

## THE FORMATION OF POLICY NETWORKS PREFERENCES, INSTITUTIONS AND ACTORS' CHOICE OF INFORMATION AND EXCHANGE RELATIONS

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### ABSTRACT

This article attempts to explain why actors form policy networks of information and exchange contacts, and how the institutional settings of public decision-making affect policy network formation. In their empirical analysis of the formation of four different policy networks in the German labour-policy domain, the authors examine actors' choice of mutual contacts resting on similarity of preferences on political events and test the importance of either formal procedural settings or common sector membership for information and exchange network formation. The choice of policy network contacts is shown to be primarily determined by the similarity of actors' preferences. However, this is qualified by institutional settings.

KEY WORDS • neo-institutionalism • network formation • policy networks • rational choice approach • sectoralism

### **Research Problem: Explaining the Formation of Policy Networks**

Why do actors form policy networks? Do they establish contacts on grounds of their preferences on political events? Does the kind of relationship determine dyadic policy network formation, be it an asymmetric information or a symmetric exchange contact between two actors? And how do institutional settings of public decision-making affect network formation – are actors' mutual contacts determined by the formal role of public decision-makers or do they reflect their sector membership? These are some of the more relevant questions we need to answer to improve our understanding of the relationship between policy networks and the institutional setting of public decision-making. Approaches to these questions can be assigned to two classical schools of thought in policy network research, with neo-institutionalists emphasizing the relevance of formal procedural settings and sectoralists generally asserting the importance of sector membership. Although a great deal of research has been conducted on how certain policy network patterns affect public policy-making, most scholars express little concern for

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the reasons behind the formation of policy networks. A few have put it down to evolutionary processes of self-organizing order and repeated interaction that shape the preferences of involved actors endogenously (Sabatier, 1987; Scharpf, 1993; Stokman and Zeggelink, 1997). By and large, however, neither neo-institutionalism nor sectoralism has explained the formation of policy networks nor generated testable hypotheses regarding the conditions under which, and the ways in which, institutional settings exert an independent causal influence on the formation of either asymmetric information or symmetric exchange contacts between actors.

This article presents an approach to the empirical study of policy network formation based largely on the 'organizational state' framework developed by Laumann and Knoke (1987). Their framework starts with the commonplace observation that public decision-making in western democracies is characterized by the collective action of organized, corporate actors such as associations of interest groups, political parties or ministries (Knoke and Laumann, 1982: 256). It applies a policy domain concept to the study of public decision-making which is analysed in specific subsystems of political systems (Benson, 1982). The framework has been empirically applied to the comparative analysis of different policy domains, but the conceptual assumptions may limit its applicability to western democracies with functional subsystems consisting of a large set of corporate actors (Mayntz, 1993: 41). We used the organizational state framework to delineate the German labour-policy domain with 126 relevant corporate actors and 32 political events during the period 1983–88 (Knoke et al., 1996: 9).

In this article we test the validity of rational choice theory by controlling for additional variables such as institutional setting. Our explanation of the formation of different policy networks starts with an examination of the basic assumption that actors' choice of network contacts rests on the distance between their preferences being short. In this respect, we test whether network choices are primarily determined by actors' spatial distance, derived from both their policy position and interest in a set of 32 political events representative of German labour policies during the 1980s. Following the sectoral and neo-institutional view, we then control our standard assumption on network choices for the role of institutional settings. We stress the procedural view of neo-institutionalists when we first introduce a policy leadership concept, testing whether policy network choices are primarily directed towards public decision-makers with formal voting power. This perspective is further emphasized by two distinctions, strong and weak bicameralism and the governmental/opposition initiator of public policy-making. We then examine the sectoral point of view by applying a subsystem concept of public decision-making. We thereby test whether policy network choices concentrate on members of the same sector. Furthermore, we distinguish between membership in corporatist/non-corporatist sectors

as well as between labour and social policies. What we are looking for is the best predictor of an actor's policy network choice, which itself may differ with respect not only to the type of relationship but also to the measurement bias caused by the respondents' perspective.

### **Hypotheses: The Type of Policy Network Relations, Actors' Distance and Institutions**

Today, the study of policy networks is emerging as a major branch of research in the social sciences (Rhodes, 1990: 293; Dowding, 1995: 136). With the disappearance of the stereotyped image of a clear state/society divide, social scientists tend to conceive policy networks as a new form of political regulation which is increasingly replacing hierarchical and market-oriented coordination (Atkinson and Coleman, 1989: 48; Powell, 1990: 295; Scharpf, 1993: 147). With respect to the network concept, studies on policy domain networks assume stable relationships between actors over time, while event networks stress actors' shared view on single political events.<sup>1</sup> For both concepts we may assume actors' shared preference in political events to be crucial in the formation of policy networks. In order to examine this assumption on the relationship between actors' shared preference in political events and their choices of network contacts, we develop our first hypothesis:

*HYPOTHESIS 1. The shorter the distance between actors' preferences on political events, the more likely they are to establish network contacts.*

