

Northumbria Research Link

Citation: Gronow, Antti, Wagner, Paul and Ylä-Anttila, Tuomas (2020) Explaining collaboration in consensual and conflictual governance networks. *Public Administration*, 98 (3). pp. 730-745. ISSN 0033-3298

Published by: Wiley-Blackwell

URL: <https://doi.org/10.1111/padm.12641> <<https://doi.org/10.1111/padm.12641>>

This version was downloaded from Northumbria Research Link:
<http://nrl.northumbria.ac.uk/id/eprint/43735/>

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.)

Explaining Collaboration in Consensual and Conflictual Governance Networks

Antti Gronow, Paul Wagner & Tuomas Ylä-Anttila

Abstract

The conditions under which policy beliefs and influential actors shape collaborative behaviour in governance networks are not well understood. This paper applies exponential random graph models to network data from Finland and Sweden to investigate how beliefs, reputational power and the role of public authorities' structure collaboration ties in the two countries' climate change governance networks. Results show that only in Finland's conflictual climate policy domain do actors collaborate with those with similar beliefs and with reputational power, while only in Sweden's consensual climate policy domain do public authorities play central impartial coordinating roles. These results indicate that conflict is present in a governance network when beliefs and reputational power determine collaboration and that it is absent when public authorities occupy central roles. They also suggest that relative success in climate policy action is likely to occur when public authorities take on network manager roles.

KEYWORDS: Climate Change Policy, Exponential Random Graph Model, Governance Networks, Finland, Sweden

Introduction

In recent decades, researchers have drawn attention to the increasing fragmentation of governance architectures (Biermann et al., 2009; Osborne, 2010), the expanding need for cross-sector and cross-scale coordination (Hossu et al., 2017; Mukheibir et al., 2013), the rise of stakeholder participation (Wang & Wan Wart, 2007), the reliance on the expertise of non-state actors (Jennings & Hall, 2011) and the participation of citizens in policymaking processes (Barnes et al., 2003). These and similar types of interdependent and collaborative governance relationships between state and non-state actors that emerge to address complex policy problems have been labelled as governance networks (Ansell and Gash, 2008).

Koppenjan and Klijn (2015, 11) have defined governance networks as “*stable patterns of social relations between mutually dependent actors, which cluster around a policy problem, a policy programme, and/or a set of resources and which emerge, are sustained, and are changed through a series of interactions*”. The governance networks literature assumes that when actors with different beliefs, interests, resources and roles collaborate that costs can be cut, efficiencies can be made and conflicts can be resolved. Addressing complex problems that are beyond the capacity of any single organisation is thus made easier. Network approaches to governance can be criticized for assuming that collaboration automatically follows from, for example, similar beliefs (Schlager, 1995). Determining which factors explain collaboration patterns in a governance network can provide insights into how policy actors negotiate policies (Fischer, 2015), help determine if a network is fit for purpose (Bodin and Nohrstedt, 2016; Nohrstedt and Bodin, 2018), and help explain policy pathways, choices and outcomes (Calanni et al., 2010; Calanni et al., 2014; Weible, 2005). Collaboration relationships, and explaining their formation, thus, are a key issue for the governance networks literature.

The extant literature on tie formation in governance networks has examined several factors that explain collaborative behaviour: similarity of policy beliefs (Henry, 2011; Calanni et al., 2014), reputational power (Leifeld & Schneider, 2012), actors’ formal

institutional roles (Ingold & Leifeld, 2016), as well as competencies (Weible et al., 2018), expertise (Schneider et al., 2003) and trust (Berardo & Scholz, 2010). One of the central debates is whether belief similarity or reputational power matters more (e.g. Matti & Sandström, 2013). Reputational power refers to the assessment of the influence of policy actors as performed by actors themselves and recently scholars have argued that the relative influence of beliefs and reputational power on collaboration might be context-dependent: it may be that similarity of policy beliefs explain collaboration especially in conflictual contexts and reputational power explains it in consensual ones (Calanni et al., 2014; Weible et al., 2018). However, this suggestion has not been tested in a comparative setting, and that is what we do in this paper. Furthermore, we examine whether the level of conflict in a policy domain is associated with the role of public authorities in the governance networks. Because of their official decision-making power, public authorities are likely to be attractive collaboration partners (Fischer, Ingold & Ivanova, 2017; Ingold & Fischer, 2014), which puts them in a unique position wherefrom they can possibly reduce conflict by facilitating collaboration among actors with different beliefs and resources.

The contribution of this paper, thus, is to investigate if the level of conflict in a governance network is related to whether belief similarity or reputational power explains collaboration, and to analyse the relationship between the level of conflict and participation of public authorities. We examine these issues by analysing the climate change policy domains in Finland and Sweden. This policy domain in Sweden is more consensual, and climate policy more ambitious, whereas Finland's policy domain is more conflictual and policy less ambitious. Sweden has been considered a pioneer in climate change mitigation (Sarasini, 2009), whereas Finland has been labelled a failed eco-state (Koch & Fritz, 2014). Using original survey data, we apply Exponential Random Graph Models to investigate which factors are associated with collaboration in the climate change governance networks in the two countries. Our results show that only in conflictual Finland do actors collaborate with those with similar beliefs and with influential others (i.e. those with reputational power), while only in consensual Sweden do public authorities play central impartial coordinating roles. These results provide evidence about which

factors underpin collaboration in a conflictual versus a consensual policy domain, and also about which factors may explain a country's relative success in climate policy action.

In the next section, we develop our hypotheses and state our expectations for both consensual and conflictual contexts. We then describe our two cases, our data and methods, and finally, the results of our analysis. Following this, we discuss our findings and reflect on how the differences between the countries are related to their climate policy performance. We conclude by making some suggestions about how public authorities in other polities might improve their climate change policy performance.

Theoretical Framework

The question of collaboration is at the heart of the network approach to understanding governance. What makes collaboration important is that the extent of collaboration in governance networks is related to the success or failure of policy processes (Klijn & Koppenjan, 2000). It is not surprising, then, that several theories have made attempts at explaining collaboration. It is often more informative to compare and integrate the explanatory power of ideas from multiple theoretical frameworks than it is to test hypotheses drawn from just the one (Leach and Sabatier, 2005, 492). Following this advice, we integrate insights from three related theoretical discussions about the factors that explain collaboration in governance networks. Much of the governance networks literature has focused on the patterns of relationships between actors and the structural positions of specific actors or types of organisations, downplaying or ignoring the contexts within which networks emerge and exist. Our contribution to the literature is to investigate whether the level of conflict in a policy domain is reflected in the structure of a governance network. We pose the following research question:

How do beliefs, reputational power and the role of public authorities structure collaboration patterns in governance networks, and how do these effects differ in consensual and conflictual contexts?

