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Beliefs and conflict in climate policy networks

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Abstract

Climate change governance involves a wide range of public and private actors who depend on one another's resources to address a policy problem that none can solve alone. At the same time, these actors hold diverging or even conflicting problem perceptions and policy beliefs, which make coordination difficult and often give rise to conflict over credible information and appropriate policy responses. By combining Governance Network Theory (GNT) with the Advocacy Coalition Framework (ACF) and the concept of echo chambers, this dissertation contributes to a deeper understanding of the role of beliefs and conflict in networked policymaking.

Empirically, the dissertation draws on policy network survey data from thirteen countries across the Global North and South. Using social network analysis and statistical modeling, the four original articles examine how policy actors' beliefs and subsystem conflict structures enable or constrain collaboration, policy learning, and information exchange in climate governance networks.

Article I examines whether agreement over the most divisive beliefs in a policy subsystem explains collaboration between policy actors better than agreement over pre-defined belief categories. The findings indicate that belief-based collaboration is not only about attraction to like-minded partners, but also a strategic and defensive response to perceived opposition. Article II analyzes how social influence and conflict structures condition policy learning through mechanisms of complex contagion. It demonstrates that policy learning through social influence requires multiple reinforcements and takes place in collaborative, but not in conflictual, contexts. Thus, the intensity of conflict in a policy subsystem conditions the capacity of collaboration to lead to belief change. Article III studies how beliefs and macro-level institutional contexts shape collaboration structures and brokerage between coalitions. It finds that while similar coalition structures can emerge in both adversarial and collaborative subsystems, macro-level institutional contexts shape both how strongly beliefs determine collaboration and how brokerage between coalitions becomes possible. Finally, Article IV studies whether the type of belief conflict between climate advocates and obstructionists is associated with the formation of echo chambers and finds that science contestation presents a particular challenge for scientific information exchange between actors with opposing views.

Taken together, these findings demonstrate that interaction and learning among climate policy actors are not merely functions of interdependence but are fundamentally structured by shared and contested beliefs, conditioned by conflict intensity, and shaped by institutional environments.

Keywords: climate governance; Advocacy Coalition Framework; governance network theory; policy learning; social network analysis

Tiivistelmä

Ilmastonmuutoksen hallintaan osallistuu laaja joukko julkisia ja yksityisiä toimijoita, jotka ovat riippuvaisia toistensa resursseista ilmastonmuutoksen aiheuttamien poliittisten ongelmien ratkaisemiseksi. Samalla näillä toimijoilla on toisistaan poikkeavia tai jopa ristiriitaisia käsityksiä ongelman luonteesta ja sen ratkaisemisesta, mikä vaikeuttaa koordinointia ja aiheuttaa usein konflikteja luotettavan tiedon ja asianmukaisten poliittisten toimien suhteen. Tämä väitöskirja yhdistää kahden politiikan tutkimuksen teorian, governance network theoryn (GNT) ja Advocacy Coalition Frameworkin (ACF), näkökulmia, ja syventää niiden avulla ymmärrystä uskomusten ja konfliktien roolista verkostoituneessa päätöksenteossa.

Empiirisesti väitöskirja perustuu kolmestatoista maasta kerättyyn verkostoaineistoon. Sosiaalisen verkostoanalyysin ja tilastollisen mallinnuksen avulla väitöskirjan neljä alkuperäistä artikkelia tarkastelevat, miten politiikkatoimijoiden uskomukset ja niihin liittyvät konfliktit, sekä laajemmat institutionaaliset kontekstit mahdollistavat tai rajoittavat yhteistyötä, politiikkaoppimista ja tiedonvaihtoa toimijoiden välillä.

Artikkelissa I tarkastellaan, selittääkö samanmielisyys politiikan alajärjestelmän kiistanalaisimmista uskomuksista poliittisten toimijoiden välistä yhteistyötä paremmin kuin samanmielisyys ennalta määritellyistä uskomuskategorioista. Tulosten mukaan uskomuksiin perustuva yhteistyö ei liity vain samanmielisten yhteistyökumppaneiden vetovoimaan, vaan on strateginen reaktio poliittiseen vastustukseen. Artikkelissa II analysoidaan, miten sosiaaliset kontaktit ja politiikan alajärjestelmän riitaisuus vaikuttavat politiikkaoppimiseen. Artikkelissa osoitetaan, että sosiaalisten kontaktien kautta tapahtuva oppiminen edellyttää vahvistusta useista lähteistä ja sitä tapahtuu yhteistyöhön perustuvissa, mutta ei riitaisissa konteksteissa. Artikkelissa III tutkitaan, miten uskomukset ja makrotason institutionaaliset kontekstit muovaavat kannatuskoalitioiden rakennetta ja toimijoita niiden välillä. Vaikka samanlaisia koalitiorakenteita voi syntyä sekä riitaisissa että yhteistyöhön perustuvissa konteksteissa, institutionaaliset rakenteet vaikuttavat sekä siihen, kuinka vahvasti uskomukset määrittävät kannatuskoalitioiden rakennetta, että siihen, kuinka merkityksellinen välitys koalitioiden välillä on mahdollista. Artikkelissa IV tutkitaan kaikukammiota ilmastoestäjien ja ilmastotoimien ensisijaisuutta korostavien poliittisten toimijoiden välillä. Tulosten mukaan ilmastotieteen kyseenalaistaminen luo erityisen haasteen vastakkaisia näkemyksiä edustavien toimijoiden väliselle tieteellisen tiedon vaihdolle.

Yhdessä artikkeleiden havainnot osoittavat, että ilmastopolitiikan toimijoiden välinen vuorovaikutus ja oppiminen eivät johdu pelkästään niiden keskinäisestä riippuvuudesta, vaan ne perustuvat pohjimmiltaan jaettuihin uskomuksiin ja muotoutuvat konfliktien ja institutionaalisten rakenteiden kautta.

Asiasanat: ilmastohallinta; Advocacy Coalition Framework; hallinnon verkostoteoria; politiikkaoppiminen; sosiaalinen verkostoanalyysi

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The journey towards this dissertation started already in the spring of 2017, when I started working as a research assistant for Tuomas Ylä-Anttila and Antti Gronow. At that time, I worked on integrating the national policy network survey datasets collected by different country teams as part of the Comparing Climate Change Policy Networks (COMPON) research project, to allow for cross-country comparisons. When I finally got my master's degree in sociology the following year, it seemed clear that I should continue the work in a dissertation. During these nine years, Tuomas and Antti have been my closest colleagues. Together, we have worked on several articles (some of which are included in this dissertation) and grant proposals, travelled to conferences and workshops, and taught courses. It is obvious that without you, this dissertation would not exist. As a supervisor, Tuomas has been an invaluable source of support and reassurance. On the one hand, he has trusted and believed in my ability to work independently, but he has also carried me when there has been a need for it.

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List of original publications

This doctoral dissertation consists of the following four articles, which are hereby referred to using their assigned Roman numerals, and the summary.

I Karimo, A., Wagner, P. M., Delicado, A., Goodman, J., Gronow, A., Lahsen, M., Lin, T.-L. A., Ocelik, P., Schneider, V., Satoh, K., Schmidt, L., Yun, S.-J., & Ylä-Anttila, T. (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), 421433. https://doi.org/10.1093/jopart/muac031

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III Ylä-Anttila, T., Gronow, A., Karimo, A., Goodman, J., & da Rimini, F. (2020). Breaking the Treadmill? Climate Change Policy Networks and the Prospects for Low Carbon Futures in Australia and Finland. *Society and Natural Resources*, *33*(11), 1380-1398. https://doi.org/10.1080/08941920.2020.1802540

IV Karimo, A., Chen, T.H., Gronow, A., Delicado, A., Lin, T.-L. A., Ocelik, P., Satoh, K., Schmidt, L., Yun, S.-J., Wagner, P. M., & Ylä-Anttila, T. (Unpublished). Echo chambers of climate advocates and obstructionists: information exchange among policy actors in ten countries.

1 Introduction

Climate change is widely recognized as one of the most complex and urgent policy challenges of our time. Its governance spans multiple levels, sectors, and issue areas, involving a wide range of public and private actors with diverging interests (Bulkeley & Newell, 2010). Previous research has conceptualized climate change as a wicked problem, for example, due to the contested nature of climate science and policy, the profound equity dilemmas over who should be responsible for climate action, and the interdependence of multiple challenges where progress in one area may cause problems elsewhere (Head, 2022; Levin et al., 2012).

When it comes to dealing with complex policy problems, governments are increasingly dependent on non-state actors and the resources they control (Klijn et al., 2025). Actors from multiple sectors of society, such as businesses, non-governmental organizations (NGOs), and scientific institutions, offer both material and informational resources that states need to achieve climate objectives (Basseches et al., 2022; Bulkeley & Newell, 2010; Cairney, 2016). Many of these actors also use lobbying power and shape public opinion, thereby both directly and indirectly influencing climate policy agendas and their political feasibility (Basseches et al., 2022; Szarka, 2013; Wright & Nyberg, 2024).

These dynamics make climate policy a field where governments and non-state actors are deeply interdependent. Governments depend on non-state actors for resources, legitimacy, and implementation capacity, while non-state actors rely on governmental authority to advance their interests. This mutual dependence is at the core of governance network theory (GNT; Klijn et al., 2025; Rhodes, 1997), which offers a conceptual lens for understanding the horizontal, interdependent, and often conflictual relations between diverse policy actors. From this perspective, climate change governance can be understood as a networked process in which public and private actors collaborate, compete, and exchange information to address a policy problem that none of them can resolve in isolation.

The diverging or even conflicting objectives and problem perceptions of these actors, however, make coordination challenging (Klijn et al., 2025). GNT emphasizes that governance networks combine conflict and collaboration: conflict arises from differing problem perceptions and interests, while collaboration emerges because no single actor can solve complex policy problems alone (Klijn et al., 2025). Despite this, GNT has paid less attention to how these differing problem perceptions shape the structure and functioning of governance networks.

This dissertation examines collaboration and information exchange between policy actors involved in climate change policymaking across different sectors of society. The four original articles that constitute this dissertation use the theoretical and conceptual lenses of advocacy coalitions (Articles I, II, and III) and echo chambers (Article IV) to analyze interaction patterns and learning among these actors. In this summarizing chapter, I bring in insights from governance network theory that allow me to discuss the implications of these interaction patterns for climate governance.

GNT provides a useful conceptual umbrella for understanding complex policymaking environments, but to explain why governance networks take the forms they do in contentious policy arenas such as climate governance, it benefits from integration with more specialized frameworks. Three of the articles draw directly on the Advocacy Coalition Framework (ACF), which places policy beliefs at the center of the policy process. The ACF posits that actors who share beliefs form competing coalitions to advance their policy objectives, particularly in adversarial subsystems (Jenkins-Smith & Weible, 2025). This focus on beliefs and cross-coalition conflict complements GNT by clarifying how differences in problem perceptions shape collaborative relationships. At the same time, not all policy subsystems are adversarial, and the ACF's assumptions must be adapted for more collaborative contexts (Koebele, 2019). Thus, GNT, and particularly literature on collaborative governance, can help explain why actors may coordinate for reasons beyond shared beliefs in cooperative policy settings (Koebele, 2019).

In one article, I extend this analysis by turning to the concept of echo chambers in climate governance networks. Both GNT and the ACF suggest that the use of scientific knowledge often leads to conflicts over what is considered credible information, as competing actors turn to their own experts who support their positions (Klijn et al., 2025; Sabatier, 1988). Such selective and strategic use of information can lead to the formation of echo chambers, where like-minded actors predominantly interact with each other, reinforcing existing beliefs and limiting exposure to diverging viewpoints (Jamieson & Cappella, 2008). Together, these frameworks illustrate how divergent problem perceptions and structural features of governance networks explain both the escalation and potential resolution of conflict over scientific evidence in climate policy.

Together, these perspectives enable a more comprehensive account of how governance networks are structured in different contexts and what consequences follow from their structure. Across the four articles, I investigate how actors' beliefs and the conflict structures of climate change policy subsystems condition interaction patterns and learning among policy actors. This leads to the overarching research question of the dissertation:

How do beliefs and conflict structures enable or constrain collaboration, policy learning, and information exchange in climate governance networks?

I understand conflict structures as emerging from two interconnected sources. At the subsystem level, they reflect belief-based conflict among actors (Jenkins-Smith & Weible, 2025). At the macro-level, conflict structures are shaped by institutional contexts that make either adversarial or cooperative interactions more likely. For instance, majoritarian political systems tend to reinforce competitive, conflictual dynamics, while consensus-oriented systems foster broader coordination among coalitions (Sabatier & Weible, 2007; Satoh, 2025). Thus, conflict structures capture how both belief-based disagreements and institutional structures condition the patterns of conflict and interaction within governance networks.

In this summarizing chapter, I develop three main arguments based on the results of the four original articles. First, I argue that while advocacy coalitions do share beliefs, collaboration with like-minded others is not only about shared beliefs, but a response to perceiving opposition to one's beliefs in the policy subsystem. This is why collaboration relationships are based on shared beliefs over the issues that are the most divisive in the policy subsystem. Second, the level of conflict in a policy subsystem, whether due to the dynamics of the subsystem itself or the broader institutional context, conditions both how much beliefs determine collaboration relationships and the extent to which collaboration leads to belief change. Third, the way policy actors react to belief differences between themselves and other actors depends on the types of beliefs and interaction in question. When it comes to scientific information exchange between policy actors, more fundamental belief differences, such as disagreement over the reliability of climate science, make policy actors avoid information produced by the opposing side, even though disagreements over climate policies do not have the same effect.

By situating the analysis within governance network theory and drawing on both the ACF and the concept of echo chambers, the dissertation contributes to a deeper understanding of how divergent policy beliefs and conflict in the policy subsystem shape networked policymaking. I use empirical evidence from a total of 13 countries, which further allows me to identify the conditions under which networks foster collaboration and policy learning, and the conditions under which they reproduce segregation and echo chambers.