In many decision-making analyses, preferences are reduced to two elements: actors' interest and their policy position on political events (Bueno de Mesquita and Stokman, 1994; König, 1997). Alongside actors' support or opposition to political proposals, there is a third position: indifference, which should not affect the distance between two actors. To measure their distance we consider both the similarity and dissimilarity of actors as derived from a comparison of their support or opposition to each political proposal. Similarity expresses how often two actors share a position, while dissimilarity counts how often two actors' positions differ. Considering the actor-specific importance of each political event we also use their interest in each political event as a weighting factor for similarity or dissimilarity. High interest increases dissimilarity when actors have different positions, but

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1. An event is defined as a 'critical, temporally located decision point in a collective decision-making sequence that must occur in order for a policy option to be finally selected' (Laumann and Knoke, 1987: 251). National policy domains are conceived as a set of actors with major concerns about a substantive area, whose preferences and actions on political events must be taken into account by the other domain participants (Knoke and Laumann, 1982: 256).

raises actors' similarity when they share a policy position. Both weighted similarity and dissimilarity are measures of actors' distance, and we expect the probability of network choice to increase with actors' average distance.

To generalize our findings on network formation we use different types of policy networks as dependent variables because the type of relationship may determine actors' choices. In public policy-making, information and exchange networks are conceived as fundamental elements of political structures in modern societies (Knoke et al., 1996: 19). Two reasons lend weight to our hypothesis that actors will spend information resources on actors having similar preferences in political events. First, one may stress a social matching mechanism whereby actors with closer preferences are more likely to meet and therefore more likely to send and receive valuable information, even more so in segregated policy domains. Second, information is an important power resource so actors will send their exclusive information to allies but hide it from opponents.

Exchange relations are important because no one actor is capable of deciding public policies in western democracies (Aldrich and Pfeffer, 1976; Cook, 1977). In choosing exchange relations, policy domain actors try to optimize their resource allocation in collective decision-making by overcoming their different positions on political events (Wright, 1988: 606). Where gridlock occurs, exchange may provide a solution through issue linkage promoting a better situation for both opponents. Compared to networks of valuable information, exchange relations accordingly presuppose dissimilarities between actors because exchange is only possible if actor A supports a political event to which actor B is opposed, whilst actor B is in favour of another political event to which actor A is opposed. Our first hypothesis on network choices can be made to take specific account of how the type of relationship is conditioned by the concept of distances between actors' preferences over political events.

*HYPOTHESIS H1a. The greater actors' similarity, the more likely they are to establish information network contacts.*

*HYPOTHESIS H1b. The greater actors' dissimilarity, the more likely they are to establish exchange network contacts.*

Even if different interest distribution is an additional precondition for bilateral exchange, we expect dissimilarities to be a better predictor of exchange relationships, while information network formation should be better explained by the similarity of actors' preferences.

### *Controlling for the Neo-institutional View on Network Formation*

These hypotheses on network formation are based on the standard assumption of distance between preferences, whereby actors' participation in public

decision-making has the unequivocal goal of influencing the outcome (Knoke et al., 1996: 174). In addition to this standard goal-oriented approach, many social scientists refer to various concepts of institutional settings when studying public policy-making. When attempting to delineate the actor set of 'fairly open (policy) networks' (Hecló, 1978: 88), neo-institutionalists emphasize the relevance of formal procedural settings for public decision-making (Stokman, 1995: 164). The argument is that public decision-makers take the final vote on public policies which are of interest to other actors with no formal voting power, and, thus, the latter will most likely try to get access to these public decision-makers (Stokman and Van den Bos, 1992: 220; König, 1992: 160). To control for the neo-institutional standpoint we derive our political leadership hypothesis:

**HYPOTHESIS HP1.** *Controlling for distance between actors' preferences, actors establish more contacts with public decision-makers than with other actors.*

HP1 indeed supplements H1. We also expect the policy leadership position of public decision-makers to lower the impact of actors' dissimilar preference on the formation of exchange contacts, while similar preferences should have less impact on the formation of information relationships where political leadership actors are the targets of network choices. The hypothesis can thus be refined:

**HYPOTHESIS HP1a.** *The role of public decision-makers decreases the effect of actors' similarity on information network formation.*

**HYPOTHESIS HP1b.** *The role of public decision-makers decreases the effect of actors' dissimilarity on exchange network formation.*

Another institutional aspect refers to the type of procedural settings when the legislative framework offers strong and weak bicameral decision-making. Germany is an ideal case for the study of the impact of bicameral settings on legislative decision-making because it provides for both strong and weak bicameral settings at the level of federal legislation. This distinction can be used as a further step in specifying the formal targets, because Bundesregierung (federal government) and Bundestag (lower house) actors dominate weak bicameral decision-making, while Bundesrat (upper house) actors only have the same voting rights under strong bicameral legislation (König and Bräuninger, 1996). Unlike the core actors of Bundesregierung and Bundestag, Bundesrat actors are conceived as a less powerful subset of political leadership actors in German bicameral legislation. Due to their different formal importance we control for the type of public decision-maker:

**HYPOTHESIS HP2.** *Controlling for distance between actors' preferences,*

*actors establish more contacts with core decision-makers of the Bundesregierung and Bundestag than with Bundesrat actors.*

We expect better predictions for policy network formation in the case of core policy leadership actors, while Bundesrat actors will have a lower impact on policy network formation. Again, concerning the relative effects of decision-makers and actors' preference on network formation, we refine the derived hypotheses on the type of relationship:

*HYPOTHESIS HP2a. The role of core decision-makers decreases the effect of actors' similarities on information network formation.*