Beliefs

The causes and the effects of wicked problems like climate change are complex, making the development of solutions particularly challenging. Addressing such problems is made more difficult still by the presence of multiple actors with different backgrounds, worldviews, objectives, interests, values and problem perceptions. Conflict and disagreement among policy actors are therefore likely to arise as a consequence of actors interpreting information differently on the basis of incompatible problem perceptions (Wolsink, 2007). A major challenge in addressing policy problems is overcoming disagreements over how such problems are understood, rather than over the availability of quality information and data. How actors give meaning to problems shapes their attitudes and beliefs about potential policy ideas, which in turn can shape how they interact with others as they seek collaborative relationships with those that wish to see the same policy decisions and outcomes as themselves (Weible, 2005; Sabatier, 1988). The tendency for policy actors to collaborate with those with similar beliefs to their own is a recurring finding in the literature (Fischer & Sciarini, 2016; Jasny et al., 2015; Leifeld & Schneider, 2012; Wagner & Ylä-Anttila, 2018a; Gronow & Ylä-Anttila, 2019).

The advocacy coalition framework is perhaps the best known approach for examining actors' beliefs and how they lead to collaborations and coalition formation in policymaking processes (Sabatier, 1988). The framework argues that sharing policy beliefs is the main factor that induces actors to collaborate. It was developed to be applied in the pluralist and conflictual context of the US, where interest groups tend to compete against one another. Its utility for understanding politics in non-pluralist countries has been questioned (Wagner & Ylä-Anttila, 2018b). In non-pluralist contexts it is possible that one group of dominant actors will emerge rather than two or more opposing coalitions (Leifeld, 2013). Nevertheless, divisions based on beliefs do sometimes exist within specific policy domains in non-pluralist countries (Matti & Sandström, 2011). Therefore, what matters is not necessarily the pluralist or non-pluralist nature of a country but rather the level of conflict in a policy domain. Indeed, recently researchers have argued that beliefs are more likely to lead to collaborative relations in conflictual contexts than they are in consensual

ones (Weible et al., 2018), perhaps because when policy actors have different beliefs they are more likely to engage in a policy process in a confrontational manner (Lodge & Matus, 2014). This study is the first to examine this question using a comparative approach. We investigate if actors in a conflictual context are likely to collaborate with those with similar beliefs to their own and if actors in a consensual context have no such preference.

H1b: In a conflictual governance network, actors are more likely to collaborate with those whose policy beliefs are similar to their own.

H1a: In a consensual governance network, actors are not more likely to collaborate with those whose policy beliefs similar to their own.

Reputational Power as a Resource

Scholars have drawn upon Resource Dependency Theory (Pfeffer and Salancik, 1978) to argue that actors involved in complex policy processes seek out resources from others to make up for their own weaknesses and deficiencies (Henry, 2011; Weible, 2005). Actors engage in strategic behaviour to gain access to additional resources because they believe that they will help them achieve their objectives (Calanni et al., 2014). According to this line of argument, power relations are more important than belief similarity as a basis upon which actors choose their collaboration partners. Each individual actor's level of influence is not just determined by the resources at their disposal, but also by how easily the same (or substitutable) resources are available elsewhere. Given that influence is unevenly distributed, there is an incentive for those with fewer resources to compensate for what they lack by seeking to collaborate with those that have the resources they desire. Research has found that actors collaborate with those perceived to be influential – those with reputational power – in a variety of different policy domains (Calanni et al., 2014; Fischer & Sciarini, 2016; Heaney, 2014; Ingold & Leifeld, 2016), but not in all contexts (Matti & Sandström 2011; 2013). Reputational power may be less important in conflictual policy domains (Weible et al., 2018), and therefore, likely more important in consensual domains.

The argument then, is that when conflict is low actors tend to think in more strategic terms, leading them to seek out collaborative relationships with powerful and resource-rich actors. An understanding of under which circumstances reputational power explains collaboration will help address the question of whether beliefs and influence are complementary rather than competing explanations for collaboration. Again, this idea has not previously been tested in a comparative setting.

H2a: In a conflictual governance network, actors with greater reputational power are not likely to attract more incoming collaboration ties than would occur by chance.

H2b: In a consensual governance network, actors with greater reputational power are likely to attract more incoming collaboration ties than would occur by chance.

Public Authorities

The tragedy of the commons predicts that actors will employ non-cooperative strategies with others involved in the use or the management of some public good out of a fear of being disadvantaged by the opportunistic behaviour of others and that this will occur even when they would all be better off cooperating (Hardin, 1968). Groups can avoid sub-optimal outcomes from cooperation games when actors can communicate with one another to establish rules and behavioral norms that enable the building of consensus and a commitment to collective action (Ostrom, 1990). However, when addressing complex policy problems it may not be possible for self-organising processes to emerge or for shared objectives to be conceived and realised because beliefs or resources have significant importance. This means that some actor/s may need to manage the process (Kickert et al., 1997; Pierre, 2000). Collaboration and the coordination of goals and interests are more likely with active network management (O'Toole, 1988). Effective network management is also more likely to lead to positive outcomes (Agranoff, 1986; Meier & O'Toole, 2007; Klijn, Steijn & Edelenbos, 2010) and leave policy actors satisfied (Klijn et al., 2015).

Network managers can mediate between conflicting interests, build consensus, foment trust between different parties, enable the participation of those facing barriers to entry, create opportunities for disconnected actors to collaborate and ensure that governance processes don't stagnate or lead to lose-lose outcomes.

As outlined above, conflicts over the costs and benefits of different policy choices arise in policy processes because of the unequal distribution of influence and the diversity of views, goals and interests of policy actors. Collaboration and consensus building are therefore not a given, and as such, they need to be actively facilitated and built to increase the chances that a policy problem can be addressed. One way for these to occur is for public authorities (political parties, governmental and administrative actors) to take on network manager roles. Public authorities are best suited for these roles because they are the most likely to have the necessary authority and legitimacy (Klijn & Koppenjan, 2000). These actors often play crucial central coordinating roles in governance networks (Angst et al., 2018). Public authorities can seek to unite the beliefs of participating actors and work to address the policy problem that led to the emergence of a governance network. When public authorities with decision-making power take on these roles, they occupy central positions in a governance network (Fischer, Ingold & Ivanova 2017; Ingold & Fischer, 2014).