In the following sections, I introduce the theoretical background, data, and methods of the dissertation, and synthesize the main findings of the four original articles around the core theme of beliefs and conflict structures. Finally, in the concluding chapter, I discuss how GNT can help utilize these findings for better climate governance.

2 Theoretical framework

2.1 The challenge of climate governance

Climate change has become one of the most frequently cited examples of a "wicked problem" in public policy. Unlike issues that can be addressed through linear solutions or technical fixes, climate change is characterized by high complexity, interdependence, and uncertainty (Head, 2022). Both the underlying causes of climate change and the appropriate strategies for reducing greenhouse gas emissions remain subjects of intense debate in public discourse (O'Neill, Williams, Kurz, Wiersma, & Boykoff, 2015) and among policy elites (Jasny & Fisher, 2019; Wagner & Ylä-Anttila, 2018).

Several features contribute to the wickedness of climate change policy. First, the challenges associated with climate change are deeply interconnected with other environmental and social problems, such as biodiversity loss, water scarcity, and food security. Efforts to address one problem often create trade-offs in others. For instance, the transition from fossil fuels to biofuels may reduce greenhouse gas emissions but simultaneously threaten biodiversity (Vera et al., 2022). Such trade-offs are not exceptions, but a defining characteristic of climate governance (Baldwin-Cantello et al., 2023).

Second, climate change requires policymakers to balance immediate costs against uncertain long-term benefits. Even when the necessity of action to prevent catastrophic future impacts is widely recognized, the short-term burdens of behavioural and policy changes can overshadow both the collective interest in reform and the capacity of political systems to respond (Levin et al., 2012). Moreover, the risks and consequences of climate change manifest simultaneously at local, regional, and global scales, making the assessment of impacts and the appropriate adaptive strategies particularly challenging (Head, 2022).

Third, despite broad scientific consensus regarding the anthropogenic causes and risks of climate change (Myers et al., 2021), the policy domain remains highly contested. A proliferation of conflicting information and the active efforts of stakeholders, such as fossil fuel industries, to cast doubt on the urgency of mitigation measures, contribute to ongoing polarization in both public and policy debates (Dunlap & Brulle, 2020; Ekberg et al., 2023). Additionally, unresolved questions about who should bear the burden of climate action and how costs and

benefits should be distributed introduce profound equity dilemmas and moral considerations that further complicate consensus-building (Head, 2022).

Due to these complexities, governments' ability to address climate change is increasingly dependent on cooperation with non-state actors (Klijn et al., 2025). While national governments remain central to climate policymaking, previous research shows that governmental composition alone cannot explain the adoption of stringent climate policy (Basseches et al., 2022; Tobin, 2017). Factors such as institutional structures (e.g., veto points and administrative capacity), economic conditions, international pressures like EU membership, the strength and coordination of advocacy coalitions, and the influence of organized interests have all been found to shape the ambition of climate policies (Basseches et al., 2022; Tobin, 2017).

There are multiple reasons for the influence of organized interests and coalitions. For example, businesses in sectors where greenhouse gas emissions are concentrated, such as energy, transport, and agriculture, provide essential goods and services that states cannot easily substitute (Bulkeley & Newell, 2010). Furthermore, globalization limits governments' ability to implement certain policies, such as taxation, because firms threatened by strict regulations may relocate to areas with less regulation (Bulkeley & Newell, 2010). Consequently, governments must negotiate and cooperate with these sectors to realize policy goals (Basseches et al., 2022; Bulkeley & Newell, 2010).

In addition to material resources, non-state actors provide information that governments rely on for evidence-based policymaking. Scientific institutions, NGOs, and think tanks produce policy-relevant knowledge that shapes problem framings and possible solutions, yet the contested nature of climate science, the diversity of stakeholders, and the complexity of potential solutions mean that evidence alone rarely resolves conflicts or drives consensus (Cairney, 2016). At the same time, many of these actors (both business and NGOs) hold significant lobbying power and use it to influence climate policy both at the international and national levels (Basseches et al., 2022; Falkner, 2008; Wright & Nyberg, 2024). Moreover, non-state actors seek to shape public opinion on climate change, thereby indirectly affecting electoral outcomes and the policy options governments consider politically feasible (Brulle, 2014; Dryzek et al., 2019; Szarka, 2013; Wright & Nyberg, 2024). Consequently, any framework seeking to understand climate governance must account for the wide array of actors involved and the complex interdependencies that shape their interactions (Bulkeley & Newell, 2010).

2.2 Governance network theory

The Governance Network Theory (GNT) offers a useful lens for understanding the complexities in climate governance. Its perspective on public policymaking differs from that of both traditional public administration and new public management,

which view governance as a process of top-down steering and market-based management. GNT conceptualizes policymaking as occurring within networks of interdependent public, private, and societal actors who rely on one another's resources to address complex policy problems (Klijn et al., 2025).

The idea that policy is developed and implemented through networks has a long tradition in political science, organizational science, and public administration (Laumann & Knoke, 1987; Kickert et al., 1997; Rhodes, 1997). GNT combines three related strands of literature from these fields, namely research on policy networks, service delivery and implementation networks, and managing networks (Klijn et al., 2025). The policy networks tradition examines the relationships between the state and interest groups and how these shape public policymaking (Adam & Kriesi, 2007; Rhodes & Marsh, 1992). The service delivery and implementation networks tradition focuses on coordination challenges in fragmented service delivery systems, emphasizing the need for collaboration among multiple organizations to ensure effective implementation of public services (Hjern & Porter, 1981). The managing networks tradition, in turn, stresses the complexity of decision-making and implementation and focuses on solving public policy problems through networks (Koppenjan & Klijn, 2004). The concept of collaborative governance (Ansell & Gash, 2008) in the public administration literature largely overlaps with the concept of network management, as both emphasize the deliberate facilitation of collaboration and joint problem-solving among interdependent actors.

Based on these traditions, GNT claims that *network governance* takes place within *governance networks*, more or less stable patterns of social relations between mutually dependent actors (Klijn et al., 2025). Network governance includes network management strategies that deliberately aim at facilitating collaboration between others, and strategies that actors use to realize their own objectives without the focus on furthering collaboration between others (Klijn et al., 2025).

Governance network processes involve both conflict and collaboration. Conflict arises from the autonomy of actors, whose interests and objectives may diverge. At the same time, actors depend on each other's resources, making collaboration necessary. GNT is normative in the sense that, instead of viewing governance networks and network management simply as instruments to arrive at effective solutions to complex policy problems, it argues that the various legitimate perceptions and interests of different actors should be acknowledged (Klijn et al., 2025). In this dissertation, I focus on understanding the complexities of climate governance networks. In the discussion section, I further consider how these insights can be useful for managing them.

According to GNT, there are three sources of complexity in governance networks: substantive, strategic, and institutional complexity (Klijn et al., 2025). In this dissertation, I focus on the first two. Substantive complexity becomes apparent when actors in governance networks struggle to understand or agree on the nature

of a problem (Klijn et al., 2025). Because many societal problems have multiple, interrelated causes and effects, and actors interpret them through different lenses, simple solutions rarely exist. This is especially true for wicked problems such as climate change (Head, 2022). According to Klijn et al. (2025), substantive complexity is caused by two factors: (1) actors having different perceptions of a problem to begin with, and (2) efforts to reduce uncertainty through gathering information and using experts often intensify disputes over facts and expertise rather than solve them.

Actors with diverging problem perceptions frame the same situation differently, shaping what they see as problems, causes, and solutions (Rein & Schön, 1992). Problem perceptions are deeply embedded in actors' beliefs, norms, and values and are thus difficult to change (Gorman & Gorman, 2021). Fights over problem perceptions may lead to "dialogues of the deaf", where actors try to convince one another but only reinforce their own perceptions (van Eeten, 1999). At the same time, attempts to reduce complexity by relying on experts and scientific research often lead to conflicts over what is considered credible information, because competing actors turn to their own experts who will support their standpoints (Klijn et al., 2025). Actors are also likely to resist information that challenges their problem perceptions and the accompanying solutions (White, 1992). Despite identifying the use of information as one source of substantive complexity, GNT does not further theorize how different problem perceptions lead to problems like dialogues of the deaf.

Strategic complexity, on the other hand, refers to the unpredictable and interdependent interactions among multiple actors engaged in policymaking (Klijn et al., 2025). Actors, in GNT, refer to individuals, informal groups of individuals, organizations, and groups of organizations that have the capacity to implement strategies designed to influence social interaction processes (Scharpf, 1997). GNT highlights the actors' dependency on each other's resources. It claims that actors are tied to one another because no single actor holds all the necessary resources to formulate and implement policies, address public problems, or deliver public services (Klijn et al., 2025). When actors realize that achieving their goals depends on the actions of others, they engage in strategic interaction aimed at influencing the other participating actors or the interaction process itself to advance their objectives (Klijn et al., 2025). These strategies include, among others, promoting specific problem definitions, obstructing decision-making, collaboration, and coalition building (Klijn et al., 2025). To understand how, exactly, these strategies unfold in governance networks, it is useful to integrate GNT with more specific frameworks on policy actors' strategic interaction.

2.3 Understanding interaction in governance networks – the Advocacy Coalition Framework

Specifically, I turn to the Advocacy Coalition Framework (ACF, Jenkins-Smith & Weible, 2025) for a more concrete analytical lens to study the strategies of collaboration and information exchange. According to the ACF, policy actors form coalitions to pool their resources with others based on shared beliefs rather than resource dependence alone (Jenkins-Smith & Weible, 2025). The ACF ties GNT concepts of substantive and strategic complexity together by arguing that, under conditions of substantive complexity and divergent policy perceptions, policy actors aim to control strategic complexity by coordinating with like-minded others.

The ACF conceptualizes coordination as a broad umbrella term referring to purposeful, policy-oriented interaction among actors aimed at advancing shared beliefs (Jenkins-Smith & Weible, 2025). What is included under coordination varies across ACF applications. Some studies rely on general measures of coordination, while others differentiate between specific coordination activities, ranging from low-commitment interactions such as information exchange to high-commitment activities such as jointly implementing programs or policies (Pfeiffer et al., 2025; Weible & Sabatier, 2005).

Building on this, the articles in this dissertation distinguish between two types of interaction: collaboration (Articles I, II, and III) and scientific information exchange (Article IV). Collaboration refers to mutual support oriented toward the achievement of common policy goals and typically involves higher levels of commitment. While functional interdependencies may occasionally lead actors from opposing coalitions to collaborate, the ACF predicts that such interaction is common among actors who share beliefs and strategic objectives (Weible & Sabatier, 2005).

Scientific information exchange, by contrast, constitutes a lower-commitment form of interaction and may be more strongly shaped by resource dependence (Pfeiffer et al., 2025; Weible & Sabatier, 2005). Actors may exchange information with opponents not only to acquire expertise they lack themselves, but also to influence the beliefs of others. Still, the ACF assumes that policy actors use their existing beliefs as filters when evaluating information sources, and when presented with evidence that threatens their belief systems, respond by mobilizing counter-arguments and alternative sources of expertise (Jenkins-Smith & Weible, 2025; Sabatier, 1988).

The ACF acknowledges that, even though the majority of interaction is expected to occur within coalitions, some degree of cross-coalition interaction persists. Such interaction can be driven by resource dependence, as emphasized in GNT. At the same time, the ACF argues that as policy conflict intensifies and coalitions become more polarized, interaction across coalitions will diminish (Jenkins-Smith & Weible, 2025).

The ACF includes three main theories: the advocacy coalition theory, the policy-oriented learning theory, and the policy change theory (Jenkins-Smith & Weible, 2025). In the following two subchapters, I introduce the first two of these theories and discuss how existing research sees the role of beliefs and conflict in collaboration relationships between policy actors. In subchapter 2.3.3, I outline how the ACF can help us understand the formation of echo chambers, where policy actors predominantly exchange scientific information with like-minded others.

2.3.1 Advocacy coalitions and the belief homophily hypothesis

The first ACF theory explains how advocacy coalitions form. Advocacy coalitions are groups of policy actors (individuals and organizations) who form alliances on policy issues (Weible & Ingold, 2018; Weible et al., 2020). These coalitions are informal and are based on a shared understanding of a policy problem and preferred solutions rather than formal membership. Advocacy coalitions are a means for individual actors to aggregate their resources to increase their influence in the policymaking process. They are different from other political associations in multiple ways; advocacy coalitions are, for example, broader and less formal than interest groups and more stable than social movements, which often cease to exist when new policies have been adopted or defeated (Weible & Ingold, 2018).

The existence of advocacy coalitions has been well documented over the course of more than 30 years of ACF applications, and the concept has also been revised over the years (Weible et al., 2020). According to the current version of the ACF, advocacy coalitions are defined by five attributes: policy actors, shared beliefs, coordination, resources, and stability (Weible et al., 2020). The concept of *policy actors* in the ACF includes both governmental and non-governmental actors, private businesses, researchers, and the news media. Policy actors can be any individuals or groups of individuals who seek to influence certain policies through action. Policy actors can be either central to the coalition or act as "auxiliary" coalition members on the periphery of the coalition. Coalition members *share beliefs,* especially regarding "the policy goals of whether and how a government should or should not act in relation to a problem or concern" (Weible et al., 2020). I will outline the ACF's view about belief systems and their role in coalition formation with more detail later in this subchapter. *Coordination* of political activities, such as strategic use of information, lobbying, or protests, within advocacy coalitions aims to ensure that limited resources are used efficiently. It can be formally agreed upon or tacit, when one actor focuses on one part of the policy subsystem while its ally focuses on another part of the same subsystem. In the ACF, *resources* refer to different sources of power or influence for the coalitions. In addition to money and knowledge, resources include, for example, supportive members of the public and access to elected officials. Finally, the ACF assumes that at least in mature policy subsystems, coalitions are relatively *stable* both regarding

their beliefs and composition over time spans of a decade or more, making major policy change difficult (Sabatier & Weible, 2007).