*HYPOTHESIS HP2b. The role of core decision-makers decreases the effect of actors' dissimilarities on exchange network formation.*

Besides strong and weak bicameral procedures we also take into consideration the type of proposal initiator. Since the Bundesregierung and Bundestag majority mostly act in unison to initiate and pass German legislation, governmental proposals are more likely to be adopted than opposition proposals which lack majority support in the Bundestag. However, when splitting the set of political events, the calculation starting point is modified. Therefore it is not possible to estimate the effect of the type of proposals on network formation independently from the effect of distance between actors' preferences, but we can compare the impact of similarity and dissimilarity, depending on the type of proposal. Since similar party majorities in the Bundestag and Bundesrat are supposed to overcome bicameral checks-and-balances for government proposals, we formulate HP3a and HP3b on the type of proposal under similar party majorities in both houses:

*HYPOTHESIS HP3a. Government proposals decrease the effect of actors' similarities on information network formation with core decision-makers.*

*HYPOTHESIS HP3b. Government proposals decrease the effect of actors' dissimilarities on exchange network formation with core decision-makers.*

Since we conceive our policy domain networks to be aggregates of political event networks, both government and opposition proposals should explain network formation, and we estimate whether the effect of government proposal (dis-)similarity is stronger than the opposition proposal effect.

### *Controlling for the Sectoral View on Network Formation*

The sectoral view on institutional settings is focused less on the formal procedures of public decision-making than on the actors' embeddedness in systems of social action (Coleman, 1990: 33; Laumann and Knoke, 1987: 11). In sectoral terms, modern societies are characterized by functional differentiation – not simply in the form of occupational specialization, but

differentiation at the societal macro-level through the development of functional subsystems (Mayntz, 1991: 7). These subsystems possess boundaries establishing sector or community self-regulation by policy networks (Wilks and Wright, 1987: 299). This policy network perspective comes close to the concept of transaction costs but sector segregation is an additional characteristic of policy network analysis (Kenis and Schneider, 1991: 34). Concepts of functional differentiation, policy community, social subsystem etc. suppose that transaction costs are lower between members of the same sector, while these costs should increase in the case of intersectoral relationships. From the sectoral perspective our first hypothesis is concerned with sector segregation:

*HYPOTHESIS HS1. Controlling for distance between actors' preferences, actors establish more contacts with members of their own sector than with other actors.*

As was the case of the neo-institutional view on network formation, HS1 also supplements H1, and we expect sector membership to lower the impact of dissimilar preferences on exchange network formation, while the effect of similar preferences on information network formation should be decreased. Since sector membership is supposed to save transaction costs, we conclude that actors spread more information to actors of their own sector than of other sectors. We also expect that lower transaction costs support the formation of exchange relations within the same sector.

*HYPOTHESIS HS1a. Sector membership decreases the effect of actors' similarities on information network formation.*

*HYPOTHESIS HS1b. Sector membership decreases the effect of actors' dissimilarities on exchange network formation.*

Sector membership takes up the argument on network partiality in terms of subsystem formation (Jordan, 1990: 325). Another aspect concerns the relevance of specific sectors in different policy domains. In systems of functional differentiation, we often find sectors which are more segregated than others. Such segregation is rather dependent on the material basics of different policy domains characterized by societal cleavages, i.e. producers versus consumers, state versus church etc. In the labour-policy domain, the basic conflict is between capital and labour. To save transaction costs in labour politics, public decision-makers have established systems of corporatist-interest mediation integrating employer and employee peak organizations monopolizing sector representation (Rhodes, 1990: 303; Schmitter, 1996: 6). With respect to higher savings on transaction costs, we may confine our sector hypothesis to the German labour-policy domain:

*HYPOTHESIS HS2. Controlling for distance between actors' preferences,*

*actors establish more contacts within corporatist sectors than within non-corporatist sectors.*

Furthermore, we expect a lower impact of distance between preferences on network formation among actors of the employer, employee and public decision-maker sector (excluding Bundesrat actors). Since membership in corporatist sectors is supposed to save transaction costs, corporatist actors circulate more information to themselves than to other sectors. We also expect that lower transaction costs support the formation of exchange relations within the corporatist sectors. The derived hypotheses on the type of policy network are:

*HYPOTHESIS HS2a. Corporatist actors decrease the effect of actors' similarities on information network formation.*

*HYPOTHESIS HS2b. Corporatist actors decrease the effect of actors' dissimilarities on exchange network formation.*

Despite functional differentiation large policy domains can hardly be reduced to a single dimension. Their policy space is often defined in two or more dimensions, as is the case for the German labour policy domain which is determined by labour and social policy dimensions (Pappi et al., 1995: 217). A further dimension may structure actors' activities, and we distinguish between social and labour proposals with regard to our labour-policy domain application. In the labour-policy domain, we expect labour proposals rather than social proposals to structure the activities of actors.<sup>2</sup> Corporatist systems of interest mediation have been established to coordinate employers' and employees' preferences on labour proposals, while social proposals embarrass the preferences of many interest groups of the labour-policy domain, such as welfare and health organizations, churches and minority groups etc. Compared to labour proposals, the variety of actors involved will reduce the savings on transaction costs so that we can specify our hypotheses:

*HYPOTHESIS HS3a. Labour policies decrease the effect of corporatist actors' similarities on information network formation.*

*HYPOTHESIS HS3b. Labour policies decrease the effect of corporatist actors' dissimilarities on exchange network formation.*

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2. Like governmental and opposition proposals there is no hypothesis for the difference between labour and social proposals independent from distance between actors' preferences.