Above, we described how beliefs and reputational power can determine collaboration patterns. Here, we suggest that how public authorities participate in a governance network shapes its structure, and that the role that they play is associated with the degree of consensus in a policy domain. When public authorities occupy central coordinator roles they can bring actors with diverse beliefs together and reduce conflict. When they fail to occupy these roles, conflict is more likely to be present and beliefs are more likely to drive collaboration.

H3a: In a conflictual governance network, public authorities are collaboration partners less often than would occur by chance.

H3b: In a consensual governance network, public authorities are collaboration partners more often than would occur by chance.

Public authorities do not automatically reduce or eliminate conflict in a policy domain just by occupying central positions. They also have to be seen as impartial coordinators rather than taking the side of one set of interests. In a consensual context, public authorities would dedicate a relatively equal amount of time and resources to establishing relationships with actors representing different, traditionally opposing societal interests. If public authorities favour one kind of actor over others in a situation where there are opposing interests involved, this could be an indication of both partiality and the state's preferred approach to resolving a policy problem. Thus, in a consensual context, public authorities would not exclusively forge collaborative relationships with actors representing one sector of societal interests. Conversely, in a conflictual context, the opposite would occur - public authorities are more likely to be partial coordinators that favour one sector of opposing societal interests over another.

H4a: In a conflictual governance network, public authorities collaborate more closely with actors representing one sector of opposing societal interests than they do with another.

H4b: In a consensual governance network, public authorities do not collaborate more closely with actors representing one sector of opposing societal interests than they do with another.

Cases, Data and Methods

Cases

Much of the research on governance networks has examined policy processes in pluralist contexts. More research is needed to understand the structure and the dynamics of the collaboration patterns among actors in corporatist countries, where the formation of opposing beliefs-based coalitions is less likely (Leifeld, 2013). Nonetheless, there is evidence

that beliefs and influence affect collaboration in governance networks of corporatist countries too (Matti & Sandström, 2011), and our objective is to examine how the level of conflict in a policy domain conditions the effects of beliefs and reputational power. We do this by comparing climate governance networks in two countries, Sweden and Finland. These two countries are relatively similar Nordic corporatist polities but they differ in the level of conflict over climate change governance. In Sweden the level of conflict is remarkably low, whereas in Finland it is considerably higher.

Sweden is the prime example of the Nordic model of consensual democracy (Lane & Ersson, 2002; Lijphart, 2012) and can be characterized as a negotiating or a harmonious democracy because of its deeply consensual nature (Arter, 2016). Its political institutions have traditionally sought to avoid conflict and to favour open consultation with a broad range of political interests (*ibid.*, 187-188). Its political institutions are organised to encourage compromise and the creation of pragmatic solutions.¹ Finnish political institutions have historically been less consensual than those in Sweden, leading Arter (2016) to brand Finland a compulsory consensus democracy. Both countries are corporatist in nature, where state actors mediate negotiations between business interests and labor unions. These tripartite negotiations have traditionally been associated with economic issues, but they have also been used in other policy areas, including the environment.

The level of conflict in the two countries' climate change policy domains differs in both substance and character. There is much more consensus in Sweden, the most influential actors agree on the need to implement ambitious climate change policy, and the country's environmental NGOs are actively involved in the national climate policy process (Gronow et al., 2019). In Finland, business organisations, trade unions and governmental organisations tend to prioritize economic growth over environmental concerns, and have long been in conflict with environmental NGOs and green and leftwing political parties (Gronow & Ylä-Anttila, 2019; Teräväinen, 2012; Tirkkonen, 2000).

¹ This characterisation of Swedish political institutions as open and non-conflictual holds despite Social Democrats' control of the executive branch for decades and the lack of the multi-party features usually associated with consensual countries (Lijphart 2012, 35-36).

Sweden has produced more ambitious climate policies than Finland. Sweden is known as a pioneer in tackling environmental problems (Sarasini, 2009), and climate change in particular (Karapin, 2016, p. 2). Goldstein and Qvist (2019) have even claimed that Sweden has solved the problem of climate change. Finland, in contrast, has been labeled ‘a failing eco-state’ due to its poor performance in addressing ecological problems, especially climate change (Koch & Fritz, 2014). Sweden has traditionally pushed for more ambitious EU emissions reduction targets, while Finland has resisted them (Teräväinen 2012). Sweden was one of the first countries in the world to outline a national climate strategy (Sarasini, 2009, 640) and is consistently at the top of The Climate Change Performance Index (Germanwatch, 2019). Finland, in contrast, ranks 31st based on a ten-year average (2008–2017) of the same index.

Another way to analyse differences in climate policies is to look at the costs that countries impose on carbon-based energy sources. This measure makes visible the extent to which governments put a price on a carbon-free future (Finnegan, 2019). Both in Finland and Sweden the price of carbon is higher than its market price, but the level is around three times higher in Sweden (Finnegan, 2019). Finland’s per capita greenhouse gas emissions are approximately double those of Sweden, and have been for some time. The differences in the two countries’ adaptation policies are less pronounced. Finland was the first country in Europe to publish its National Adaptation Strategy in 2005. However, the implementation of adaptation measures has not followed this strategy and has been fragmented across different levels of governance (Juhola, 2010).

Sweden’s higher level of ambition is in line with the argument that consensual contexts are more likely to lead to more ambitious environmental policies (Christoff & Eckersley, 2011). The logic behind this claim is that consensual power-sharing arrangements are more likely to ‘yield more diverse and ambitious intertemporal undertakings’ (Jacobs, 2016: 447). Consensus, then, facilitates more ambitious climate policies because political actors are more likely to take a long-term perspective.

Data

We collected data by surveying the most important organisations involved in the domestic climate policymaking processes in Finland (2014) and Sweden (2015). A preliminary list of respondents was drawn up for each country based on previous research and the researchers' knowledge of the two national climate policy domains. While compiling the lists, a guiding principle was that the respondent organisations would represent different sectors of society (NGO's, business, government, etc.) and that the respondents' profiles would be fairly similar in both countries. The preliminary lists were then shown to national experts on climate policy, who then suggested some additions. There are 96 organisations in the Finnish climate policy domain and 99 in Sweden's. When we first contacted each organisation by phone, we sought out the person responsible for articulating their organisation's climate policy positions (or environmental policy when no person had this responsibility). A research assistant then sent a link to an online questionnaire to the respondent if they agreed to participate. After several reminders, 82 actors (85%) responded to the questionnaire in Finland and 69 (70%) in Sweden (see Table 1 and the appendix for network descriptive statistics). Nonrespondents are excluded from our analysis.

