepticism in the Print Media in Six Countries, 2007–10." *Environmental Research Letters* 7 (4).
- Pfeffer, Jeffrey, and Gerald R. Salancik. 2003. *The External Control of Organizations: A Resource Dependence Perspective*. Stanford, California: Stanford University Press.
- Provan Keith G. Kenis Patrick N. 2008. "Modes of network governance: Structure, management, and effectiveness." *Journal of Public Administration Research and Theory* 18 (2):229–52. <https://doi.org/10.1093/jpart/mum015>
- Provan, K.G. and Milward, H.B., 1995. "A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems." *Administrative Science Quarterly*, 1-33.
- Pierce, Jonathan J., Holly L. Peterson, Michael D. Jones, Samantha P. Garrard, and Theresa Vu. 2017. "There and Back Again: A Tale of the Advocacy Coalition Framework." *Policy Studies Journal* 45 (S1): S13–S46. doi: 10.1111/psj.12197.
- Robins, Garry, Pip Pattison, Yuval Kalish, and Dean Lusher. 2007. "An Introduction to Exponential Random Graph (P) Models for Social Networks." *Social Networks* 29 (2): 173–191. doi: 10.1016/j.socnet.2006.08.002. <https://www.sciencedirect.com/science/article/pii/S0378873306000372>.
- Sabatier, Paul A. and Jenkins-Smith, Hank .C., 1993. *Policy change and learning: An advocacy coalition approach*. Westview Press.
- Sabatier, Paul A. 1998. "The Advocacy Coalition Framework: Revisions and Relevance for Europe." *Journal of European Public Policy* 5 (1): 98–130. 10.1080/13501768880000051.
- Sabatier, Paul A., and Hank C. Jenkins-Smith. 1999. "The Advocacy Coalition Framework: An Assessment." In *Theories of the Policy Process*, edited by Paul A. Sabatier, 117–166. Boulder, Colorado: Westview Press.
- Sabatier, Paul A., and Christopher M. Weible. 2007. "The Advocacy Coalition Framework: Innovations and Clarifications." In *Theories of the Policy Process*, edited by Paul A. Sabatier, 189–222. Boulder, CO: Westview Press
- Schneider, Mycle. 2011. Fukushima crisis: Can Japan be at the forefront of an authentic paradigm shift? *Bulletin of the Atomic Scientists*, 9 September 2011. Available at <http://www.thebulletin.org/web-edition/features/fukushima-crisis-can-japan-be-the-forefront-of-authentic-paradigm-shift>
- Siciliano, M.D., Wang, W. and Medina, A., 2021. "Mechanisms of network formation in the public sector: A systematic review of the literature". *Perspectives on Public Management and Governance*, 4:1, 63-81.

- Stokman, Frans N., and Van den Bos, Jan M. M. 1992. "A Two-Stage Model of Policymaking with an Empirical Test in the U.S. Energy-Policy Domain." In *The Political Consequences of Social Networks*, edited by G. Moore and J. A. Whitt, 219–253. Greenwich, CN: JAI Press.
- Sørensen, E., & Torfing, J. (2009). "Making governance networks effective and democratic through meta-governance." *Public Administration*, 87(2), 234–258.
- True, James L., Bryan D. Jones, and Frank R. Baumgartner. 2007. "Punctuated-Equilibrium Theory: Explaining Stability and Change in Public Policymaking." In *Theories of the Policy Process*, edited by Paul A. Sabatier, 155–188. Boulder: Westview Press.
- Wagner, Paul, and Tuomas Ylä-Anttila. 2018. "Who Got their Way? Advocacy Coalitions and the Irish Climate Change Law." *Environmental Politics* 27 (5): 872–891. doi: 10.1080/09644016.2018.1458406. <http://www.tandfonline.com/doi/abs/10.1080/09644016.2018.1458406>.
- Weible, Christopher M. 2005. "Beliefs and Perceived Influence in a Natural Resource Conflict: An Advocacy Coalition Approach to Policy Networks." *Political Research Quarterly* 58 (3): 461–475. doi: 10.1177/106591290505800308. <https://www.jstor.org/stable/3595615>.
- Weible, C. M. (2008). Expert- based information and policy subsystems: a review and synthesis. *Policy Studies Journal*, 36(4), 615-635.
- Weible, Christopher M., Karin Ingold, Daniel Nohrstedt, Adam Douglas Henry, and Hank C. Jenkins- Smith. 2019. "Sharpening Advocacy Coalitions." *Policy Studies Journal*. doi: 10.1111/psj.12360.
- Weible, Christopher M., and Paul A. Sabatier. 2005. "Comparing Policy Networks: Marine Protected Areas in California." *Policy Studies Journal* 33 (2): 181–201. doi: 10.1111/j.1541-0072.2005.00101.x. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1541-0072.2005.00101.x>.
- Wellstead, Adam. 2017. "Plus Ça Change, Plus C'est La Même Chose? A Review of Paul Sabatier's 'An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein.'" *Policy Sciences* 50 (4): 549–561. doi: 10.1007/s11077-017-9307-z. <https://search.proquest.com/docview/1964393231>.