Like our final policy leadership hypotheses, we calculate actors' preference for both types of proposal in order to compare the effects of labour and social policies. Before testing our hypotheses, we will introduce our data and measurement techniques.

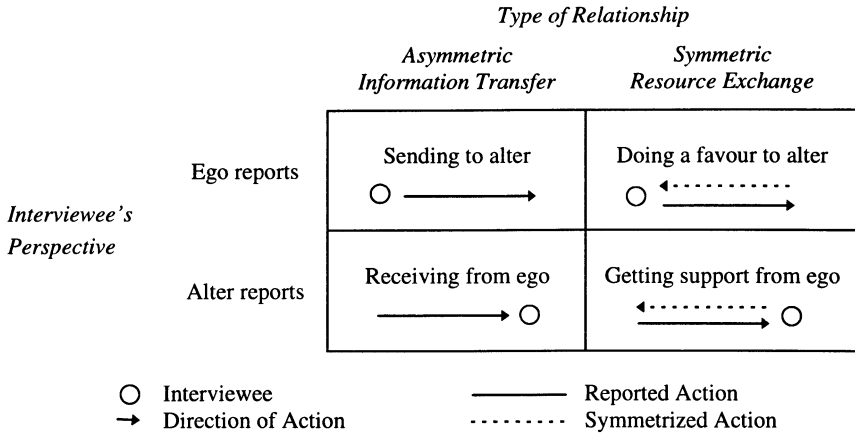
### **Data and Measurement: Policies and Networks in the German Labour-policy Domain**

For the identification of relevant labour-policy domain actors we applied two criteria: formal voting power and repeated participation in labour hearings in the Bundestag. We included all 25 German public decision-makers who have the right to take the final vote on labour-policy proposals. This set of legislators not only consists of the parliamentary and committee groups of Christian Democrats, Social Democrats, Liberals and Greens, but it also encompasses the ministries of Labour, Finance, Justice, Internal Affairs, Youth, Education and Economic Policy which dominate legislative agenda-setting. Moreover, since German legislation provides bicameral settings for public policy-making, the 10 Länder of the Bundestag complete the political leadership set of formal public decision-makers.<sup>3</sup> To identify those relevant domain actors with no formal voting power we applied the criterion of being invited to two or more Bundestag hearings on labour policies between 1983 and 1988. We identified 16 other political organizations such as parties or party-affiliated organizations and 86 interest groups which can be categorized according to the following sectors: 18 unions, 24 employers, 6 public-interest groups, 7 medical professionals and 5 other professional groups, 13 mandatory insurance organizations, 8 churches and 5 discrimination associations, which were all interviewed up to the beginning of 1988 (Pappi et al., 1995).

Having identified 126 relevant labour organizations we asked their labour-affairs delegates to check whether we had listed all influential actors in the German labour-policy domain. As a result of their responses we had to include an additional organization, namely the German Farmers Association. Since the interview response rate is about 99 percent, one employer organization is missing; we consider the 126 actors of our sample to be the set of relevant labour-policy domain actors (for a detailed list of all organizations, see Knoke et al., 1996: 241–6). These actors were asked to mention their mutual information and exchange relationships. We surveyed the 'sending' and 'receiving' of information as well as 'doing a favour' and 'getting support'. We are thus dealing with four binary networks of size 126

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3. We excluded Berlin from the set of public decision-makers because it had no formal voting right before unification.



**Figure 1.** Types of Policy Networks from Ego’s and Alter’s Perspective

× 126, each indicating whether a pair of actors has a relationship or not. Ideally, we would expect identical responses from the ‘ego’ and the ‘alter’, but the ‘social dynamic effect’ may bias findings on network formation. The change of actor perspective on similar relationships enables us to control for this measurement effect which stresses responses coming from less prominent organizations. Less prominent organizations often mention their provision of resources to prominent organizations, regardless of whether the latter, in fact, make use of the offer. Comparing our findings from the ego and alter perspective allows us to check for such measurement bias.

As Figure 1 shows, we analyse four policy networks which differ with regard to the interviewee’s perspective and the type of relationship. We always study the acting entities’ perspective in order to explain network choices. We take either the ego’s mentions of network activities or the transposed alter’s data on his/her received activities in order to check our hypotheses on the choice of information and exchange relationships from both sides. Moreover, we ask whether the type of relationship determines network choices. Even though respondents may empirically mention asymmetric relationships (and getting support indicates one side of an exchange relationship, whereas doing a favour covers the second side) we symmetrize both exchange relationships for theoretical reasons.<sup>4</sup> In sum, our analysis

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4. We weakly symmetrize both exchange networks which means that either ego’s mentions or alter’s receipts establish an exchange relationship. In contrast, strongly symmetrized would require that both interviewees must mention a mutual exchange relationship.

deals with asymmetric information and symmetric exchange contacts between pairs of actors from both ego's and alter's perspective.