[Insert **TABLE 1** around here]

We collected data on each organisation's policy beliefs by asking respondents to indicate on a five-point Likert scale (No, totally reject = 1, Neutral = 3, Strongly agree = 5) their position on 21 different climate policy ideas, ranging from the validity of climate science to the extent that mitigation should be prioritized over economic growth. The list of 21 questions was constructed using the existing academic literature and our own prior work on media debates on climate change, with the aim of capturing the most important issues that usually divide policy actors in relation to climate change mitigation. In each country's questionnaire, we listed all the organisations that we identified as being in the national climate change governance networks. Thus, the respondents were identical to a roster of organisations used in the questionnaire. We then asked each respondent the questions below to gather data about their organisation's network ties:

- i.) *With which of the listed organisations does your organisation have a long-term and mutually collaborative relationship in relation to climate change policy?*
- ii.) *Which organisations are especially influential in domestic climate change politics?*

It is worth noting that our definition of collaboration here is quite restrictive; following landmark work in the network literature (Laumann & Knoke, 1987) we examine relationships of long-term mutual collaboration, not more or less random instances of collaboration. It is difficult to evaluate and compare the usefulness of the resources under the control of individual actors in a governance network. Not least because actors can have different views about which resources are of value and about which resources they wish to access. One approach for evaluating actors' resource endowments is to use a proxy, such as Hunter's (1953) reputational power measure. The logic underpinning the concept, when applied in the policy studies literature, is that the actors involved in a governance network are those that are best placed to evaluate which actors are influential. Actors derive their reputational power, and therefore their influence, from their resource endowments, and thus what we measure is influence as reputational power. Our final hypothesis investigates whether public authorities collaborate more closely with actors representing one sector of opposing societal interests than they do with another. In the climate change policy domain environmental NGOs and business interests often find themselves taking opposing policy positions. For this reason, we investigate the collaboration ties between public authorities and these two groups (cf. Yun, Ku & Han 2014).

The number of collaboration ties in the Finnish governance network is much higher than it is in Sweden (Table 1 above, network density). A reasonable argument can be made that collective action is more likely when there are more collaboration ties present in a network. However, it is not just the number of ties that is important, but instead, how different types of actors, with different roles, views and resources collaborate with one

another. It is therefore crucial to investigate what factors determine collaboration and shape a governance network's structure.

Methods

We test our hypotheses by fitting Exponential Random Graph Models to our data using the Statnet software package (Goodreau et al. 2008). Through the application of these models, researchers can investigate multi-theoretical hypotheses about network dynamics simultaneously and compare the relative strengths of the processes that interact to produce observed network structures. These models enable researchers to investigate if the structure present in some observed network Y for which data is collected is explainable by the relative prevalence of a set of network statistics and covariates included in a model $s(y)$. The probability of these being present in a network Y is expressed in terms of a parameter estimate (θ), which when negative implies that a statistic has a lower probability of being observed in a network than chance and when positive implies that it has a greater probability of being observed than chance. The parameter estimates express the relative strength of each explanatory variable and can be tested using a Wald test to see if they are statistically significant. Expressed simply, the likelihood of network Y is explained by the prevalence of network statistics $s(y)$, testable via parameters (θ). z is the normalizing constant to ensure that the probability scales to 1.

$$P(Y = y) = \frac{\exp\{\theta' s(y)\}}{z\{\theta\}}$$

Models and Variables

The dependent variables in our models are the national climate change collaboration networks of the two case countries. They are represented by $n \times n$ adjacency matrices, that is, square matrices where the rows and columns are the actors in the networks, with the presence or absence of ties encoded using binary elements. The ties in the networks are asymmetric and there are no self-loops because actors cannot collaborate with themselves.

We test if actors are more likely to collaborate with those with beliefs that are more similar to their own (H1a and H1b) with a variable that we construct using each respondents' answers to the policy beliefs survey questions. We begin by constructing a composite variable that measures the actors' policy beliefs with regard to the importance of economic development versus environmental protection (Sabatier & Jenkins-Smith 1999, 122). Based on inter-item correlation tables and exploratory factor analyses of 21 policy beliefs questions, we identified six strongly correlated items that constitute the final scale. The six items of the final sum scale are 1) "Climate science is too uncertain to be a basis for policymaking", 2) "Climate change is not caused by human activities", 3) "National economic competitiveness is more important than taking care of climate change", 4) "Securing national energy supply is more important than taking care of climate change", 5) "The government puts too much effort into reducing CO2 emissions" and 6) "My country should not try to take a leading international role in international negotiations on climate change". We calculated the simple sum of all items (as opposed to summing by factor scores) to maximize transparency of interpretation and scaled the final composite variable so that values ranged from 0 to 1 to maximize readability. Cronbach's alpha for the composite variable is 0.875 for Finland and 0.828 for Sweden.² We used these values to calculate a dissimilarity matrix that contains the Manhattan distance between the beliefs of each pair of actors. We then subtracted each dissimilarity value from the maximum dissimilarity value to create a similarity matrix. This matrix represents an undirected and weighted network that represents in quantitative form the similarity in the preferences of each pair of actors, with larger distances between a pair implying more similar beliefs (Leifeld and Schneider, 2012).

To investigate if actors are more likely to collaborate with those with greater reputational power (H2a and H2b) we use each actor's reputational power score. We calculate this by summing the number of times that they were named as being influential

²As a robustness check, we tested an alternative approach to operationalizing belief similarity. Using the respondents' answers to 21 survey questions on the five-point Likert scale, we constructed a similarity matrix using the Leifeld and Schneider's approach (2012). The results of our models are robust to this change of operationalization of belief similarity: the independent variables that are in/significant remain the same when the numbered likert values are used.

by all the other actors in the network. These values are assigned to each actor as a continuous attribute variable.

We investigate if public authorities are central actors in the networks by including a variable that allows us to test if they are more likely to be named as collaboration partners than would occur by chance (H3a and H3b). Finally, we construct two matrices to test our final hypotheses (H4a and H4b). The first of these indicates all potential collaborations between public authorities and businesses interests. The second indicates all the potential collaborations between public authorities and environmental NGOs.

Controls and endogenous variables

We include an influence attribution matrix in our models constructed using respondents' answers to the question asking them to name those actors that they believe to be especially influential. By including this matrix we control for the tendency for actors to name their collaboration partners as influential (cf. Fischer & Sciarini 2015). Second, we include a matrix in our models that indicates all the potential collaborative relationships between business interests and environmental NGOs. Business interests include agricultural organisations, consultancy firms, companies working in the energy sector and business associations. NGOs are non-profit organisations that operate independently of government, whose purpose is to address political, social or environmental issues. Including these variables allows us to examine if these two actor types, representing different societal interests, collaborate with one another more or less than would occur by chance.