The ideal typical advocacy coalition can be described as a group of policy actors that "share beliefs, coordinate their activities with allies against opponents, use their resources competitively, and do all of this over extended periods of time" (Weible et al., 2020). The minimal requirement for identifying coalitions includes a set of actors sharing beliefs.

In contrast to GNT, which pools all the actors' beliefs, norms, and values under the concept of problem perception, the ACF divides beliefs into deep core, policy core, and secondary beliefs, ranging from general to more specific beliefs (Weible et al., 2020). Deep core beliefs include, for example, the ordering of various ultimate values and the traditional left/right scale of the political spectrum, and they relate to many policy subsystems (Sabatier & Weible, 2007). Deep core beliefs are assumed to result from early socialization and are thus very resistant to change. The second tier, policy core beliefs, applies to specific policy subsystems and shapes the actors' views about the priority of different policy-related values, such as economic development or environmental protection, and the overall seriousness and causes of policy problems (Sabatier & 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 & Weible, 2007). Secondary beliefs are even narrower in scope and are defined to be relevant only for a subset of the policy subsystem. They include beliefs necessary to implement policy core beliefs, such as the appropriateness and efficacy of specific policy instruments (Jenkins-Smith et al., 2014; Weible et al., 2020).

The assumption that policy actors collaborate based on shared beliefs is called the *belief homophily hypothesis* (Jenkins-Smith & Weible, 2025). The ACF states that deep core beliefs are too general to elicit collaboration, and secondary beliefs are too specific, which is why policy core beliefs contribute the most to the formation of collaboration relationships (Jenkins-Smith et al., 2014; Weible et al., 2020). However, empirical evidence on the role of different kinds of beliefs for collaboration is mixed (Weible et al., 2020). Even though beliefs have been found to influence collaboration in many studies (Ingold & Fischer, 2014; Matti & Sandström, 2013; Weible, 2005; Weible & Sabatier, 2005), some argue that aggregated belief systems explain collaboration better than policy core beliefs alone (Henry, Lubell, & McCoy, 2011), and others have found that also secondary beliefs can drive collaboration (Ingold, 2011; Matti & Sandström, 2013).

Article I argues that one reason for the mixed findings regarding the belief homophily hypothesis is that previous research has overlooked a key part of the mechanism linking beliefs and collaboration. The ACF's central assumption, that actors within advocacy coalitions share policy core beliefs, has often been misinterpreted to mean that agreement alone drives collaboration. This interpretation leaves out the crucial role of conflict. From the start, ACF scholars

have emphasized that coalitions tend to emerge when disputes over core beliefs push actors to join forces with like-minded others in response to opposing goals (Weible et al., 2020). Thus, the missing element in the original belief homophily hypothesis is that belief similarity leads to collaboration only when there is sufficient belief incongruence within the policy subsystem.

Policy actors are likely to collaborate with like-minded others as a deliberate strategy to counter opposing groups and strengthen their own influence in policymaking. Beyond this strategic choice, avoidance bias may also play a role, as belief differences have been found to inhibit collaboration even more than belief similarities incentivize it (Henry, Lubell, & McCoy, 2011). Theories of network formation argue that network segregation can stem from even a slight reluctance to form ties across different actor types (Henry, Pralat, & Zhang, 2011).

Previous research on the belief homophily hypothesis has produced inconsistent results, partly because (1) the role of conflict within policy subsystems has been overlooked, and (2) there has been no systematic method for identifying which beliefs matter and why. To address these shortcomings, Article I introduces the concept of divisive beliefs – beliefs over which substantial disagreement among actors can be empirically observed. The article further argues that collaboration depends on agreement regarding precisely those beliefs that are contested, rather than pre-defined categories of policy core beliefs or secondary beliefs.

What counts as a divisive belief can differ across policy subsystems and evolve over time, rather than being tied to particular categories of the ACF belief hierarchy. For instance, once consensus is reached on the seriousness of a problem, disagreements may shift toward more instrumental matters, such as which policy tools should be used. Likewise, issues that were once highly contested can lose their divisive character if perceptions of the policy problem change. Markard, Suter, and Ingold (2016) illustrate this dynamic in Swiss energy policy, where renewable energy sources became less controversial as they matured and proved more economically viable. Article I examines whether the agreement over the most divisive beliefs in the policy subsystem predicts collaboration between policy actors better than agreement over pre-defined belief categories.

2.3.2 Policy learning and brokerage

The ACF suggests that policy actors tend to collaborate with actors that share similar policy beliefs because joining forces makes it more likely that actors can push for policies that align with their beliefs. Like GNT, the ACF also considers actors' beliefs to be resistant to change. Among the central arguments in the ACF is that both the beliefs and constitution of advocacy coalitions are reasonably stable over extended periods of time, making policy change difficult, especially in mature policy subsystems (Sabatier & Weible, 2007).

According to both Weible et al. (2020) and Henry et al. (2020), most ACF applications have focused on identifying coalitions, and more attention should be paid to the possibility that policy actors' beliefs can also evolve due to the influence of their network connections. Indeed, policy learning is assumed to be instrumental for coalition members as they seek to understand the world better to further their policy objectives (Sabatier, 1988). Policy-oriented learning, in the ACF, refers to relatively permanent changes in beliefs or behavior concerning policy objectives. Such policy learning may, in time, lead to policy change by influencing either the coalitions' beliefs or membership. Ingold et al. (2019) argue that while ACF assumes that learning is a critical part of the process of acquiring and updating beliefs, little is known about factors that facilitate learning and lead to alterations in policy beliefs.

Article II studies policy learning through the lens of social influence, focusing in particular on a mechanism known as complex contagion. Social influence occurs when an actor's beliefs or behaviors shift to align with those of their network contacts. In the context of policy learning, this means that actors update their beliefs based on the beliefs that their contacts hold.

Sometimes social influence takes place because a single contact provides new information or exerts social pressure. For example, information about job opportunities can spread through just one contact because such information is often considered credible even if it only comes from a single source (Guilbeault et al., 2018). Centola and Macy (2007) described these cases as simple contagions. However, the diffusion of normatively laden beliefs and collective behaviors follows a different logic (Centola & Macy, 2007). Rather than spreading like simple pieces of information, these beliefs and behaviors require complex contagion. This occurs when social reinforcement comes from multiple sources within an actor's network. In such cases, change is blocked until enough reinforcement accumulates from different contacts. As a result, normatively laden beliefs and behaviors spread only through complex contagion, where the threshold for adoption is crossed through support from multiple sources (Centola, 2018).

While policy learning is assumed to be more likely within advocacy coalitions because of their shared policy goals (Sabatier, 1988), broker organizations mediating connections between competing coalitions can also play an important role in belief change (Weible et al., 2020). Brokerage refers to a phenomenon in which an actor connects otherwise disconnected parts of a network. It is often thought that brokerage is conducive to the diffusion of novel ideas because an old idea in one group is potentially a new idea in another group. In the ACF, brokers are actors that are typically not aligned with a coalition, but seek to mitigate conflict in ways that facilitate compromise and learning (Jenkins-Smith & Weible, 2025).

Learning induced by brokers often results in reaching an agreement based on compromises, and brokers need to have connections to both competing coalitions to be able to mediate between them. It also helps if the brokers' policy beliefs are

moderate compared to the beliefs held by members of competing coalitions (Ingold & Varone, 2012). Policy actors that are held to advocate a specific policy option cannot convincingly fulfill the functional requirements of the role of a policy broker. Previous research has pointed out that there is a need for cross-national studies of policy brokering (Ingold & Varone, 2012).

Based on previous ACF research, both policy learning in general and cross-coalition learning through brokering are more likely in the presence of low conflict (Ingold et al., 2017; Jenkins-Smith, 1988; Weible & Sabatier, 2009). Ingold et al. (2017), for example, suggest that policy beliefs are more likely to change in contexts where conflict lines between opposing coalitions are weaker. Weible and Sabatier (2009) also argue that policy learning is more likely to occur in collaborative compared to adversarial subsystems because collaborative cases are associated with moderate rather than extreme beliefs and with less polarization.

Taken together, these dynamics raise important questions about the conditions under which policy learning occurs and the actors who facilitate it. On one hand, learning within coalitions may be reinforced by mechanisms of complex contagion. On the other hand, brokerage across coalitions may introduce new opportunities for belief change and compromise. Although more research is needed, previous research has suggested that both processes might be more likely when the level of conflict in the policy subsystem is relatively low. This dissertation contributes to these debates by examining how social influence and conflict structures enable or constrain policy learning among policy actors in Article II and how beliefs and institutional contexts shape brokerage between advocacy coalitions in Article III.

2.3.3 Information exchange between climate advocates and obstructionists

Literature on the science–practice interface conceptualizes the production, mediation, and application of climate information as the outcome of interactions among networks of scientists, policy-makers, and practitioners (Vogel et al., 2007; Kettle et al., 2017). From this perspective, information is not merely transferred linearly from scientists to policy-makers and practitioners, but a range of actors are actively involved in the co-production of knowledge (Vogel et al., 2007). Ideally, such processes would enable policy actors to develop a shared understanding of what constitutes reliable information, thereby fostering a common perception of the policy problem (Cash et al., 2003). However, both the ACF and GNT emphasize that policy actors tend to use and interpret information through their pre-existing beliefs. As a result, attempts to reduce uncertainty through scientific information may have the opposite effect, reinforcing disagreement rather than reaching a shared understanding (Klijn et al., 2025; Sabatier, 1988).

From an ACF perspective, this dynamic can be explained by both the model of the individual actor, drawn from social psychology, and the strategies used by

advocacy coalitions to defend their beliefs. The ACF assumes that policy actors are boundedly rational and therefore limited in their capacity to process information objectively and comprehensively (Sabatier, 1988). Rather than neutrally updating their beliefs in response to new evidence, actors tend to search for information in a biased manner, interpret ambiguous information in belief-congruent ways, and resist information that conflicts with their existing belief systems (Sabatier & Weible, 2007). Especially when confronted with information that challenges their policy core or normative beliefs, actors are likely to discount or ignore it. In addition to individual actors favoring belief-congruent information, coalitions respond to threatening evidence by mobilizing counter-arguments and alternative sources of expertise in competitive policy subsystems (Jenkins-Smith & Weible, 2025; Sabatier, 1988). As a result, information exchange becomes a contested and politicized process rather than a neutral mechanism for reducing uncertainty.

In climate change policy, these strategic dynamics are particularly visible in the production and dissemination of misinformation, which can be understood as a deliberate form of information use. Research on climate denial shows that a coordinated climate change countermovement comprising actors from multiple sectors, such as fossil fuel industries, has played a central role in spreading misinformation about climate change, particularly in the U.S. but also worldwide (Brulle et al., 2021; Dunlap & Brulle, 2020; Farrell, McConnell, & Brulle, 2019). Within the ACF, the commissioning of counter-research can be understood as a strategic use of scientific information as a coalition resource, intended to challenge the credibility of opposing coalitions and maintain uncertainty around policy-relevant evidence (Sabatier, 1988).

While outright climate denial represents one extreme form of strategic information use, opposition to climate action increasingly takes more nuanced forms that seek to reinterpret or reframe scientific information. Such opposition often takes the form of emphasizing the economic costs of mitigation or deflecting responsibility for emission reductions onto other countries (Coan, Boussalis, Cook, & Nanko, 2021; Van Rensburg, 2015). More recently, scholars have increasingly adopted the term *climate obstruction* in place of climate denial or climate skepticism, as it more accurately reflects the diversity of strategies used to oppose or delay climate action (Ekberg et al., 2023).

These diverse obstructionist strategies differ not only in their policy claims but also in the degree to which they contest the epistemological foundations of climate science. The concept of climate obstruction goes beyond the denial of climate science, i.e., *primary obstruction*, to include arguments that oppose or delay climate action, referred to as *secondary obstruction* (Ekberg et al., 2023). Research on such delay arguments shows that political actors often justify inaction or insufficient measures even when they acknowledge that climate change is caused by human activity (Lamb et al., 2020). Secondary obstructionists, for instance, may argue that responsibility for emission reductions lies with other countries; that

future technological advances will resolve the problem without the need for emission reduction in the present; or that mitigation is unlikely to succeed, leaving adaptation as the only viable response (Lamb et al., 2020). While these views may reflect legitimate concerns about the distributional effects of moving away from fossil fuels, they are often accompanied by unsupported claims or overly optimistic expectations about technological development (Lamb et al., 2020). On the other side of the political debate are climate advocates, who generally accept climate science and prioritize mitigation as a central policy objective.

As outlined above, from the ACF perspective, the persistent conflict between climate advocates and obstructionists can be understood as the outcome of both cognitive and strategic processes. One consequence of such belief-driven and strategic information use is the emergence of echo chambers. Echo chambers arise when actors predominantly get information from like-minded sources, reinforcing existing beliefs and limiting exposure to diverging viewpoints (Jamieson & Cappella, 2008; Nguyen, 2020). Echo chambers are harmful for climate policy because they can create a false sense of support for one's beliefs, as familiar arguments are repeated from multiple sources without new evidence (Lackey, 2021). This dynamic makes actors less aware and open to the critique presented to their views (Ranalli & Malcolm, 2023). As a result, echo chambers can lead to never-ending debates about the causes of climate change (Jasny, Waggle, & Fisher, 2015) and climate policies that conflict with scientific evidence (Wagner et al., 2021). Indeed, previous research has found that echo chambers exist in information exchange networks between organizations involved in environmental policymaking in many countries (Jasny et al., 2015; Wagner & Ylä-Anttila, 2018; Malkamäki et al., 2021; Wagner et al., 2021).