*Descriptive Statistics on Network Relationships and Preferences on Political Events*

To obtain an insight into our data we calculate densities and means of in- and outdegrees of our four networks.<sup>5</sup> Sending and transposed receiving information networks have higher and quite similar densities (.19 and .17) than favour and transposed support networks (.06 and .09). Accordingly, information is supposed to be a relatively low-cost asymmetric relationship primarily induced by actors' similar preferences, while support is considered a costly symmetric relationship likely to indicate a resource dependency from other actors (Knocke et al., 1996: 105). With respect to our hypotheses on institutional settings we differentiate between core decision-makers, Bundesrat actors and other actors. The core decision-makers of the Bundesregierung and Bundestag send and receive most information in both networks (means of in-/outdegrees about .30), while they are less engaged in exchange contacts; in particular, few are doing a favour (mean of in-/outdegrees .09). By contrast, Bundesrat actors send more information than they receive and often do a favour. Other actors have fewer information and exchange contacts (about .16 and .07). Finally, we look at internal network densities in corporatist and non-corporatist sectors and also contact densities between different sectors. The highest internal network densities have non-corporatist actors, either in their information or exchange contacts (between .51 and .35). Within the corporatist sectors of public decision-makers, employers and employees have modest contact densities, but their internal densities are still higher than those between sectors. In sum, the descriptive overview indicates contact variation in our four networks and differences with respect to institutional settings.

Besides their pairwise relationships, the 126 actors had to mention their preferences on 32 political events which occurred in the labour-policy domain during the mid-1980s. Respondents indicated whether they were in favour (1), opposed (-1) or indifferent (0) to each proposal. In addition they were prompted to mention their interest on each proposal, ranging between almost no interest (0) and very high interest (.5). Table 1 lists the frequency of actors' policy positions, their mean interest and standard

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5. Densities are calculated as the ratio between the number of mentions and all possible mentions. Outdegrees refer to ego's actions, either ego's reports on sending information and doing a favour or alter's affirmation of receiving information and getting support from ego. Indegrees refer to the actions of other organizations.

deviation for each proposal. Only a few proposals such as the Employment Opportunities Act or the Entitlement Reductions attracted most of the 126 policy domain actors. In almost all cases, most actors had indifferent positions on the proposals. For closer inspection, the proposals can be classified into two different sets of political events, one set primarily dealing with labour and the other with social policy. Labour policies

**Table 1.** Political Events in German Labour-policy Domain

Political Event	Actor Characteristics					Type of Proposal	
	Interest <sup>a</sup>		Position			Initiator <sup>b</sup>	Domain <sup>c</sup>
<i>m</i>	SD	Pro	Con	Indiff.			
1. Labour court jurisdiction	.039	.128	2	7	117	GO	LA
2. Illegal employment	.044	.129	8	4	114	OP	LA
3. Entitlement reductions	.298	.216	23	39	63	GO	SO
4. Remigration of foreign workers	.136	.199	24	7	95	GO	LA
5. Early retirement	.235	.225	40	14	71	GO	LA
6. Stricter Sunday work	.153	.210	19	12	94	OP	LA
7. Bankruptcy law reform	.081	.166	11	9	106	OP	LA
8. Deregulate work protection	.148	.202	22	14	90	GO	LA
9. Employment opportunities act	.312	.202	47	29	47	GO	LA
10. Limits on public servants' earnings	.083	.167	16	5	104	GO	LA
11. Extend unemployment payments	.148	.205	38	2	85	GO	SO
12. Anti-gender discrimination	.117	.180	22	9	95	OP	LA
13. Farmers' social benefits	.039	.128	10	0	116	GO	SO
14. Reduction of overtime work	.065	.157	7	8	111	OP	LA
15. Improve vocational education	.130	.198	27	4	95	GO	LA
16. Employment of handicapped	.177	.215	26	10	90	GO	LA
17. Federal employment agency neutrality	.210	.232	30	21	74	GO	LA
18. Extend co-determination rights	.132	.202	22	11	93	OP	LA
19. Vocational training act	.046	.126	13	0	113	GO	LA
20. Farmers' social insurance	.037	.121	8	0	118	GO	SO
21. Mothers' annuity insurance	.182	.223	30	10	86	OP	SO
22. Labour participation in management	.113	.197	19	8	99	OP	LA
23. Worker savings promotion	.079	.167	17	2	107	GO	SO
24. Illegalize employee lockout	.093	.180	12	10	104	OP	LA
25. Part-time worker protection	.088	.176	15	4	107	OP	LA
26. Restrict leasing of workers	.062	.156	10	5	110	OP	LA
27. Steel industry co-determination	.120	.197	24	7	95	GO	LA
28. Amend work promotion act	.175	.222	20	14	91	GO	LA
29. Represent youth on work councils	.119	.193	25	6	95	GO	LA
30. Social insurance registration	.089	.174	19	2	104	GO	SO
31. Age limit for doctors' licences	.109	.191	14	14	98	OP	SO
32. Amend work council act	.178	.223	17	20	88	GO	LA

<sup>a</sup> Range 0–.5; 0 = (almost) no interest; .5 = very high interest; *m* = mean; SD = standard deviation.

<sup>b</sup> Initiator: GO = federal government, coalition parties in Bundestag or Länder of federal government coalition type; OP=opposition parties in Bundestag or Länder of non-federal government coalition type.