We include several variables to control for endogenous network effects. The first of these is the edge statistic, which provides a means for modelling the density of the networks and the baseline propensity for collaboration ties to be formed. We include a mutual statistic to capture reciprocated collaboration ties. We account for triadic closure in the networks using the geometrically weighted edgewise shared partner (GWESP) statistic (Hunter et al., 2008). It captures how frequently two directly connected actors are also indirectly connected to one another through a third actor. Finally, we include the

gwodegree term to control for the out-degree tie distribution in the network and the two-path term to control for the number of actors connected via a third actor.

Results

Results are presented in Table 2 (Finland) and Table 3 (Sweden). In what follows, we summarize our findings and explain the substantive meaning of the estimates for the endogenous variables.

[Insert **TABLE 2** and **TABLE 3** around here]

Exogenous variables

In conflictual Finland, actors are more likely to collaborate with those with similar beliefs to their own, while in consensual Sweden there is no association between beliefs and collaboration ties (H1a and H1b). The results for the reputational power hypotheses (H2a and H2b) are the opposite to what was expected. In Finland and not in Sweden, actors with greater reputational power are more likely to be named as collaboration partners than would occur by chance. Results support our hypotheses regarding the centrality of public authorities (H3a and H3b). In Finland, public authorities receive fewer collaboration ties than would occur by chance, while in Sweden they attract more. Finally, results indicate that in neither country do public authorities collaborate more closely with actors representing one sector of societal interests than they do with the other (H4a and H4b). However, including these variables in the Swedish model worsens model fit. Table 4 highlights the differences in the roles of the public authorities in the two countries. It shows that only two of the ten most popular collaboration partners in Finland are public authorities, and that the remaining eight are an environmental NGO, a civil society organisation, four different scientific organisations and two actors representing business interests. This contrasts greatly with Sweden, where public authorities are six of the ten most popular collaboration partners.

[Insert **TABLE 4** here]

Controls and endogenous variables

As expected, actors in both countries were likely to name their own collaboration partners as influential. In Finland, business interests and environmental NGOs collaborate with one another less than would occur by chance, while in Sweden there is no significant relationship. These results provide further evidence that the Finnish climate policy domain is more conflictual than that in Sweden.

In both countries we find that actors reciprocate collaboration ties and a positive and significant parameter estimates for the GWESP statistic, indicating a tendency towards triadic closure. The parameter estimates for the two-path statistics are negative and significant in both countries, indicating that pairs of actors who are not directly connected share common collaboration partners more often than would occur by chance. Finally, the parameter estimates for the gwodegree statistic are negative and statistically significant in both cases, implying that most of the actors tend to have a similar number of outgoing collaboration ties.

Discussion and Conclusion

Collaborative governance networks have the potential to generate solutions to policy problems if they are structured in an appropriate way (Scholz, Berardo & Kile 2008). There is therefore a need to understand what factors shape collaboration patterns in these networks and how they are related to effective governance. In recent years there has been a debate in the literature about whether beliefs or reputational power are more important as determinants of collaboration ties in these networks (e.g. Matti & Sandström, 2013). This article set out to examine the conditions under which these factors are significant. Specifically, we tested two arguments: (i) that belief similarity is more likely to explain collaboration in a conflictual context than it is a consensual one, and (ii) that collaborating with actors with reputational power (i.e. influence) is more important in a consensual

context than in a conflictual one. Added to this, we argued that the level of conflict in a policy domain is related to how public authorities participate in a governance network.

Our results support the argument that the differences in the degree of consensus in Finland and Sweden are reflected in the structure of their national climate governance networks. Only in the conflictual Finnish climate policy domain do we find that actors collaborate with those with similar policy beliefs to their own, which both indicates and also exacerbates conflict (cf. Henry et al., 2010). For governance networks to be effective, it is essential to avoid or to break cycles of association that deepen segregation and intensify conflict. This can be achieved when actors have and use opportunities to reduce conflict as well as their reliance on the support of those with which they have similar beliefs (Leifeld & Schneider, 2012). The consensual Swedish network - where public authorities are central actors and where there is no evidence that actors prefer to collaborate with those that share their beliefs - offers an example of how this might be achieved.

Following Weible et al. (2018), we hypothesized that reputational power is more likely to explain collaboration patterns in low-conflict policy domains when policy beliefs are less likely to divide actors into opposing camps. We suggested that in these circumstances actors' strategic concerns are more important, and therefore more likely to shape their choice of collaboration partners. Contrary to expectations, results show that actors with reputational power are not popular collaboration partners in Sweden and that they are in Finland. This implies that both strategic concerns (that is, reputational power of collaboration partners) and similarity of policy beliefs underpin collaborative relationships in the conflictual case, but not in the consensual one. This finding contradicts literature that has examined either beliefs or influence on their own, but is in line with Henry (2011), who argues that belief similarity is a more important driver of collaboration than reputational power, but that *among* those actors holding similar beliefs, actors with reputational power are more popular collaboration partners.

In consensual Sweden, neither belief similarity nor reputational power then explains collaboration. This is perhaps a unique finding in the literature examining collaboration tie formation in governance networks. How Swedish public authorities

participate in the national climate governance network offers a possible explanation for the results. The inter-organisational collaboration and the consensus needed to address policy problems are not a given and therefore need to be encouraged by network managers, preferably by public authorities with both authority and legitimacy. Effective network management can overcome the detrimental effects of belief polarisation and the imbalances in the distribution of influence (Purdy, 2012). Our results show that in consensual Sweden, public authorities receive more collaboration ties than would occur by chance, while in conflictual Finland that they receive fewer. Swedish public authorities are therefore playing a central role in how the country is responding to climate change, while in Finland they are not. Effective climate governance, then, is perhaps more likely when public authorities occupy central impartial coordinating roles in a governance network. Thus, by occupying central positions, Swedish public authorities seem to make both belief similarity and reputational power less relevant for network collaboration.

Our study is the first to show a relationship between the level of consensus in a governance network and the network positions of public authorities. Network management involves identifying crucial actors and activating and connecting them (Klijn, Steijn & Edelenbos 2010). Our results imply that when public authorities are central in a network that they can fulfil this role. From this position, they can engage in “metagovernance”, which holds the potential to realize the values of effective and democratic governance (Sørensen & Torfing 2009).

Perhaps the most important limitation of our study is that is based on a comparison of only two cases. Although this is more than in most other studies, where the focus is on single cases, and even though our cases are selected specifically to assess the influence of the level of conflict in the variable of interest (collaboration patterns), it obviously limits the degree to which our results are generalizable. Future research could examine the effects of beliefs, reputational power and public authorities in a larger set of countries and policy domains, including both conflictual and consensual ones, with a view to building a body of evidence.