Conceptual discussions on echo chambers in the context of climate change are especially concerned about the echo chambers of climate obstructionists because they are suggested to spread misinformation and provide a space where false information is not challenged (Nguyen, 2020; Ranalli & Malcolm, 2023; Törnberg, 2018). This is especially true of those echo chambers built around primary obstruction, that is, the denial of climate science.

Building on the ACF's conceptualization of belief systems and the conditions under which cross-coalition learning is expected to occur, different forms of climate obstruction can be interpreted as conflicts that have different implications for scientific information exchange. Learning between coalitions is more likely when the debated issues are analytically tractable and competing coalitions share a common epistemological and methodological foundation for evaluating evidence (Jenkins-Smith & Weible, 2025). According to Jenkins-Smith and Weible (2025), analytical tractability is often low on normative issues, represented by normative policy core beliefs or even deep core beliefs. Primary obstruction possibly reflects the actors' deep core beliefs if it originates from generalized distrust in science. At least it challenges the legitimacy of established scientific methods and expert

institutions, signaling a high level of belief conflict within the climate policy subsystem. Under such conditions, both primary obstructionists and climate advocates are likely to form echo chambers.

Several mechanisms identified in previous research further suggest that primary obstructionists are particularly likely to form echo chambers. First, primary obstructionists may view researchers and institutions that communicate undesirable information as an unreliable elite and attempt to avoid cognitive dissonance by not accepting scientific information produced by climate advocates (Jylhä et al., 2023). Second, people with more conservative views are more likely to form echo chambers compared to more liberal ones (Boutyline & Willer, 2017). Since political conservatism has a strong connection with climate obstruction (Taciano, Sibley, & Osborne, 2025), the tendency of conservatives to form echo chambers may also apply to climate obstructionists. Third, people holding more extreme beliefs are more likely to form echo chambers compared to more moderate ones (Boutyline & Willer, 2017), and fourth, favoring attitude-affirming information is more common among people who feel like they need to defend their beliefs (Hart et al., 2009). This may be the case among primary obstructionists because climate scientists demonstrate a strong consensus on the reality of climate change.

In contrast, secondary obstructionists focus on aspects relating to burden-sharing and the economic feasibility of climate action (Lamb et al., 2020). Although these arguments also align with the ACF policy core beliefs, such consideration can be debated within shared epistemological foundations with climate advocates, making echo chamber formation in scientific information exchange less likely between these groups.

This distinction suggests that different forms of climate obstruction are associated with different conditions for information exchange, with important implications for the formation of echo chambers. Article IV examines whether the type of belief conflict between climate advocates and obstructionists is associated with the formation of echo chambers. Understanding the conditions under which echo chambers emerge and identifying the types of beliefs they reinforce is a necessary step toward explaining when information exchange may contribute to learning and when it instead sustains polarization in climate governance networks.

The four article-specific focus points presented in this section all contribute to the overall aim of this dissertation to better understand the role of beliefs and conflict structures in climate governance networks. In the next section, I will introduce the data and case selection for the articles, after which I will summarize the methods and main results of each article. Table 1 below provides an overview of the original articles.

Table 1 Overview of the original articles

	Article I	Article II	Article III	Article IV
Overall RQ	How do beliefs and conflict structures enable or constrain collaboration, policy learning, and information exchange in climate governance networks?			
Article research question	Does agreement over the most divisive issues in the policy subsystem predict collaboration between policy actors?	How do social influence and conflict structures enable or constrain policy learning between policy actors?	How do beliefs and macro-level institutional contexts shape coalition structures and brokerage between them?	Is a higher level of belief conflict between climate obstructionists and climate advocates associated with echo chambers?
Theoretical lens	The Advocacy Coalition Framework (ACF)	The Advocacy Coalition Framework (ACF)	The Advocacy Coalition Framework (ACF)	Echo chambers in climate policy
Data and case countries	Policy network survey data from Australia, Brazil, Czechia, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan	Policy network survey data from Brazil, Indonesia, and Vietnam	Policy network survey data from Australia and Finland	Policy network survey data from Australia, Czechia, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan
Methods	Exponential random graph modeling (ERGM)	Node-level regression	Community detection	Cluster analysis and ERGM
Main findings	Agreement over divisive issues explains collaboration better than agreement over pre-defined normative and empirical policy beliefs or policy instruments	Policy learning through social influence requires multiple reinforcement and takes place in collaborative Indonesia and Vietnam but not in conflictual Brazil.	Both countries have similar coalition structures, but there are a lot more brokers between the coalitions in consensual Finland than in majoritarian Australia.	Echo chambers are generally rare among climate policy actors, but both climate advocates and obstructionists form echo chambers in contexts where the groups disagree over climate science in addition to climate policies.
Conclusion	Belief-based collaboration is not just about shared beliefs, but a response to opposition.	Intensity of conflict in a policy subsystem conditions the capacity of collaboration to lead to belief change.	Macro-level institutional contexts shape how much beliefs determine collaboration relationships.	Not all disagreement have the same effects on information exchange. More fundamental belief differences are associated with more segregated groups.

3 Research design

This dissertation adopts a quantitative, comparative research design that combines policy network survey data with a range of social network analysis (SNA) and statistical modeling techniques to investigate the formation and structure of interaction relationships among policy actors. Across the four articles, the dissertation examines how organizational policy beliefs, belief conflict, and institutional contexts shape inter-organizational interaction and policy learning within climate governance networks.

The empirical foundation of the dissertation consists of policy network survey data collected from organizational actors involved in national climate policymaking, including governmental organizations, NGOs, business associations, and scientific institutions. The surveys capture information on interaction relationships (information exchange and collaboration) as well as on organizational policy beliefs. In total, the data cover 14 climate policy subsystems in 13 countries located in different regions of the world, which vary in their levels of economic development. Articles I, III, and IV draw on data from mature climate policy subsystems, primarily in developed countries of the Global North, while Article II is based on data from emerging climate policy subsystems in forest-rich tropical countries of the Global South. Each article analyzes a distinct set of countries. Although the four articles share a common empirical foundation, they employ different analytical strategies suited to their specific research questions.

Examining governance networks requires deliberate conceptual and methodological choices to ensure analytical precision. As Berardo, Fischer, and Hamilton (2020) emphasize, it is essential to clearly define network boundaries (identify the set of relevant actors) and the nature of ties connecting actors. Moreover, they note that addressing issues such as missing data and methodological transparency is vital to produce robust and comparable insights into the structure and functioning of governance networks. Finally, because governance networks are dynamic systems that evolve over time in response to contextual changes and actors' strategic behavior, longitudinal approaches are necessary to capture these temporal processes (Berardo et al., 2020). In the following subchapters, I introduce the data, case selection, and methodological choices of each article. In the discussion section, I further reflect on the limitations of the chosen approaches.

3.1 Data, case selection, and methods for Articles I, III, and IV

The empirical basis of Articles I, III, and IV consists of policy network survey data collected by eleven country teams as part of the Comparing Climate Change Policy Networks (COMPON) project in Australia, Brazil, Czechia, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan. The data was collected between 2010 and 2016, depending on the country. Each national dataset represents a climate policy subsystem, comprising approximately 100 organizations central to domestic climate policymaking. The boundary specification included a multi-step process that combined existing academic research, media analysis, local researchers' case knowledge, and consultation with national experts. This ensured that key actors across different sectors of society, governmental organizations, NGO's, business organizations, and scientific organizations, with national reach, were included. Within each organization, individuals targeted as respondents were responsible for either climate policy or environmental policy. In organizations where such positions did not exist, a person in a leading position, such as the chief director or party secretary, was targeted.

While the boundary specification process aimed to identify the most central actors in national climate policymaking at the time of data collection, it reflects the historical context of the data collection period (2010–2016). During this time, climate policy in the case countries was predominantly understood as a problem of transforming energy and industrial systems through technological innovation, market-based instruments, and expert-led regulatory reform (Knox-hayes & Hayes, 2014; Oels, 2005). Thus, there is a strong presence of energy companies, industrial associations, and technocratic agencies within the subsystems, and comparatively low inclusion of actors associated with climate justice, public health, adaptation, local governments, or everyday consumption practices. Literature on post-Paris Agreement climate governance highlights a shift toward more polycentric governance arrangements, in which cities, regions, and diverse civil-society actors play a more visible role (Marquardt et al., 2022). Accordingly, the subsystem boundaries employed here should be understood as capturing the pre-Paris climate policy paradigm, rather than the full complexity of climate governance as it has evolved in more recent years.

The surveys were conducted either face-to-face, online, or on paper, depending on local conditions, and they included questions about both the interactions between organizations and their beliefs regarding climate change. Data on collaborative relationships were collected by providing each respondent with a roster of organizations active in the climate policy subsystem of their respective country. This roster comprised the same organizations that formed the survey's target population. Because the concept of collaboration can be defined in multiple ways (Berardo et al., 2020), the surveys offered additional clarification by

specifying the types of relationships to be reported. Respondents were asked: "Sometimes one organization provides support on a policy issue to another organization, and that organization provides similar support in return. Please indicate the organizations with which your organization has such a long-term, mutual support relationship regarding climate change issues". Information on scientific information exchange was collected using the same roster. Respondents were asked to identify the organizations from which their organization "gets reliable scientific information about climate change."

Data on beliefs were gathered by asking respondents to indicate their level of agreement with a series of statements about climate policy on a five-point Likert scale (1 = "Strongly disagree," 5 = "Strongly agree"). The number of belief-related questions varied across countries, and each article draws on a different subset of these questions, as specified in the article-specific sections below. Table 2 presents descriptive information about the data.

Table 2 Case countries

Country	Year	Response rate (%)	Number of respondents	Included in articles
Australia	2015	45	43	I, III, and IV
Brazil	2013	46	62	I
Czechia	2016	69	91	I and IV
Germany	2012	73	51	I and IV
Finland	2014	85	82	I, III, and IV
Ireland	2013	91	52	I and IV
Japan	2012	58	72	I and IV
South Korea	2010	83	80	I and IV
Portugal	2016	68	57	I and IV
Sweden	2015	70	69	I and IV
Taiwan	2011	82	82	I and IV

Survey-based network data are inevitably imperfect, as some degree of nonresponse is unavoidable. Collecting information on information exchange, collaboration, and beliefs of hundreds of organizations across thirteen countries is, however, scarcely feasible by any other means. Even within the demanding context of political elite networks, the response rates compare favorably with those reported in previous studies (Leach & Sabatier, 2005; Henry, Lubell, & McCoy, 2011; Jasny & Fisher, 2019).

Still, nonresponse remains a concern because missing actors or ties can bias estimates of network structure and model parameters, especially if nonresponse is systematically related to network position (Berardo et al., 2020; Smith, Moody, & Morgan, 2017). Overall, the respondents in these data occupy more central roles in the networks than the nonrespondents, suggesting that the most important actors participated in the surveys. However, in Australia, many of the most influential

actors, especially among governmental and business organizations, did not respond. This limitation was addressed in Articles I and IV by also considering the results without Australia, but it has more serious consequences for Article III, which only includes Australia and Finland. Thus, the results of Article III need to be interpreted with caution. Each original article provides a more detailed discussion of nonresponse, and I address additional limitations of survey-based research in the discussion section of this summary chapter.

3.1.1 Case selection and methods for Article I

Article I uses data from eleven COMPON case countries: Australia, Brazil, Czechia, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan. The country case selection is intended to maximize diversity, the idea being that if the results on the types of beliefs that predict collaboration between policy actors are similar in a wide range of different cases, they can be considered quite robust.

The article employs ERGMs to analyze the formation of collaboration ties between policy actors. The dependent variable represents the observed collaboration network in each country. The key independent variables capture belief similarity among actors, following the Advocacy Coalition Framework. To test if the agreement over the most divisive beliefs in the policy subsystem predicts collaboration between policy actors better than agreement over pre-defined belief categories, policy beliefs were divided into three categories: (1) normative and empirical policy beliefs, (2) beliefs concerning policy instruments, and (3) divisive issues. Normative and empirical policy beliefs included general subsystem-wide orientations, such as views on the severity of climate change, the adequacy of national climate policy, global equity, and attitudes toward economic and renewable energy priorities. Beliefs concerning policy instruments focused on specific policy measures, both technical (e.g., energy sources) and political (e.g., international agreements). Divisive issues were identified as the ten most contentious items within each country based on standard deviations across belief variables. For each belief category, similarity matrices were computed using Euclidean distance following Leifeld and Schneider (2012) and normalized to range between 0 and 1. These matrices served as edge covariates in the ERGMs, allowing the effect of belief similarity on collaboration to be modeled. Separate models were estimated for each belief category in each country to avoid multicollinearity.

3.1.2 Case selection and methods for Article III

Article III focuses on two contrasting cases of Finland and Australia, which represent carbon-intensive economies with differing institutional and political settings. Both countries face challenges in decarbonization, but Australia's dependence on coal contrasts with Finland's energy-intensive industrial base.

Institutionally, Finland exemplifies a corporatist and consensual polity, while Australia represents a majoritarian and pluralist system. By analyzing these two cases, Article III investigates how beliefs and institutional contexts shape brokerage between advocacy coalitions.

The mapping of the coalition structures of the policy networks is based on a survey question on collaboration. The resulting network matrix was symmetrized, meaning that a collaboration tie between two organizations was coded if either one of them had indicated the existence of collaboration. This method has the advantage of enabling the inclusion of non-respondents in the network analysis if they were indicated as collaboration partners by respondents. To identify collaborating coalitions, the Factions algorithm in the UCInet software package was applied. The algorithm partitions organizations into subgroups with dense internal collaboration and sparse external ties, maximizing within-group connectivity. Brokers were operationalized as organizations that have an equal number of collaboration ties to two or more subgroups. The factions algorithm in UCInet places each actor in a subgroup based on the number of their ties to other actors in that subgroup. If an actor has an equal number of ties to two or more subgroups, the algorithm places it in a different subgroup when it is run several times. These actors were identified by running the factions algorithm 25 times, and then removed from the subgroups and analyzed separately.