<sup>c</sup> Policy domain: LA = labour policy domain; SO = social policy domain.

include 24 proposals on collective bargaining regulations, work councils, participation of labour in management, internal organization, employment and working conditions, while eight social policy proposals concern disadvantaged populations, discrimination in employment and social protection. Another distinction refers to the proposal initiator, i.e. the governmental majority or the opposition minority. Despite the clear majority/minority divide, the opposition initiated about one-third of all 32 proposals often attracting but a few policy-domain actors.

Our data indicate that policy networks differ slightly with regard to the relationship type and the actors' perspective. There are also differences between sets of actors, depending on whether they are public decision-makers or members of other specific sectors. Moreover, the descriptive overview shows that policy domain actors observe political events selectively. Again, it is important to note that our network data refer to the aggregate of all 32 political events which occurred in the period 1982–8. Our interviewees mentioned their network relationships at the end of 1988, and thus we conceive their responses on information and exchange contacts as results of their preference on political events. In order to test the impact of their preferences on the formation of different network relationships, we now present specific measures of distance between actors' preferences.

#### *Measuring Actors' Distance: Similarity and Dissimilarity of Preferences*

Information and exchange networks are defined as different types of relationships each containing dichotomous data on the existence of pairwise actors' relationships. While information transfer may confer unequal positional advantage on some policy-domain actors, exchange relations are considered to offer common profits by optimizing actors' resource deployment. Since both network relationships differ with respect to the symmetry of related actors, we must test our hypotheses with specific (dis-)similarity measures (see Appendix). Exchange assumes mutual preferences of two actors on political events, but information can be sent only by one side. Therefore we presuppose the acting entity's preference when we examine the effects of an actor's (dis-)similarity to other actors on the choice of information contacts. By contrast, we consider the mutual preferences of the acting entity and its network partner with respect to the formation of exchange contacts. For both types we formulate measures of similarity and dissimilarity.

Table 2 summarizes all the dependent and independent variables which we use for the following analysis of network choices. We will test for dichotomous dependent variables on information and exchange relationships with actors' (dis-)similarity on 32 political events, controlling for dummy variables on actors' formal and sector characteristics. To test our

**Table 2.** Variables for Multivariate Analysis

Code	Variable Label	Value	Value Label
<i>Dependent Variables</i>			
$se_{ih}$	Actors' report on sending information	1/0	$i$ sends information to $h$ /else
$rt_{ih}$	Actors' report on receiving information (transposed)	1/0	$h$ receives information from $i$ /else
$fa_{ih}$	Actors' report on giving favour	1/0	$i$ gives favour to $h$ /else
$st_{ih}$	Actors' report on being supported (transposed)	1/0	$h$ is supported by $i$ /else
<i>Independent Variables</i>			
1	Constant	1	
$S_{ih}$	Similarity of actors $i$ and $h$	0–1	low–high
$D_{ih}$	Dissimilarity of actors $i$ and $h$	0–1	low–high
$A_i$	Dummy being public decision-maker	1/0	$i$ is public decision-maker/else
$A_h$	Dummy being public decision-maker	1/0	$i$ or $h$ is public decision-maker/else
$A_i^u$	Dummy being core public decision-maker	1/0	$i$ is public decision-maker/else
$A_{ih}^u$	Dummy being core public decision-maker	1/0	$i$ or $h$ is public decision-maker/else
$A_i^b$	Dummy being Bundesrat public decision-maker	1/0	$i$ is public decision-maker/else
$A_{ih}^b$	Dummy being Bundesrat public decision-maker	1/0	$i$ or $h$ is public decision-maker/else
$T_{ih}$	Dummy common sector membership	1/0	$i$ and $h$ of same sector/else
$T_{ih}^c$	Dummy common sector membership (corporatist sector)	1/0	$i$ and $h$ of same sector/else
$T_{ih}^n$	Dummy common sector membership (non-corporatist sector)	1/0	$i$ and $h$ of same sector/else

hypotheses developed in the previous section we apply regression analysis using a logit model. This is an econometric technique applied in the analysis of dichotomous or polytomous choice data (McFadden, 1973; Aldrich and Nelson, 1984<sup>6</sup>).

6. The logit model estimates probabilities of the discrete dependent variables' events using the cumulative logistic probability function  $F$ . Given our dichotomous dependent variable  $z$  with  $z=0$  or  $z=1$ , the probability that an individual  $i$  will make a certain choice  $z_i = 1$  is given by

### Findings: Significant Patterns of Policy Network Formation

In order to test our hypotheses on policy network formation we designed logit regression models to encompass different institutional settings.<sup>7</sup> To control our standard argument on distance between actors' preferences, we distinguish between base models, policy leadership and sector models (see Appendix). Whereas base models solely contain distance between preferences, policy leadership and sector models control for detailed information on institutional settings and proposal types. Having provided that no model is misspecified,<sup>8</sup> we first summarize our findings on all hypotheses in Table 3, discussing whether we can reject the null hypotheses or not. Table 4 then takes a closer look at the various effects on network formation, thus specifying how each coefficient contributes to explanations of the choice of information and exchange contacts. In Table 5 we finally delineate the predicted probabilities of network formation, distinguishing between combinations of coefficient values.