We conclude by suggesting that public authorities interested in producing more ambitious climate policy look to Sweden's national climate governance network for ideas about how they might participate in their national climate change governance network. The most obvious lesson is that public authorities ought to play central impartial coordinating roles in a country's governance network. This can be achieved by finding ways to get actors that disagree with one another to work together towards finding commonly agreed problem perceptions and viable solutions. This could perhaps be achieved by reframing problems, de-politicising issues and by enabling actors to learn about the value of potential solutions. Public authorities may also try to give actors an understanding of how the network is structured and how it shapes their roles and functions within it. They might try to create opportunities for actors to interact in different ways that could restructure the network and improve their collective problem-solving capacity.

Acknowledgments

We thank Jeffrey Broadbent who originally initiated the COMPON (Comparing Climate Change Policy Networks) framework and data collection scheme. We also thank Marcus Carson and Christofer Edling, who participated in data collection in Sweden, and research assistants Eva Gronow and Maija Jokela. The editor Salvador Parrado and anonymous reviewers made many helpful comments and suggestions. An earlier version of the paper was presented at the Advancing Frontiers on Comparative Policy Research through the ACF Research Program workshop in the ECPR Joint Sessions, Cyprus, 10-14 April 2018.

Bibliography

Agranoff, R.I., 1986. *Intergovernmental Management. Human services problem-solving in six metropolitan areas*, Albany, NY: State University of New York Press.

Angst, M., Widmer, A., Fischer, M., & Ingold, K. M. (2018). Connectors and coordinators in natural resource governance: insights from Swiss water supply. *Ecology and Society*, 23(2).

Ansell, C. and Gash, A., 2008. Collaborative governance in theory and practice. *Journal of public administration research and theory*, 18(4), pp.543-571.

Arter, D., 2016. *Scandinavian Politics Today*. 3rd Edition. Manchester: Manchester University Press.

Barnes, M., Newman, J., Knops, A. and Sullivan, H., 2003. Constituting 'the public' in public participation. *Public administration*, 81(2), pp.379-399.

Berardo, R. and Scholz, J.T., 2010. Self-organizing policy networks: Risk, partner selection, and cooperation in estuaries. *American Journal of Political Science*, 54(3), pp.632-649.

Biermann, F., Pattberg, P., Van Asselt, H. and Zelli, F., 2009. The fragmentation of global governance architectures: A framework for analysis. *Global Environmental Politics*, 9(4), pp.14-40.

Bodin, Ö. and Nohrstedt, D., 2016. Formation and performance of collaborative disaster management networks: Evidence from a Swedish wildfire response. *Global environmental change*, 41, pp.183-194.

Christoff, P. and Eckersley R. (2011). Comparing state Responses. In: J.S. Dryzek, R.B. Norgaard, and D. Scholsberg, eds. *The Oxford handbook of climate change and society*. Oxford: Oxford University Press, 431–448.

Calanni, J., Leach, W.D. and Weible, C., 2010. March. Explaining coordination networks in collaborative partnerships. In *Western Political Science Association 2010 Annual Meeting Paper*.

Calanni, J.C., Siddiki, S.N., Weible, C.M. and Leach, W.D., 2014. Explaining coordination in collaborative partnerships and clarifying the scope of the belief homophily hypothesis. *Journal of Public Administration Research and Theory*, 25(3), pp.901-927.

Fischer, M., 2015. Collaboration patterns, external shocks and uncertainty: Swiss nuclear energy politics before and after Fukushima. *Energy policy*, 86, pp.520-528.

Fischer, M., Ingold, K. and Ivanova, S., 2017. Information exchange under uncertainty: The case of unconventional gas development in the United Kingdom. *Land use policy*, 67, pp.200-211.

Finnegan, J. (2019). *Institutions, climate change, and the foundations of long-term policymaking*. Centre for Climate Change Economics and Policy Working Paper No. 353.

Fischer, M., & Sciarini, P. (2015). Unpacking reputational power: Intended and unintended determinants of the assessment of actors' power. *Social networks*, 42, 60-71.

Fischer, M. & Sciarini, P. 2016. Drivers of collaboration in political decision making: A cross-sector perspective. *Journal of Politics* 78(1): 63–74.

Germanwatch, 2019. The Climate Change Performance Index. <https://germanwatch.org/en/indices> [accessed April 2019].

Goldstein, J. S., & Qvist, S. A. (2019). *A Bright Future: How Some Countries Have Solved Climate Change and the Rest Can Follow*. New York: PublicAffairs.

Goodreau, S.M., Handcock, M.S., Hunter, D.R., Butts, C.T. and Morris, M., 2008. A statnet Tutorial. *Journal of statistical software*, 24(9), p.1.

Gronow, A. and Ylä-Anttila, T., 2019. Cooptation of ENGOS or Treadmill of Production? Advocacy Coalitions and Climate Change Policy in Finland. *Policy Studies Journal*, 47(4), pp. 860-881.

Gronow, A., Ylä-Anttila, T., Carson, M., & Edling, C., 2019. Divergent neighbors: corporatism and climate policy networks in Finland and Sweden. *Environmental Politics*, 28(6), pp. 1-23.

Hardin, G., 1968. The tragedy of the commons. *Science*, 162(3859), pp.1243-1248.

Heaney, M.T., 2014. Multiplex networks and interest group influence reputation: An exponential random graph model. *Social Networks*, 36, pp.66-81.

Henry, A. D. 2011. Ideology, power, and the structure of policy networks. *Policy Studies Journal*, 39(3), 361-383.

Henry, A.D., Lubell, M. and McCoy, M., 2010. Belief systems and social capital as drivers of policy network structure: The case of California regional planning. *Journal of Public Administration Research and Theory*, 21(3), pp.419-444.

Hunter, F., 1953. *Community Power Structure*. Chapel Hill: University of North Carolina Press.

Hunter, D.R., Goodreau, S.M. and Handcock, M.S., 2008. Goodness of fit of social network models. *Journal of the American Statistical Association*, 103(481), pp.248-258.

Hossu, C.A., Ioja, I.C., Nita, M.R., Hartel, T., Badiu, D.L. and Hersperger, A.M., 2017. Need for a cross-sector approach in protected area management. *Land Use Policy*, 69, pp.586-597.

Ingold, K. and Fischer, M., 2014. Drivers of collaboration to mitigate climate change: An illustration of Swiss climate policy over 15 years. *Global Environmental Change*, 24, pp.88-98.