In accordance with the ACF (Weible et al., 2020), coalitions were defined as groups of organizations that both coordinate and share policy core beliefs. To complement the collaboration-based subgrouping, belief similarity was assessed using survey data on policy core beliefs related to climate change. From 21 belief items, six highly correlated variables were identified through exploratory factor analysis and combined into a composite measure of pro-climate belief. The composite measure, scaled between 0 and 1, captures orientations toward climate science, government intervention, and prioritization of mitigation over economic growth. Mean scores and standard deviations were used to assess belief similarity within and between the identified coalitions, as well as groups of brokering organizations located between them.

3.1.3 Case selection and methods for Article IV

Article IV, in turn, uses COMPON data from ten countries: Australia, Czechia, Germany, Finland, Ireland, Japan, South Korea, Portugal, Sweden, and Taiwan. These countries were chosen to capture variation in climate policy ambition and institutional settings, ranging from corporatist and consensual systems (e.g., Finland, Sweden) to majoritarian and pluralist ones (e.g., Australia, South Korea). The cross-national diversity enhances the generalizability of findings on the association between the type of belief conflict and the echo chambers of climate advocates and obstructionists.

Cluster analysis is used to identify groups of actors that share similar positions on issues related to climate obstruction. As outlined in the theory section, such groups may have an incentive to form echo chambers and to avoid exposure to contradicting views. Drawing on previous research on climate obstruction and climate-skeptic arguments (Ekberg et al., 2023; Van Rensburg, 2015), primary obstruction (the questioning of evidence for climate change) is measured through statements concerning the reality of climate change and the reliability of climate science. Secondary obstruction (the opposition to climate policies) is measured through statements regarding the costs of climate action, the prioritization of economic and energy supply interests over climate action, and the perceived national responsibility to mitigate climate change. To identify clusters of organizations holding similar beliefs regarding climate obstruction in each country, a multi-step process of imputation, clustering, and validation is employed.

Finally, exponential random graph models (ERGMs) are used to analyze whether these groups predominantly rely on scientific information from within their like-minded cluster, that is, whether they are in echo chambers. Unlike traditional statistical tools, ERGMs are designed to account for interdependencies between actors in a network (Robins et al., 2007). These models reveal whether certain network processes (e.g., obstructionist echo chambers) drive tie formation by examining whether the corresponding network configurations (e.g., dyadic homophily among obstructionists) are commonly observed in the system. The analysis focuses on whether policy actors form information exchange ties significantly more often with others in their like-minded cluster. To this end, a cluster-level homophily configuration is applied to measure whether two organizations within the same cluster are likely to be linked. The models also control for the overall tendency of organizations to send ties, that is, to acquire information from others. Accordingly, the within-cluster homophily term is interpreted as the probability that sent ties occur within the sender's cluster.

3.2 Data, case selection, and methods for Article II

Article II examines policy learning in emerging climate policy subsystems by focusing on the development of policy actors' beliefs on REDD+ (Reducing Emissions from Deforestation and Forest Degradation) policies in Brazil, Indonesia, and Vietnam. Established at the 13th UNFCCC Conference of the Parties in Bali in 2007, REDD+ was designed as a market-based global mechanism to curb forest loss and related CO_2 emissions in forest-rich tropical countries. From the beginning, the initiative has generated significant domestic policy activity and debate concerning its effectiveness, equity, and implementation (Brockhaus et al., 2014; Korhonen-Kurki et al., 2019).

The study focuses on Brazil, Indonesia, and Vietnam, three countries that were early adopters and active participants in REDD+ policy development. Brazil

represents a federal democracy with a contentious REDD+ debate characterized by polarization between pro-market actors and advocates for indigenous and local rights (Brockhaus & Di Gregorio, 2014). Indonesia is a decentralized democracy where REDD+ emerged through complex interactions among multilateral and bilateral donors (notably Norway), civil society, and domestic bureaucratic actors (Angelsen & McNeill, 2012; Brockhaus & Di Gregorio, 2014). Vietnam, by contrast, is a unitary single-party state, where policy change occurs within a highly centralized political system (Brockhaus & Di Gregorio, 2014). Among the three cases, Vietnam's REDD+ policy subsystem is the smallest and largely collaborative, Indonesia's is larger and more diverse, yet still predominantly collaborative, and Brazil's is the most conflictual (Brockhaus & Di Gregorio, 2014). Including these three contrasting contexts allows the study to examine how varying levels of conflict within policy subsystems shape policy learning processes in emerging climate governance networks.

The empirical analysis is based on two waves of national-level policy network surveys conducted between 2010–2012 (first round) and 2015–2016 (second round). The surveys targeted organizations that were involved or had relevance in the national REDD+ policy subsystem, including government organizations, foreign government agencies, intergovernmental organizations, and both domestic and international NGOs, business organizations, and research institutes. Respondents were high-level representatives with direct knowledge of their organization's position and activities in the policy domain. The first survey round collected responses from 55 actors in Brazil (response rate 86%), 65 in Indonesia (64%), and 52 in Vietnam (100%). The second round yielded 72 responses in Brazil (55%), 84 in Indonesia (64%), and 48 in Vietnam (87%). For the longitudinal analyses, only organizations that participated in both waves were included, resulting in a panel of 27 organizations in Brazil, 43 in Indonesia, and 27 in Vietnam. The larger first-round datasets were nonetheless used to construct baseline variables describing organizational attitudes and network structures.

The panel design allows for the identification of belief change over time and the assessment of whether social ties influence these changes. The study of such temporal processes in governance networks has been called for in previous research (Berardo et al., 2020). Unlike studies that rely on self-reported learning (Leach et al., 2013), this design infers learning from observed changes in beliefs across two survey waves. The dependent variable captures shifts in organizational beliefs about REDD+ between data collection rounds. Respondents were asked to indicate their level of agreement or disagreement with a series of statements related to REDD+ on a five-point Likert scale. A factor analysis was conducted using all items measuring normative beliefs related to the subsystem topic (i.e., the REDD+ program). In line with the ACF, such beliefs correspond to policy core beliefs (Weible et al., 2020). Based on the results of the factor analysis, the analysis focused on four questions included in both survey rounds that addressed key outcomes of

REDD+ concerning Effectiveness, Efficiency, and Equity (the "3 E's"; Angelsen et al., 2009), as well as governance outcomes. Together, these items measured how organizations evaluated REDD+ as a policy instrument. Cronbach's alpha indicated acceptable internal consistency in both rounds, and the mean of the four items was calculated for each organization. Belief change was then computed by subtracting the first-round value from the second-round value, resulting in an approximately normally distributed variable in which positive scores indicate increasingly favorable evaluations of REDD+.

The key independent variables measure the extent to which the beliefs of an organization's collaborators differ from its own. A collaboration network was constructed by asking organizations to identify other actors with whom they regularly collaborate on REDD+-related issues. Based on these data, ratios were calculated to indicate the share of an organization's collaborators that held more positive or negative beliefs about REDD+ than the focal organization in the first survey round. The purpose is to test if a bigger share of an organization's collaboration partners holding more positive views of REDD+ than the organization itself makes it more likely to adopt these more favorable views over time, and vice versa. The analysis was conducted using node-level regression in UCINET, which estimates coefficients through ordinary least squares while accounting for interdependence among network observations via simulated standard errors (Borgatti et al., 2013). Although the study cannot rule out other possible drivers of belief change, the approach allows an assessment of whether changes in organizational beliefs align systematically with the belief orientations of their social contacts, providing evidence of policy learning through social influence.

4 Summary of original publications

4.1 Article I: Shared positions on divisive beliefs explain interorganizational collaboration: evidence from climate change policy subsystems in 11 countries

Article I analyzes the collaboration networks of policy actors involved in climate change policymaking in 11 countries: Australia, Brazil, Czechia, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan, using exponential random graph models (ERGMs). The goal is to clarify which types of beliefs contribute to the formation of collaborative relationships between policy actors. Previous research on the beliefs driving coalition formation has produced mixed results, likely due to both neglecting the role of conflict in the policy subsystem and the lack of a systematic approach for defining which beliefs are important and why.

The article proposes the concept of divisive beliefs as a potential solution to these issues. Divisive beliefs are defined as those over which substantial disagreement among actors in the policy subsystem can be empirically measured. Collaboration is argued to depend on agreement over these disputed beliefs rather than on general belief similarity. For example, there is considerable disagreement in most of the case countries over the statement: "My country should take a leading international role in greenhouse gas reduction." The divisive beliefs hypothesis predicts that organizations agreeing with this statement will collaborate with one another, as will those disagreeing with it, potentially resulting in two competing coalitions. In other countries or at another time, the beliefs that are divisive could be different.

To evaluate whether agreement over the most divisive beliefs predicts collaboration better than agreement over pre-defined belief categories, three ERGM models are compared: one based on agreement over normative and empirical policy beliefs, one on agreement over beliefs regarding specific policy instruments, and one on agreement over the most divisive beliefs. In the ACF, normative policy beliefs are usually categorized as policy core beliefs that the framework suggests should act as the glue binding coalitions together (Weible et al., 2020), while policy

instruments are categorized as secondary aspects that have also been found to elicit collaboration in some studies (Ingold, 2011).

The ERGM results are presented in Figure 1. Note that the belief similarity variables are included in the models separately and that the parameter estimates presented in Figure 1 are combined from three different models.

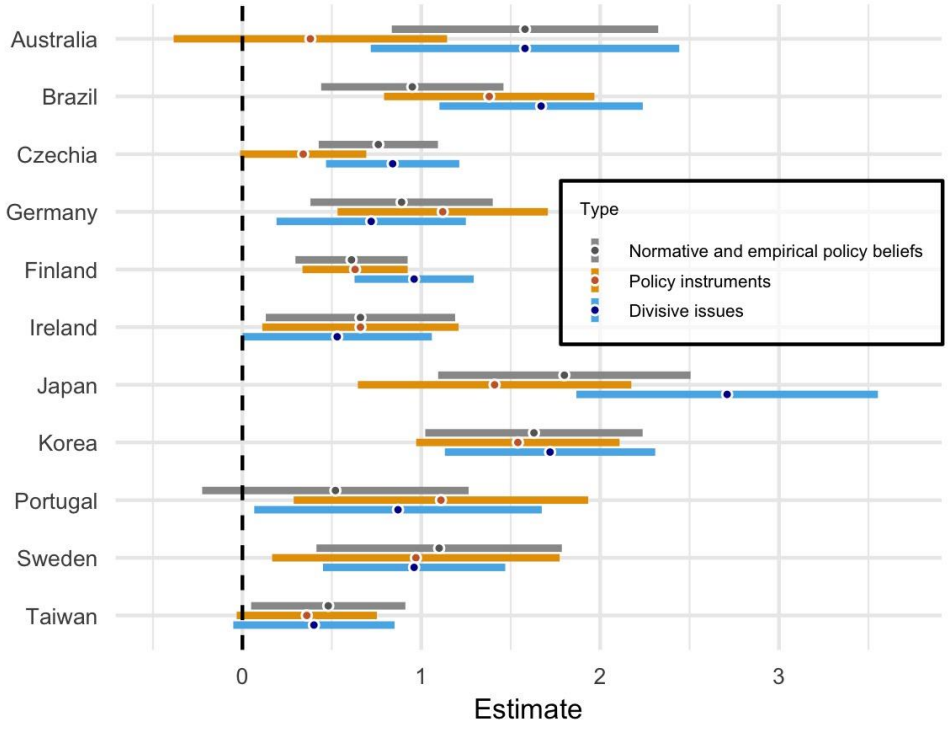


Figure 1 ERGM estimates for belief similarity variables

Belief similarity regarding normative and empirical policy beliefs and divisive issues significantly predicts collaboration in 10 of the 11 countries. In Portugal, collaboration is not significantly predicted by belief similarity regarding normative and empirical policy beliefs, while in Taiwan, it is not predicted by divisive beliefs. Agreement over policy instruments significantly predicts collaboration in 8 countries, with exceptions in Australia, Czechia, and Taiwan. In Brazil, Czechia, Finland, Japan, and Korea, the parameter estimate for divisive beliefs exceeds those for the other two measures. In Sweden and Taiwan, the estimate for normative and empirical beliefs is highest, while in Germany and Portugal, policy instruments show the strongest effect. In Australia, estimates for normative and empirical beliefs and divisive beliefs, and in Ireland, estimates for normative and empirical beliefs and policy instruments, are equally high. Overall, in most cases, belief

similarity regarding divisive issues predicts collaboration better, or equally well, compared to the other two belief similarity variables.

In most countries, all three belief similarity variables predict collaboration significantly. This gives strong support for the belief homophily hypothesis in the ACF. However, the relative importance of the pre-defined belief categories of normative and empirical policy beliefs and policy instruments is not clear. In some countries, belief similarity regarding normative and empirical policy beliefs predicts collaboration better than belief similarity regarding policy instruments, and in some countries, the opposite is true. Yet in some countries, both belief similarity variables predict collaboration equally well. Based on these results, using belief similarity regarding divisive issues to predict collaboration between policy actors has two advantages: first, in most cases, it predicts collaboration better or equally well than pre-defined belief categories, and second, it provides a systematic way of defining which beliefs are important for collaboration.

4.2 Article II: Policy learning as complex contagion: how social networks shape organizational beliefs in forest-based climate change mitigation

Article II studies how social influence and conflict structures enable or constrain policy learning among forest policy actors in two collaborative REDD+ policy subsystems in Indonesia and Vietnam, as well as in an adversarial REDD+ policy subsystem in Brazil. According to the ACF scholarship, policy learning is more likely to occur in collaborative than in adversarial subsystems, as collaborative cases are associated with moderate rather than extreme beliefs and with less polarization (Weible & Sabatier, 2009).