Our base models focus on distance between actors' preferences, distinguishing between the effects of similarity and dissimilarity on network formation. According to the results listed in Table 3, all transposed

$$P(z_i = 1) = F(\Sigma \beta_k x_{ik}) = \frac{1}{1 + \exp(-\Sigma \beta_k x_{ik})}$$

where the independent variables are denoted by  $x_{ik}$ . Simple manipulation yields

$$\ln\left(\frac{P(z_i = 1)}{1 - P(z_i = 1)}\right) = \Sigma \beta_k x_{ik}$$

meaning the logarithm of the odds is assumed to be linearly dependent on the independent variables  $x_k$ .

7. Using ordinary logistic regression we assume the pairwise relations of all actors to be independent. We accordingly suppose that ego's network choice is dependent on neither alter's reciprocal choice nor ego's total number of in- and outdegrees. Krackhardt (1988), by contrast, uses a quadratic assignment procedure in order to test the significance of multiple regression coefficients when network choices are assumed to be interdependent. He supposes that ego's network choices are determined by the number of in- and outdegrees. A model based on dyadic dependence is given by Holland and Leinhard (1981), while a generalized logistic regression model is developed by Lazega and van Duijn (1997) assuming that both dyads and relationships from and to the same actors are related.

8. Since they are hierarchically nested, base models can be compared to constant models using the log-likelihood ratio statistic ( $LR = -2\ln(L_0/L_1)$ , where  $L_0$  and  $L_1$  are the respective log-likelihoods of the restricted and the unrestricted models). Accordingly, the base model is nested within the policy leadership model 1 and section model 1. All test statistics are significant at the .99 level. As models 1, 2 and 3 are not hierarchically nested, we compare model 1 and 2 as well as model 2 and 3 for both the policy leadership and the sector type using the Akaike (1987) information criterion ( $AIC = 2L_1 + 2(k + 1)$ , where  $k + 1$  denotes the number of coefficients estimated). Except for the policy leadership model for sending information, the AIC values suggest that the more elaborate models fit better.

**Table 3.** Empirical Evidence of Hypotheses on Policy Network Formation

Model	Hypothesis	Coefficients <sup>a</sup>			
		Send	Receive (trans.)	Favour	Support (trans.)
Base Model [1, <i>S</i> , <i>D</i> ]	H1: $S + D > 0$	9.2**	7.3**	6.9**	4.3**
	H1a: $S > 0$	7.3**	6.1**		
	H1b: $D > 0$			-2.2	-4.9
Policy Leadership Model 1 [1, <i>S</i> , <i>D</i> , <i>A</i> , <i>AS</i> , <i>AD</i> ]	HP1: $A > 0$	0.9**	0.5**	0.0	0.3**
	HP1a: $AS < 0$	-2.8**	-1.8*		
	HP1b: $AD < 0$			-0.9	2.6
Policy Leadership Model 2 [1, <i>S</i> , <i>D</i> , <i>A</i> <sup><i>u</i></sup> , <i>A</i> <sup><i>u</i></sup> <i>S</i> , <i>A</i> <sup><i>u</i></sup> <i>D</i> , <i>A</i> <sup><i>b</i></sup> , <i>A</i> <sup><i>b</i></sup> <i>S</i> , <i>A</i> <sup><i>b</i></sup> <i>D</i> ]	HP2: $A^u - A^b > 0$	1.7**	1.0**	-0.3	0.2**
	HP2a: $A^u S < 0$	-2.5**	-2.6**		
	HP2b: $A^u D < 0$			3.7	6.7
Policy Leadership Model 3 [1, <i>S</i> <sup>GO</sup> , <i>D</i> <sup>GO</sup> , <i>S</i> <sup>OP</sup> , <i>D</i> <sup>OP</sup> , <i>A</i> <sup><i>u</i></sup> , <i>A</i> <sup><i>u</i></sup> <i>S</i> <sup>GO</sup> , <i>A</i> <sup><i>u</i></sup> <i>D</i> <sup>GO</sup> , <i>A</i> <sup><i>u</i></sup> <i>S</i> <sup>OP</sup> , <i>A</i> <sup><i>u</i></sup> <i>D</i> <sup>OP</sup> , <i>A</i> <sup><i>b</i></sup> , <i>A</i> <sup><i>b</i></sup> <i>S</i> <sup>GO</sup> , <i>A</i> <sup><i>b</i></sup> <i>D</i> <sup>GO</sup> , <i>A</i> <sup><i>b</i></sup> <i>S</i> <sup>OP</sup> , <i>A</i> <sup><i>b</i></sup> <i>D</i> <sup>OP</sup> ]	HP3a: $A^u S^{GO} - A^u S^{OP} < 0$	0.3	-6.2**		
	HP3b: $A^u D^{GO} - A^u D^{OP} < 0$			-5.1	-24.0**
Sector Model 1 [1, <i>S</i> , <i>D</i> , <i>T</i> , <i>TS</i> , <i>TD</i> ]	HS1: $T > 0$	1.0**	0.6**	2.0**	1.5**
	HS1a: $TS < 0$	-2.5**	-0.2		
	HS1b: $TD < 0$			-4.0*	-12.9**
Sector Model 2 [1, <i>S</i> , <i>D</i> , <i>T</i> <sup><i>c</i></sup> , <i>T</i> <sup><i>c</i></sup> <i>S</i> , <i>T</i> <sup><i>r</i></sup> , <i>T</i> <sup><i>r</i></sup> <i>D</i> , <i>T</i> <sup><i>r</i></sup> <i>S</i> , <i>T</i> <sup><i>r</i></sup> <i>D</i> ]	HS2: $T^c - T^r > 0$	-1.8	-1.7	-1.2	-1.1
	HS2a: $T^c S < 0$	0.1	2.4		
	HS2b: $T^r D < 0$			-9.1**	-15.5**
Sector Model 3 [1, <i>S</i> <sup>LA</sup> , <i>D</i> <sup>LA</sup> , <i>S</i> <sup>SO</sup> , <i>D</i> <sup>SO</sup> , <i>T</i> <sup><i>c</i></sup> , <i>T</i> <sup><i>c</i></sup> <i>S</i> <sup>LA</sup> , <i>T</i> <sup><i>c</i></sup> <i>D</i> <sup>LA</sup> , <i>T</i> <sup><i>c</i></sup> <i>S</i> <sup>SO</sup> , <i>T</i> <sup><i>r</i></sup> , <i>T</i> <sup><i>r</i></sup> <i>S</i> <sup>LA</sup> , <i>T</i> <sup><i>r</i></sup> <i>D</i> <sup>LA</sup> , <i>T</i> <sup><i>r</i></sup> <i>S</i> <sup>SO</sup> , <i>T</i> <sup><i>r</i></sup> <i>D</i> <sup>SO</sup> ]	HS3a: $T^c S^{LA} - T^c S^{SO} < 0$	-2.6*	-0.1		
	HS3b: $T^r D^{LA} - T^r D^{SO} < 0$			-6.9	8.9