Ingold, K. & Leifeld, P., 2016. Structural and Institutional Determinants of Influence Reputation: A Comparison of Collaborative and Adversarial Policy Networks in Decision Making and Implementation. *Journal of Public Administration Research and Theory*, 26(1), pp.1-18.

Jacobs, A. M., 2016. Policy making for the long term in advanced democracies. *Annual Review of Political Science*, 19, 433-454.

Jasny, L., Waggle, J. and Fisher, D.R., 2015. An empirical examination of echo chambers in US climate policy networks. *Nature Climate Change*, 5(8), p.782.

Jennings Jr, E.T. and Hall, J.L., 2011. Evidence-based practice and the use of information in state agency decision making. *Journal of Public Administration Research and Theory*, 22(2), pp.245-266.

Juhola, S., 2010. Mainstreaming Climate Change Adaptation: The Case of Multi-Level Governance in Finland. In: Keskitalo, E. C. H., ed. *Developing adaptation policy and practice in Europe: multi-level governance of climate change*. Dordrecht: Springer, 1–38.

Kickert, W.J.M., E.H. Klijn, and J.F.M. Koppenjan 1997. *Managing Complex Networks: Strategies for the public sector*, London: Sage.

Klijn, E.H. and J. F. M. Koppenjan. 2000. Public management and Policy Network: Foundations of a network approach to governance. *Public Management*, 2, 2, 135–158

Klijn, E.H., B. Steijn, and J. Edelenbos 2010. The impact of network management strategies on the outcomes in governance networks, *Public Administration*, 88(4): 1063–1082.

Klijn, E.H., Ysa, T., Sierra, V., Berman, E., Edelenbos, J. and Chen, D.Y., 2015. The influence of network management and complexity on network performance in Taiwan, Spain and the Netherlands. *Public Management Review*, 17(5), pp.736-764.

Koch, M., & Fritz, M., 2014. Building the eco-social state: do welfare regimes matter? *Journal of Social Policy*, 43 (4), 679–703.

Koppenjan, J. and Klijn, E.H., 2015. *Governance networks in the public sector*. Routledge.

Lane, J.-E. and Ersson, S., 2002. The Nordic Countries. Contention, Compromise and Corporatism. In J. M. Colomer (ed.): *Political Institutions in Europe. 2nd Edition*. London & New York: Routledge, 245–278.

Laumann, E.O. and Knoke, D. 1987. *The Organizational State. Social Choice in National Policy Domains*. Madison: University of Wisconsin Press.

Leifeld, P. 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.

Leifeld, P. and Schneider, V., 2012. Information exchange in policy networks. *American Journal of Political Science*, 56(3), pp.731-744.

Lijphart, A., 2012. *Patterns of democracy: Government forms and performance in thirty-six countries*. Yale University Press.

Lodge, M., & Matus, K. 2014. Science, Badgers, Politics: Advocacy Coalitions and Policy Change in Bovine Tuberculosis Policy in Britain. *Policy Studies Journal*, 42(3), 367-390.

Mukheibir, P., Kuruppu, N., Gero, A. and Herriman, J., 2013. Overcoming cross-scale challenges to climate change adaptation for local government: a focus on Australia. *Climatic change*, 121(2), pp.271-283.

Meier, K.J., and L.J. O'Toole, 2007. Modeling public management: empirical analysis of the management–performance nexus, *Public Management Review*, 9(4): 503–527.

Matti, S., & Sandström, A., 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.

Nohrstedt, D., 2009. Do advocacy coalitions matter? Crisis and change in Swedish nuclear energy policy. *Journal of Public Administration Research and Theory*, 20(2), pp.309-333.

Nohrstedt, D. and Bodin, Ö., 2018. Collective Action Problem Characteristics and Partner Uncertainty as Drivers of Social Tie Formation in Collaborative Networks. *Policy Studies Journal*.

Osborne, S.P. ed., 2010. *The new public governance: Emerging perspectives on the theory and practice of public governance*. Routledge.

Ostrom, E., 1990. *Governing the Commons. The evolution of institutions for collective action*, Cambridge: Cambridge University Press.

O'Toole, L.J., 1988. Strategies for intergovernmental management: implementing programs in interorganizational networks, *Journal of Public Administration*, 11(4): 417-441.

Pierre, J., 2000. *Debating Governance: Authority, steering, and democracy*, Oxford: Oxford University Press.

Pfeffer, J., & Salancik, G. R., 1978. *The External Control of Organizations: A Resource Dependence Approach*. NY: Harper and Row Publishers.

Purdy, J.M., 2012. A framework for assessing power in collaborative governance processes. *Public administration review*, 72(3), pp.409-417.

Sabatier, P.A., 1988. An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy sciences*, 21(2-3), pp.129-168.

Sabatier, P., Hunter, S. and McLaughlin, S., 1987. The devil shift: Perceptions and misperceptions of opponents. *Western Political Quarterly*, 40(3), pp.449-476.

Sabatier, Paul A., and Jenkins-Smith, Hank C.. 1999. The Advocacy Coalition Framework: An Assessment. In *Theories of the Policy Process*, ed. Paul A. Sabatier. Boulder, CO: Westview Press, 117– 68.

Sarasini, S., 2009. Constituting leadership via policy: Sweden as a pioneer of climate change mitigation. *Mitigation and Adaptation Strategies for Global Change*, 14(7), 635–653.

Schlager, E. (1995). Policy making and collective action: Defining coalitions within the advocacy coalition framework. *Policy sciences*, 28(3), 243-270.

Schneider, M., Scholz, J., Lubell, M., Mindruta, D. and Edwardsen, M., 2003. Building consensual institutions: networks and the National Estuary Program. *American journal of political science*, 47(1), pp.143-158.

Scholz, J. T., Berardo, R., & Kile, B., 2008. Do networks solve collective action problems? Credibility, search, and collaboration. *The Journal of Politics*, 70(2), 393-406.

Sørensen, E., & Torfing, J. (2009). Making governance networks effective and democratic through metagovernance. *Public administration*, 87(2), 234-258.

Teräväinen, T., 2012. *The politics of energy technologies. Debating climate change, energy policy, and technology in Finland, the United Kingdom, and France*. Helsinki: Into.

Tirkkonen, J., 2000. *Ilmastopoliittika ja ekologinen modernisaatio. Diskursiivinen tarkastelu suomalaisesta ilmastopoliitikasta ja sen yhteydestä metsäsektorin muutokseen.* [Climate policy and ecological modernisation. A discursive study of Finnish climate policy and its connections with forestry.] Acta Universitatis Tamperensis, 781: Tampere University Press.