Particular attention is given to complex contagion, a mechanism of policy learning referring to situations in which social influence occurs only when social reinforcement is provided by multiple sources (Centola & Macy, 2007). In their original formulation, complex contagion was conceptualized by Centola and Macy (2007) as depending on multiple contacts. Later, Centola (2018) emphasized that the share of contacts might be more important than their absolute number. In the context of belief change, this implies that change may not occur if only a small fraction of social contacts "pulls" in the direction of belief change, but only if they constitute the majority of contacts. Thus, in Article II, it is expected that the share, rather than the absolute number, of social ties matters for policy learning.

In addition to examining whether the overall share of contacts holding different beliefs from a policy actor is associated with belief change, it is argued that attribute-related factors may make belief change more likely. Actors might consider contacts that are similar to them as more reliable. Thus, similar actors might influence the actors' belief change more than others (Riche et al., 2020). Since public authorities often play important roles in policy subsystems due to their

official decision-making power (Fischer et al., 2017), it is suggested that they may be more likely to induce belief change, especially in authoritarian Vietnam. Similarly, actors that are central in the collaboration network (Borgatti, 2005) and actors that are considered especially influential in the policy subsystem (Fischer & Sciarini, 2015) might have bigger effects on belief diffusion processes. Finally, since reciprocal relationships are likely to be sources of trust (Berardo & Scholz, 2010), they are expected to influence belief change more than other relationships.

Node-level regression was used to study the dynamics of social influence. It was tested whether the ratio of (1) all contacts, (2) contacts with the same organization type, (3) contacts that are governmental organizations, (4) central contacts, (5) influential contacts, and (6) reciprocal contacts holding different beliefs from the actor is associated with their belief change. The results of these six models are presented in Figure 2.

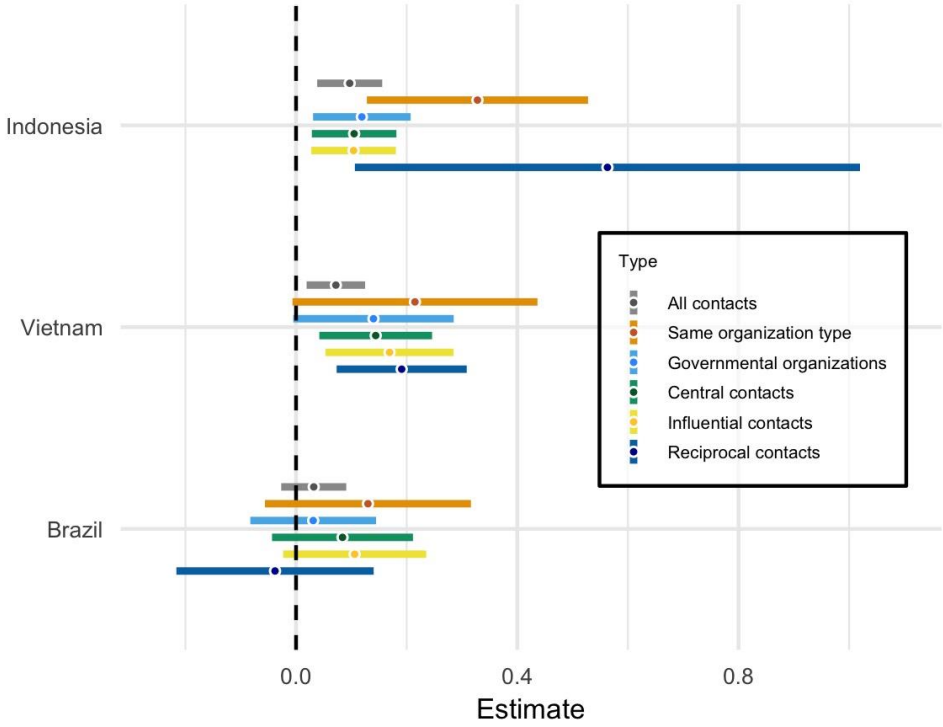


Figure 2 Regression coefficients for node-level regression models

In Indonesia, beliefs of the actor's contacts are associated with belief change regardless of the type of contact. Contacts that are of the same organization type as the actor, and especially contacts with whom the actor has a reciprocal relationship, are even more influential than other types of contacts. In Vietnam, the beliefs of all contacts, but also the beliefs of central, influential, and reciprocal contacts, are

associated with belief change. Again, the estimate is highest for contacts with whom the actor has a reciprocal relationship.

Thus, the share of social contacts holding different beliefs is not the only thing that matters in explaining belief change through social influence. The actor's beliefs are especially likely to change when the majority of their reciprocal contacts hold either more negative or more positive beliefs than they do. This is likely due to reciprocal relationships being trusted more than other types of relationships (Berardo & Scholz, 2010).

In Brazil, the beliefs of the actor's contacts are not associated with the way actors change their beliefs about REDD+. The fact that policy learning seems to be possible through social influence in collaborative REDD+ subsystems in Indonesia and Vietnam, but not in the adversarial subsystem in Brazil, gives support to the assumption presented in previous ACF literature that policy learning is more likely in collaborative conditions where conflict is low (Ingold et al., 2017; Weible & Sabatier, 2009). Also, the particularly strong influence of reciprocal relationships gives reason to suggest that even in collaborative contexts, policy learning through social influence requires multiple reinforcements from trusted sources.

4.3 Article III: Breaking the treadmill? Climate change policy networks and the prospects for low-carbon futures in Australia and Finland

Article III examines how beliefs and macro-level institutional contexts shape collaboration structures and brokerage between coalitions in Australia and Finland. Both countries are carbon-intensive economies with relatively low ambition in their climate policies, yet they are very different in their economic structures and political institutions. Australia's system is pluralist and majoritarian, whereas Finland's is more consensual and corporatist (Lijphart, 2012). Because Australia's adversarial institutional context might not encourage cross-coalition interaction, it is expected that Finland will have more brokers than Australia. Consequently, collaboration in Australia is assumed to rely more heavily on shared beliefs.

To identify brokers between coalitions, the coalition structure in both countries was first analyzed. Advocacy coalitions were identified based on both collaboration ties and belief similarity (Sabatier & Jenkins-Smith, 1999), measured by the mean and standard deviation of pro-climate beliefs within subgroups identified using network community detection.

The analyses reveal a remarkably similar coalition structure in both countries: a Treadmill Coalition consisting of industry organizations, trade union organizations, key governmental organizations, and political parties; a Climate Coalition composed primarily of environmental NGOs; and a Government Coalition consisting of governmental organizations, including governmental research institutions. All three coalitions in both countries have a high degree of

collaboration within the coalition and low collaboration between them, which indicates that they are actual coalitions. This interpretation is further supported by an analysis of belief congruence within the coalitions. The differences in mean pro-climate beliefs between the Treadmill and Climate coalitions are statistically significant in both countries, whereas the beliefs of the Government Coalition do not significantly differ from those of the Treadmill Coalition.

In both countries, a significant number of organizations were found to be unaffiliated with any coalition. These organizations maintain the same number of links to two or more coalitions, positioning them as brokers capable of mediating between these groups. Another criterion for brokerage considered is the holding of moderate beliefs relative to the coalitions connected by the brokers (Ingold & Varone, 2012). Figure 3 presents the means and standard deviations of pro-mitigation beliefs for the three coalitions in both countries, alongside the beliefs of the organizations occupying broker positions based on their network position.

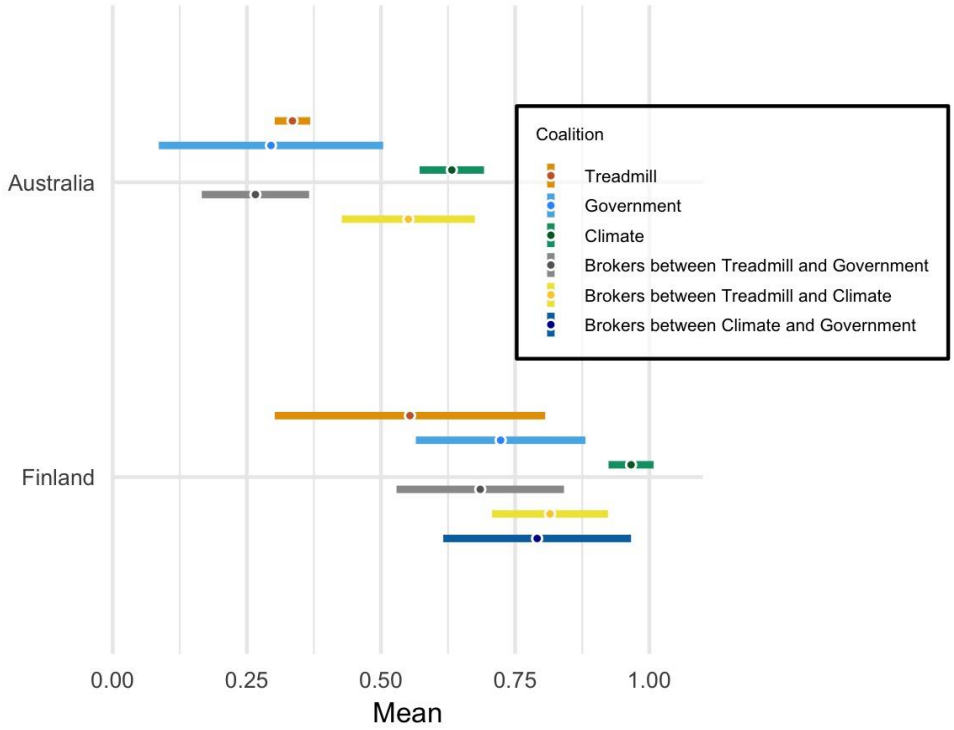


Figure 3 Pro-climate beliefs by coalition and brokering organizations

Despite the similarities in coalition structure, the countries differ markedly in the beliefs held by the coalitions. Australian organizations are generally less supportive of ambitious climate policies than their Finnish counterparts. In Finland, the Treadmill Coalition is near the midpoint of the pro-mitigation scale

(0.55), the Climate Coalition is highly pro-mitigation (0.97), and the Government Coalition falls between these two. The standard deviations indicate that the Climate Coalition in Finland is united in its beliefs, whereas the Treadmill and Government coalitions represent a broader range of beliefs. In Australia, all coalitions exhibit lower support for mitigation: the Climate Coalition is the most supportive, but only slightly above the midpoint (0.63), while the Government Coalition is even less supportive than the Treadmill Coalition. Both the Climate and Treadmill coalitions in Australia are highly unified in their beliefs, suggesting that both belief-based collaboration and belief conflict between coalitions are stronger in Australia than in Finland, as expected.

In Australia, brokers mediating connections between the Treadmill and Climate Coalitions hold moderate beliefs relative to the coalitions, enabling them to potentially mediate belief conflicts. This is not the case for organizations mediating between the Treadmill and Government Coalitions, which are even less supportive of mitigation than the Government Coalition. There are only two organizations located between the Climate and the Government Coalitions, and neither of them responded to the survey. This is why, for Australia, there is no bar for brokers between Climate and Government in Figure 3. In Finland, brokers mediating connections across all three coalitions also occupy intermediary positions in terms of beliefs. These findings indicate that more organizations in Finland than in Australia occupy positions both in terms of their beliefs and network position that allow them to engage in brokerage behavior.

4.4 Article IV: Echo chambers of climate advocates and obstructionists: information exchange among policy actors in ten countries

Article IV investigates echo chambers of climate advocates and obstructionists among policy actors involved in climate change policymaking in ten countries: Australia, Czechia, Germany, Finland, Ireland, Japan, Korea, Portugal, Sweden, and Taiwan. To assess whether the level of belief conflict between these groups is associated with echo chambers, a distinction is made between primary and secondary obstructionists. It is suggested that both climate advocates and obstructionists are more likely to form echo chambers in contexts where obstructionists engage in primary obstruction, i.e., deny climate science. This is because such a fundamental difference in worldviews between the groups is likely to increase distrust.

The analysis began by identifying like-minded groups of actors in the networks through cluster analysis based on statements measuring the actors' beliefs regarding climate obstruction. Based on the cluster analysis, the optimal number of clusters in most countries was found to be two, and three in Sweden. The cluster with the lowest engagement in climate obstruction in each country was defined as

the climate advocates. A cluster was defined as climate obstructionist if the mean of any of the statements was three or higher, indicating agreement or strong agreement on at least one of the obstructionist statements. Clusters engaging in both primary and secondary obstruction were defined as primary obstructionists, whereas clusters engaging only in secondary obstruction were defined as secondary obstructionists. Clusters with means below three but higher than those of the advocate cluster were defined as indecisive, indicating that the cluster is not obstructionist but is less certain about the need to act compared to the advocate cluster.

A climate obstructionist and a climate advocate cluster were identified in all case countries. Additionally, an indecisive cluster was identified in Sweden. In most countries, the climate advocate cluster and the climate obstructionist cluster were found to differ significantly in their means on all included statements based on a t-test. In Germany, significant disagreement was observed on five out of six statements, and in Portugal on four out of six statements.

In all countries except Czechia and Japan, obstructionist clusters were found to engage only in secondary obstruction, although they were also significantly less certain about the evidence for climate change compared to advocate clusters. In Czechia and Japan, obstructionist clusters were also found to engage in primary obstruction, generally claiming that climate science is too uncertain to serve as a basis for policy. In all countries, the climate advocate cluster was found to be more certain about the evidence for climate change and, in most cases, also agreed significantly less with secondary obstructionist statements.

Exponential random graph models (ERGMs) were used to analyze whether these groups are in echo chambers, meaning that they predominantly exchange information within their like-minded group. The ERGM results concerning the role that homophily plays within the identified clusters are presented in Figure 4.

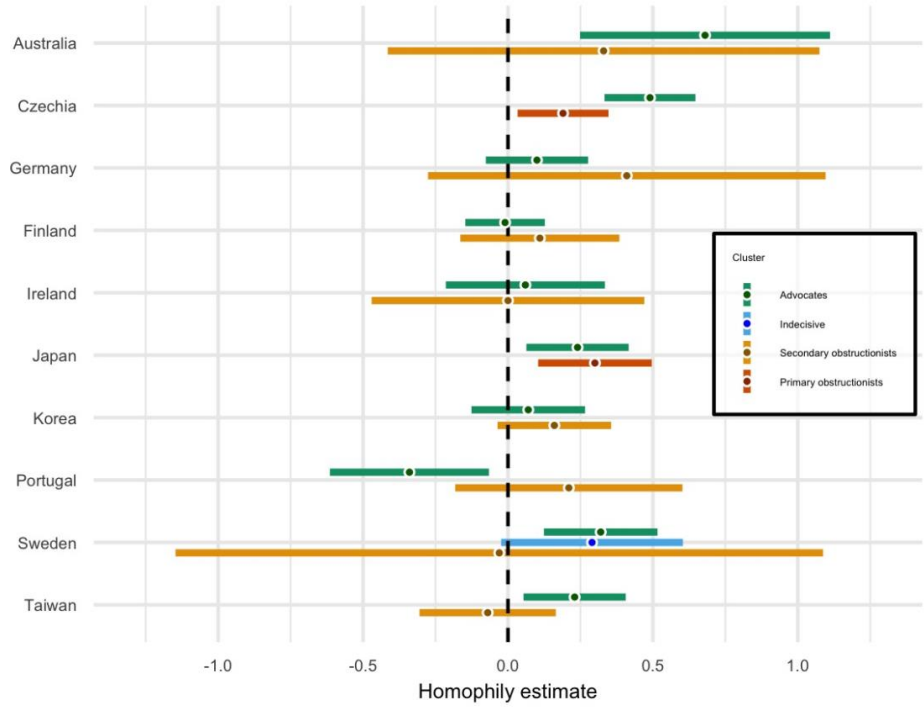


Figure 4 Homophily within clusters

Based on the ERGM results, echo chambers were formed by both climate advocates and obstructionists in Czechia and Japan, the only two countries in the study where obstructionists engage in primary obstruction. This is indicated by positive and significant coefficients for the homophily term, both for the advocates, represented by the green bars, and for the obstructionists, represented by the orange bars, in Figure 4. Echo chambers were found to form among climate advocates only in three additional countries: Australia, Sweden, and Taiwan. Secondary obstructionists, in contrast, were not found to form echo chambers in any country.

These results confirm the assumption that both climate advocates and obstructionists are likely to form echo chambers when obstruction includes science denial in the form of primary obstruction. However, echo chambers may also be formed by climate advocates in contexts where the groups only disagree over climate policies, rather than climate science.

5 Discussion and limitations

This dissertation examines how beliefs and conflict structures shape collaboration, learning, and information exchange among climate policy actors. By integrating governance network theory (GNT) with more specific frameworks on advocacy coalitions and the formation of echo chambers, it contributes to a more comprehensive understanding of how belief diversity and subsystem conflict condition the formation and functioning of climate governance networks.

Although I have brought insights from GNT in this summary from outside the original articles, I argue that there are mutual benefits from integrating these theories. From a GNT perspective, interaction between policy actors is both necessary and difficult. Because no single actor possesses all the resources required to address complex policy problems, actors must collaborate despite their divergent problem perceptions. However, as GNT highlights, these differing perceptions often lead to conflict and hinder collaboration and information exchange (Klijn et al., 2025).

The Advocacy Coalition Framework (ACF) complements GNT by specifying the mechanisms through which divergent problem perceptions, operationalized as belief systems, structure interaction among policy actors. Rather than pooling resources solely due to interdependence, actors coordinate primarily with others who share their beliefs about the nature of the policy problem and appropriate solutions. The ACF thus refines GNT's account of interaction by linking network structure explicitly to shared problem perceptions.

At the same time, integrating insights from GNT can substantially add to the explanatory power of the ACF, particularly in understanding coalition dynamics and learning in collaborative policy settings. Although the textbook version of the ACF assumes that policy subsystems are adversarial, many empirical applications have shown that not all subsystems exhibit such conflict and that coalition dynamics can differ in more collaborative settings (Jenkins-Smith & Weible, 2025). As Koebele (2019) argues, the ACF's traditional focus on adversarial competition of advocacy coalitions requires adaptation when applied to collaborative contexts. Collaborative governance theory, which is integrated in GNT's view on network governance, helps to explain why actors might coordinate for reasons other than shared beliefs and how policy-oriented learning can be facilitated through sustained

interaction and deliberation (Koebele, 2019). In this dissertation, I show that although belief similarity explains collaboration in different institutional settings (Article I), belief-based network segregation seems to be less pronounced (Articles III and IV) and policy-oriented learning more likely (Article II) in collaborative than in adversarial contexts. Insights from literature on collaborative governance would further argue that, in addition to fostering learning, collaborative processes can advance policy change through negotiated agreements (Koebele, 2019).

According to GNT, substantive complexity in governance networks results from the actors' divergent problem perceptions and the fact that the use of experts and gathering information often intensifies conflicts instead of solving them (Klijn et al., 2025). This is because actors are likely to resist information that challenges their problem perceptions and the accompanying solutions (White, 1992). In this respect, GNT aligns with the ACF in emphasizing that information is processed through pre-existing belief systems rather than assessed neutrally. However, while GNT identifies belief-driven information use as a source of substantive complexity, it remains relatively implicit about the mechanisms that lead to it. The ACF is more explicit in explaining how such cognitive processes are complemented by strategic responses by the opposing sides. When confronted with evidence that threatens their belief systems, advocacy coalitions actively mobilize counter-arguments and commission alternative research to defend their positions, thereby politicizing information exchange (Jenkins-Smith & Weible, 2025; Sabatier, 1988). As further elaborated through the concept of echo chambers in Article IV, these cognitive and strategic processes can give rise to information environments in which like-minded actors predominantly interact with one another, thereby reinforcing shared beliefs and limiting exposure to opposing evidence (Jamieson & Cappella, 2008).

In this chapter, I develop three main arguments based on the results of the original articles, discuss their scientific implications, and the main limitations of the chosen approaches. I end with a concluding chapter in which I also discuss what the implications of these results are for climate governance.

5.1 Collaboration is a strategic response to belief conflict

The analysis of collaboration networks in Article I provides strong support for the ACF's core assumption that belief similarity is a powerful predictor of interorganizational collaboration (Jenkins-Smith & Weible, 2025). Across the case countries, actors holding similar beliefs are significantly more likely to collaborate with one another regardless of the types of beliefs in question, reaffirming the belief homophily hypothesis. However, it also reveals that collaboration is not simply the product of shared beliefs.

The central contribution of Article I is in showing that collaboration is best explained through agreement on divisive beliefs, that is, beliefs over which

substantial disagreement among policy actors can be empirically observed. This finding reframes the ACF's belief homophily hypothesis: belief-based collaboration is not only about attraction to like-minded partners, but also a strategic and defensive response to perceived opposition. In this sense, the results reaffirm a core, yet often underappreciated assumption of the ACF, that coalition formation is driven not merely by agreement, but by conflict (Henry, Lubell, & McCoy, 2011).

This insight brings renewed attention to an assumption that has always been present in the ACF but often remained implicit in empirical applications: advocacy coalitions arise within policy subsystems marked by sustained conflict over policy beliefs regarding problem definitions and preferred policy responses (Jenkins-Smith & Weible, 2025). While early ACF scholarship emphasized that policy actors form coalitions in response to disputes over beliefs, empirical research has frequently operationalized belief homophily as agreement per se, without explicitly accounting for the presence or conflict. The concept of divisive beliefs makes this conflict dimension explicit and empirically tractable, thereby clarifying the mechanism linking individual beliefs to coordinated collective action.

The results further refine how the ACF belief hierarchy should be interpreted and applied. Deep core, policy core, and secondary beliefs are essential for understanding the content, scope, and stability of beliefs. However, Article I shows that these categories alone cannot determine which beliefs will structure collaboration in a specific empirical context. Divisive beliefs cut across the belief hierarchy, identifying the elements of belief systems that are politically salient at a particular moment. In some cases, these may align with normative or empirical policy core beliefs, and in others, they may concern policy instruments traditionally classified as secondary beliefs. This suggests that the belief hierarchy should not be treated as a fixed guide to coalition formation, but rather as a background structure within which the salience of specific beliefs varies across subsystems and over time.

A key implication of this perspective is that collaboration patterns are inherently dynamic. As policy debates evolve, beliefs that once structured conflict may lose their divisive character as consensus emerges, while previously marginal or technical issues become focal points of disagreement. Consequently, collaboration networks may shift even when actors' broader belief systems remain relatively stable. An important limitation of Article I is, however, that the applied cross-sectional approach could not capture these dynamic processes. I will discuss the limitations of cross-sectional network analysis later in subchapter 5.4, as they are common to all articles in this dissertation.

A further limitation of Article I concerns the comparative interpretation of the country cases. The case selection is theoretically justified on the basis of institutional variation, and the results demonstrate that belief similarity regarding divisive beliefs is associated with collaboration across different institutional settings. However, these analyses do not permit a direct comparison of effect sizes across countries. Because the exponential random graph models are estimated

separately for each network and are differently specified to reflect country-specific structures, their coefficients are not directly comparable across cases (Lusher et al., 2013). As a result, while the analysis supports the generalizability of the underlying mechanism, it cannot determine whether or how institutional contexts condition the strength of the relationship between shared beliefs and collaboration. The question itself, however, is central to this dissertation. While Article I establishes the general relevance of divisive beliefs across institutional settings, the effect of macro-level institutional factors is examined more directly in Article III. The next subchapter, therefore, returns to this issue by assessing how different institutional contexts shape coalition structures and brokerage between them.

These findings suggest that future research on coalition formation and collaboration should explicitly model belief conflict within policy subsystems, rather than assuming its presence implicitly. In addition, following Gronow et al. (2025), more longitudinal analyses are needed to examine how divisive beliefs change over time and how such changes reshape collaboration patterns.

5.2 Brokerage and learning are shaped by conflict structures

Taken together, Articles II and III demonstrate that conflict structures operate as a conditioning factor in policy subsystems, shaping both collaboration patterns and the extent to which collaboration enables policy learning. Conflict, whether reflecting belief conflict at the subsystem level or broader institutional contexts, affects how strongly beliefs determine coalition formation and whether social influence functions as a mechanism for belief change. By combining a micro-level analysis of belief change through social influence with a meso- and macro-level analysis of coalition structures and brokerage, this dissertation advances the understanding of policy learning within the ACF.

Article II focuses on policy learning as a micro-level process driven by social influence within collaboration networks. The results indicate that belief change can occur through a mechanism of complex contagion, in which learning requires reinforcement from multiple trusted sources (Centola & Macy, 2007). Importantly, such learning is observed only in collaborative REDD+ policy subsystems characterized by relatively low levels of conflict, namely Indonesia and Vietnam. In these contexts, the beliefs held by an actor's network contacts, especially reciprocal contacts, are systematically associated with belief change. In contrast, no such association is found in the adversarial Brazilian subsystem, where conflict is high, and trust between actors is limited.

These findings provide empirical support for another central assumption in the ACF: policy-oriented learning is more likely to occur in low-conflict environments (Weible & Sabatier, 2009). However, Article II goes beyond this general claim by specifying a concrete mechanism through which learning occurs. Even in

collaborative subsystems, belief change is most likely when a majority of an actor's trusted contacts provide the social reinforcement necessary for complex contagion, highlighting the importance of the quality of collaboration relationships for policy learning, instead of mere exposure to different beliefs.

Article III complements these findings by examining why some policy subsystems are more likely than others to exhibit network structures that enable cross-coalition learning. In line with recent ACF formulations (Jenkins-Smith & Weible, 2025), it shows that even though belief similarity explains collaboration in varying institutional contexts, as demonstrated already in Article I, coalition dynamics can vary between adversarial and collaborative subsystems. The findings indicate that similar coalition structures can emerge in both adversarial (Australia) and collaborative (Finland) contexts, but conflict lines between coalitions are markedly different. In Finland's consensual system, most coalitions represent a wider set of beliefs, and numerous "real" brokers connect coalitions both structurally and by holding moderate beliefs compared to the coalitions they mediate, facilitating cross-coalition interaction and potential for learning. In contrast, Australia's majoritarian and more conflictual context exhibits few such brokers and stronger belief conflict between coalitions, leading to more segregated networks. Thus, consensual institutional settings appear to enable brokerage and cross-coalition communication, while adversarial contexts reinforce polarization and the stability of belief-based coalition boundaries.

Several limitations regarding these results must be acknowledged. First, the analytical approach in Article II focuses on endogenous social influence and does not allow ruling out alternative drivers of belief change, such as exogenous shocks. Second, while the results demonstrate that belief change is associated with network exposure in collaborative contexts, they cannot fully disentangle social influence from other sources of learning. Third, with observations from only two time points, the analysis fails to detect the extent to which the altered beliefs tend to persist, which is an important criterion for policy learning in the ACF (Sabatier, 1988). Thus, rather than being definitive, the results offer suggestive evidence for policy learning.

A further conceptual and empirical limitation concerns the measurement of learning itself. In Article II, any alteration in beliefs was treated as learning, regardless of whether actors shifted from agreement to disagreement (or vice versa) or merely strengthened their existing views, for instance, from agreement to strong agreement. As emphasized by recent ACF scholarship (Weible et al., 2023), these forms of learning are analytically distinct and may have different implications for coalition dynamics and policy change. Future research should pay closer attention to these distinctions and examine the role of social learning across different types of belief change.

The main limitation of Article III is related to nonresponse. As discussed in the data section, nonresponse can bias the results, especially in cases where it is

systematically related to actor attributes (Berardo et al., 2020; Smith, Moody, & Morgan, 2017). This is the case in Australia, where many of the most influential actors did not respond to the survey, and where the response rates are particularly low among governmental and business organizations. In Articles I and IV, this does not pose a significant challenge, as the overall interpretation of the results does not change even if Australia is not considered. The results of Article III, however, need to be interpreted with caution, because the analysis only includes Australia and Finland. The fewer survey participants there are, the fewer collaboration links they report, resulting in a less dense overall network. More importantly, because public agencies are more likely to initiate collaborative governance processes to mediate conflict between diverging actors (Ansell & Gash, 2008), the low response rate among governmental organizations might affect the number of real brokers found in Australia.