Wagner, P. and Ylä-Anttila, T., 2018a. Can policy forums overcome echo chamber effects by enabling policy learning? Evidence from the Irish climate change policy network *Journal of Public Policy*, First View

Wagner, P. and Ylä-Anttila, T., 2018b. Who got their way? Advocacy coalitions and the Irish climate change law. *Environmental Politics*, 27 (5), 872 - 891

Wang, X. and Wan Wart, M., 2007. When public participation in administration leads to trust: An empirical assessment of managers' perceptions. *Public Administration Review*, 67(2), pp.265-278.

Weible, C.M., 2005. Beliefs and perceived influence in a natural resource conflict: An advocacy coalition approach to policy networks. *Political Research Quarterly*, 58(3), pp.461-475.

Weible, C.M., Heikkilä, T. and Pierce, J., 2018. Understanding rationales for collaboration in high-intensity policy conflicts. *Journal of Public Policy*, 38(1), pp.1-25.

Weiss, K., Hamann, M., Kinney, M. and Marsh, H., 2012. Knowledge exchange and policy influence in a marine resource governance network. *Global Environmental Change*, 22(1), pp.178-188.

Wolsink, M., 2007. Wind power implementation: the nature of public attitudes: equity and fairness instead of 'backyard motives,' *Renewable and Sustainable Energy Reviews*, 11(6): 1188–1207.

Yun, S.J., Ku, D. and Han, J.Y., 2014. Climate policy networks in South Korea: alliances and conflicts. *Climate policy*, 14(2), pp.283-30

TABLES*Table 1: Descriptive Statistics*

	Sweden	Finland
No. of Actors	99	96
No. of Responses	69 (69.9%)	82 (85.4%)
Density	.08	.22
Average Degree	5.5	17.8

Table 2: Finland Results

	Model 1	Model 2	Model 3	Model 4	Model 5
Edges	-1.42 (0.34)***	-1.64 (0.36)***	-2.53 (0.36)***	-2.56 (0.36)***	-2.48 (0.37)***
Similar Beliefs (H1)		0.33 (0.11)**	0.59 (0.14)***	0.62 (0.14)***	0.55 (0.14)***
Reputational Power (H2)			0.02 (0.00)***	0.03 (0.00)***	0.03 (0.00)***
Influence Network (control)			0.50 (0.06)***	0.50 (0.06)***	0.54 (0.06)***
Public Authorities (H3)				-0.14 (0.08)	-0.18 (0.09)*
Public Authorities & ENGOs (H4a)					-0.12 (0.11)
Public Authorities & Bus. Interests (H4b)					-0.05 (0.06)
Business Interests & ENGOs (control)					-0.40 (0.11)***
Mutual	1.54 (0.12)***	1.53 (0.11)***	1.68 (0.12)***	1.68 (0.12)***	1.67 (0.12)***
Twopath	-0.01 (0.00)***	-0.01 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***
GWODGEREE	-4.19 (0.09)***	-4.17 (0.09)***	-4.20 (0.10)***	-4.20 (0.10)***	-4.15 (0.10)***
GWESP (1.0)	1.61 (0.29)***	1.60 (0.30)***	1.64 (0.30)***	1.64 (0.30)***	1.65 (0.30)***
AIC	5750.35	5739.11	5395.08	5394.99	5376.37
BIC	5784.36	5779.91	5449.49	5456.20	5457.99
Log Likelihood	-2870.18	-2863.55	-2689.54	-2688.50	-2676.19

***p < 0.001, **p < 0.01, *p < 0.05

Table 3: Sweden Results

	Model 1	Model 2	Model 3	Model 4	Model 5
Edges	-2.79 (0.12)***	-2.98 (0.20)***	-3.54 (0.28)***	-3.66 (0.28)***	-3.58 (0.28)***
Similar Beliefs (H1)		0.28 (0.21)	0.41 (0.28)	0.54 (0.29)	0.48 (0.30)
Reputational Power (H2)			-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Influence Network (control)			1.41 (0.13)***	1.44 (0.13)***	1.44 (0.13)***
Public Authorities (H3)				0.23 (0.09)**	0.24 (0.09)**
Public Authorities & ENGOs (H4a)					-0.35 (0.24)
Public Authorities & Bus. Interests (H4b)					-0.18 (0.32)
Business Interests & ENGOs					-0.14 (0.11)
Mutual	0.72 (0.21)***	0.73 (0.21)***	1.02 (0.23)***	1.04 (0.23)***	1.04 (0.23)***
Twopath	-0.11 (0.01)***	-0.11 (0.01)***	-0.11 (0.01)***	-0.11 (0.01)***	-0.11 (0.01)***
GWODGEREE	-1.14 (0.26)***	-1.14 (0.26)***	-0.98 (0.28)***	-1.01 (0.28)***	-0.98 (0.28)***
GWESP (1.0)	0.99 (0.06)***	0.98 (0.06)***	0.83 (0.07)***	0.83 (0.07)***	0.82 (0.07)***
AIC	2190.62	2190.79	1994.65	1989.72	1991.40
BIC	2222.89	2229.51	2046.28	2047.80	2068.84
Log Likelihood	-1090.31	-1089.39	-989.33	-985.86	-983.70

***p < 0.001, **p < 0.01, *p < 0.05

Statistical models

Table 4: Organisations most cited as a collaboration partner

Sweden			Finland		
Organisation Name	Actor Type	% of all possible incoming ties	Organisation Name	Actor Type	% of all possible incoming ties
Energy office FSEK	PUB A.	29%	Ministry of Environment	PUB A.	58%
Swedish Environmental Protection Agency	PUB A.	29%	Ministry of Economic Affairs and Employment	PUB A.	54%
IVL Swedish Environmental Research Institute	SCI	23%	Motiva	BUS	43%
Swedish Petroleum Institute	BUS	20%	VTT Technical Research Center	SCI	42%
Chalmers University of Technology	SCI	19%	WWF (Finland)	NGO	41%
City of Stockholm	PUB A.	19%	Finnish Environment Institute (SYKE)	SCI	40%
Swedavia	PUB A.	19%	Aalto University	SCI	40%
Ministry of Environment	PUB A.	17%	Finnish Innovation Fund Sitra	CIV	38%
LU Lucid, Lund University	SCI	16%	Finnish Energy	BUS	38%
Climate municipalities	PUB A.	14%	Meteorological Institute	SCI	36%
KTH Royal Institute of Technology	SCI	14%			
Stockholm Environment Institute	CIV	14%			
Swedish University of	SCI	14%			

Agricultural Sciences

|