The possible bias caused by nonresponse in Australia, combined with the fact that the interpretation regarding the effect of macro-level institutional contexts on coalition structures and brokerage is based solely on the comparison of the two countries, makes this result highly speculative. Still, more recent studies have made similar findings. For example, in their study of belief homophily among climate policy actors in nine countries, Satoh et al. (2025) find that the more majoritarian a country's institutions are, the more actors coordinate with like-minded partners.

Despite these limitations, the findings of Articles II and III refine both the ACF and GNT by specifying how macro-level institutional contexts translate into meso-level network structures and micro-level learning dynamics. The findings on policy learning indicate that even policy core beliefs, which the ACF generally regards as resistant to change, may evolve through social influence, particularly in collaborative nascent subsystems. Finally, the ACF assumption that coalition lines get more blurred in collaborative contexts might be at least partly explained by macro-level institutional contexts either encouraging or discouraging brokerage behavior between coalitions.

5.3 Science contestation poses a specific challenge for scientific information exchange

The findings of Article IV refine existing theoretical expectations about information exchange in governance networks by demonstrating that the consequences of belief conflict depend on the types of beliefs that are contested. While both the ACF and GNT emphasize that information use is shaped by cognitive biases and strategic behavior (Jenkins-Smith & Weible, 2025; Klijn et al., 2025; Sabatier, 1988), the results show that disagreement does not always lead to segregated information exchange. Rather, echo chambers emerge most consistently when conflict concerns the epistemological foundations of climate policy, that is, when actors engage in primary obstruction by contesting the reliability of climate science itself.

From an ACF perspective, this pattern is consistent with the belief hierarchy and the conditions expected to facilitate cross-coalition learning (Jenkins-Smith & Weible, 2025). Primary obstruction challenges deep core or foundational policy core beliefs related to the legitimacy of science and expertise. Under such conditions, actors lack a shared epistemological framework for evaluating evidence, which undermines the credibility of scientific information originating from opposing coalitions. The observed formation of echo chambers among both climate advocates and obstructionists in Czechia and Japan suggests that science contestation makes both groups avoid scientific information produced by the opposing side.

By contrast, disagreement centered on secondary obstruction, such as debates over costs, feasibility, or responsibility for mitigation, does not appear to systematically inhibit scientific information exchange. Although secondary obstructionists diverge from climate advocates on policy core beliefs, these disagreements remain analytically tractable and embedded within a shared acceptance of climate science. As a result, actors may use scientific information produced by others even if they disagree with them. This finding aligns with ACF expectations that learning and information exchange across coalitions are more likely when actors share methodological standards and recognize the legitimacy of common sources of evidence. While scientific information exchange between climate advocates and secondary obstructionists does not guarantee that they would interpret the information similarly, it provides a common starting point for a meaningful debate.

Future studies should test whether science contestation has similar effects on scientific information exchange in other policy areas characterized by expert knowledge and politicized science, such as vaccination policy or GMOs. Comparing cases in which actors disagree primarily over trade-offs in policy to those in which epistemic foundations themselves are contested would allow researchers to assess whether the specific effect of science contestation on the formation of echo chambers observed in this dissertation generalizes across policy domains.

Importantly, the results also indicate that echo chambers can emerge among climate advocates even in the absence of primary obstruction, as observed in Australia, Sweden, and Taiwan. This suggests that science contestation is not a necessary condition for echo chamber formation but rather a sufficient one for mutual echo chambers involving both sides of a policy conflict. Echo chambers of climate advocates may reflect strategic behavior, such as prioritizing coordination with like-minded others, even when the epistemological foundations of climate policy are not contested. The encapsulation of advocates in echo chambers in these countries likely limits their influence within the policy networks and consequently constrains the potential for policy learning driven change (Weible, Pattison, & Sabatier, 2010).

Methodologically, these conclusions are closely tied to the chosen operationalization of echo chambers at the cluster level. This approach captures whether groups of like-minded actors, rather than all policy actors in general, predominantly exchange information internally. The advantage of this strategy is that it allows for differentiated comparisons between advocate, primary obstructionist, and secondary obstructionist clusters. Alternative operationalizations would likely result in different interpretations. A network-level measure of echo chambers, as used in many prior studies (Jasny et al., 2015; Wagner & Ylä-Anttila, 2018; Malkamäki et al., 2021; Wagner et al., 2021), would likely indicate echo chamber structures in all cases where advocate homophily is present, particularly given the size of the advocate clusters. Such an approach would hide the distinct role of primary obstruction in echo chamber formation.

Another limitation of this research is that the data were collected between 2010 and 2016, which means they may not fully reflect more recent developments in climate policy. One notable example is the growing influence of the far-right in climate obstruction, particularly in Europe (Ekberg et al., 2023), including in countries covered by this study. In many cases, the most influential far-right actors were established or gained significant political power only after the data collection period. For instance, Germany's far-right party AfD was founded after the data collection, while right-wing populist parties in Sweden and Finland rose to political prominence in the late 2010s, either by joining governing coalitions or cooperating with them. As these actors have gained political power, their climate obstructionist positions may have become more widely accepted. The presence of an obstructionist echo chamber in Czechia, where the well-known climate denialist Václav Klaus (Ocelík, 2022) served as president before the data collection, and where we observe considerable primary obstruction, further supports this assumption.

These findings underscore that not all disagreements are equal: differences in policy views may coexist with dialogue, while disagreements over fundamental epistemic beliefs can generate echo chambers that isolate policy actors from opposing perspectives. This insight contributes to existing research by identifying the conditions under which information exchange fails despite interdependence, clarifying how belief-based distrust undermines the potential of governance networks to facilitate the formation of shared understanding among climate policy actors.

5.4 Limitations of cross-sectional survey research

In addition to the article-specific limitations already discussed, the articles share the limitations of cross-sectional survey-based network analysis. The most significant limitation of this dissertation concerns the causal claims drawn from the results. While the ACF conceptualizes collaboration, coalition formation, and

learning as causal processes driven by belief systems, a cross-sectional research design applied in this dissertation cannot disentangle whether collaboration and information exchange arise from belief similarity or whether beliefs converge because actors interact with one another. This challenge, widely recognized in the network literature, reflects the difficulty of distinguishing selection from social influence (Steglich, Snijders, & Pearson, 2010). In Articles I and III, the empirical results cannot determine whether shared beliefs lead actors to collaborate or whether collaboration induces convergence in beliefs, a dynamic that recent longitudinal work suggests is mutually reinforcing over time (Kammerer & Ingold, 2025). Similarly, Article IV cannot establish whether primary obstruction generates echo chambers or whether insulated information flows contribute to deeper science contestation. The limitation extends to Article II, although it employs a two-wave panel design. Such a design cannot fully separate influence from selection, because it does not capture when belief changes occurred or whether unobserved shifts took place between survey waves (Steglich, Snijders, & Pearson, 2010). Therefore, the causal claims made in this dissertation should be interpreted as theoretically motivated rather than empirically demonstrated, underscoring the need for future studies that utilize research designs that are more capable of isolating mechanisms of selection and influence.

Moreover, similarly to nonresponse, measurement error and social desirability may also affect self-reported survey data (Marsden, 2014; Tourangeau & Yan, 2007). Measurement error can stem from poorly worded questions, ambiguous response scales, or the cognitive burden placed on respondents (Bound, Brown, & Mathiowetz, 2001). In this study, for example, the respondents might have interpreted the question regarding collaboration in different ways, even though the surveys aimed at reducing this by providing some description of what was meant by collaboration. Still, different interpretations might have resulted in bias in the reporting of collaboration partners, indicated by the relatively low reciprocity of ties in these networks. Future research should take this into account by defining collaboration with more concrete examples or providing the respondents with options to report different types of collaboration relationships.

A related source of bias arises from social desirability, where respondents provide answers that align with perceived social norms or expectations rather than reflecting their true beliefs or behaviors. In this study, actors holding climate obstructionist views, particularly in countries where they constitute the minority, may be reluctant to reveal their actual beliefs. This reluctance may be especially pronounced if the respondents fear reputational harm, since the surveys generally guaranteed anonymity only for individual respondents, while still requesting permission to report organizational-level beliefs. Addressing this problem is challenging because data on organizational beliefs about climate policies, collected from sources like their websites, may also be biased, for example, due to greenwashing. One option would be to collect data from sources where the

organizations have a stronger incentive to express their true beliefs, such as their comments on draft legislation.

6 Conclusions and implications for climate governance

In this dissertation, I show that understanding climate governance networks requires simultaneous attention to beliefs, conflict, and context. By integrating Governance Network Theory (GNT) with the Advocacy Coalition Framework (ACF) and research on echo chambers, it demonstrates that interaction and learning among climate policy actors are not merely functions of interdependence but are fundamentally structured by shared and contested beliefs, conditioned by conflict intensity, and shaped by institutional environments.

The combined insights from the four articles lead to three overarching conclusions introduced in the previous chapter. First, collaboration based on shared beliefs often emerges as a strategic response to conflict, not merely as a consequence of agreement. Second, the potential for learning and cross-coalition collaboration depends crucially on the level of conflict in the policy subsystem, as well as the institutional context in which actors interact. Collaborative institutional environments, characterized by deliberation and brokerage across coalitions, are more conducive to learning than adversarial or majoritarian ones. Third, not all types of disagreement have the same implications for governance. Conflicts over scientific credibility pose greater barriers to information exchange than disagreements over policies. Together, these findings have several implications for climate governance.

6.1 Enhancing collaboration and learning

Findings from Article II underscore that interaction alone does not guarantee learning. In line with collaborative governance literature (Ansell & Gash, 2008), which highlights the importance of trust and commitment for successful collaboration, results from Article II show that collaboration leads to learning primarily in low-conflict environments. This suggests that reducing conflict over problem definitions and policy goals may be a prerequisite for meaningful learning. Collaborative governance arrangements should therefore incorporate mechanisms that help actors develop shared problem framings and recognize interdependence, rather than simply fostering more interaction (Ansell & Gash, 2008). According to

Koebele (2019), consensus-oriented decision rules, repeated face-to-face interactions, and deliberation over both facts and values facilitate learning by allowing participants to see issues from multiple perspectives.

Importantly, the results from Article I on divisive beliefs point to a practical tool for governance facilitation. By identifying which beliefs generate the strongest disagreement, policymakers and facilitators can target interventions that address these specific sources of conflict. For example, framing dialogues or joint research around divisive issues can help actors explore the roots of disagreement and potentially reframe them in more manageable terms.

6.2 Adapting governance strategies to institutional contexts

The cross-country comparison in Article III calls attention to how macro-level institutional contexts shape micro-level interaction patterns in climate governance networks. In consensual systems such as Finland, broad-based coalitions and cross-coalition brokers facilitate collaboration and policy learning. In contrast, majoritarian and adversarial systems, such as Australia, exhibit stronger belief-based segregation and fewer bridging actors, reinforcing polarization and limiting the potential for joint learning.

This finding implies that institutional design matters for collaboration dynamics, which also affects the potential for policy learning. Thus, efforts to strengthen collaboration should be tailored to the institutional context. In consensual systems, policy-makers can use existing traditions of negotiation and consensus-seeking to foster deliberative learning. In more adversarial systems, interventions may need to focus on creating institutionalized arenas for cross-coalition dialogue and supporting brokers who can bridge divides (Klijn et al., 2025).

6.3 Addressing science contestation and building trust in knowledge

The findings from Article IV highlight that science contestation, disagreement over the credibility or legitimacy of climate science, creates particularly segregated information environments. When actors disagree over climate science itself, they are less likely to exchange information across belief lines, leading to the formation of echo chambers that reinforce polarization. Although this research could not capture the recent rise of far-right movements and their potential effect on the prevalence of climate obstructionist views in many of the studied countries, the results suggest that increasing politicization of climate science may further inhibit information exchange and hinder the formation of shared problem perceptions among policy actors.

To mitigate these dynamics, network management in climate governance should focus on reducing conflict over the credibility of scientific knowledge. According to GNT, this requires transforming how information and expertise are produced, shared, and interpreted (Klijn et al., 2025). Instead of each actor mobilizing selective scientific evidence to defend pre-existing positions, governance networks should promote joint fact-finding processes in which governments, researchers, businesses, and civil society actors collaboratively formulate research questions and co-commission studies. Such processes foster mutual trust in both the production and interpretation of knowledge (Turnhout et al., 2013). Establishing transparent and standardized information-sharing rules, for instance, concerning data collection, validation, and communication, can reduce perceptions of bias and manipulation (Klijn et al., 2025). Finally, structured dialogues where diverse actors interpret findings together can foster consensus building (Innes & Booher, 1999), improving the possibility that science promotes learning rather than conflict. These measures strengthen both the legitimacy and effectiveness of climate governance networks.

6.4 Implications for climate policy change

The findings also have broader implications for understanding policy change. When belief conflict and macro-level institutions limit the very mechanisms that promote gradual and adaptive policy change, such as information exchange, collaboration, and policy-oriented learning, policy change tends to occur only after external shocks disrupt the existing equilibrium (Sabatier & Jenkins-Smith, 1993). Policy change through disruptive emergencies is often abrupt, unpredictable, and less deliberative, raising challenges for democratic legitimacy and policy coherence (Boin et al., 2009).

Conversely, governance systems that sustain continuous cross-coalition interaction and learning are better positioned to adapt incrementally to new information, technologies, and political realities. Fostering such conditions by addressing science contestation and managing conflict constructively can enable countries to develop more ambitious and legitimate climate policies.

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