<sup>a</sup> Sum of coefficients to be tested; null hypothesis rejected at the .95 (\*) or .99 (\*\*) level of significance using a one-tailed *t*- or chi-square statistics (cf. Griffith et al., 1993: 139, 748–50). For sending information, for example, the null hypothesis to H1, H1<sub>0</sub>:  $S + D \leq 0$ , is rejected at the .99 level of significance on the basis of a chi-square test; for doing a favour, the null hypothesis to HP1, HP1<sub>0</sub>:  $A \leq 0$ , cannot be rejected at the .95 level of significance on the basis of a *t*-test.

networks show that an actor's perspective of being respondent or nominee is less important in explaining the choice of information and exchange relations. We can reject the null hypothesis to H1, i.e. actors' network choice depends on their total preference to political events. Similarity and dissimilarity contribute significantly to the choice of information and exchange networks. However, even though the choice of information contacts is significantly based on actors' similarity, supporting H1a, we must reject our second specification, H1b, predicting the predominance of dissimilarity on exchange network formation because of its insignificance.

By and large, most results tend to support our hypotheses on formal policy leadership assuming public decision-makers to be prominent targets of network choice. Concerning HP1a and HP1b, the effect of distance between actors' preference on the formation of most network relationships is reduced, whilst the dissimilarity effects on exchange network formation prove insignificant. The distinction between core decision-makers and Bundesrat actors partly supports our HP2 hypothesis, but only because of the fact that core decision-makers have more information contacts than Bundesrat actors. Yet, at the same time, we cannot reject the null hypothesis in the case of doing-a-favour exchange relations. We find strong evidence for HP2a, but the impact of distance between preferences on exchange network formation is (insignificantly) increased by the role of core decision-makers (HP2b). With regard to the third policy leadership model, government proposals decrease the effect of similar preference on receiving information to core decision-makers, and they particularly decrease the effect of dissimilar preference on exchange network formation. In contrast to this, we find the reverse (insignificant) effect for sending information.

Moving on to the sectoral view, common sector membership significantly increases the probability of network formation. Since two actors of the same sector are more likely either to build information or exchange contacts, we reject the null hypothesis on sector segregation. Moreover, common sector membership decreases the impact of (dis-)similar preference on network formation. With support for HS1a on information sending and HS1b on doing a favour and getting support, the effect of (dis-)similar preference is lowered by common sector membership in the first sector model. Challenging hypothesis HS2 on the difference between corporatist and non-corporatist sectors, the latter have a higher but insignificant impact on the formation of networks. In addition, we must reject HS2a in the case of information transfer, because corporatist sector membership does not significantly decrease the effect of actors' total preference on their network choice. However, corporatist sector membership lowers the impact of distance between preferences on exchange network formation, thus supporting HS2b. The distinction between labour and social policies

**Table 4.** Effects of Variables in the Base, Policy Leadership and Sector Model

Model	Regression Coefficients <sup>a</sup>			
	Send	Receive (trans.)	Favour	Support (trans.)
<i>Base Model</i>				
Constant [1]	-1.77**	-1.85**	-3.19**	-2.62**
Similarity [S]	7.26**	6.06**	9.09**	9.23**
Dissimilarity [D]	1.92**	1.21*	-2.21*	-4.93**
N	14875	15375	15750	15750
Log-likelihood/p > chi <sup>2</sup>	-7069/0.00	-6882/0.00	-3257/0.00	-4507/0.00
<i>Policy Leadership Model 3</i>				
Constant [1]	-1.94**	-1.95**	-3.20**	-2.74**
Core public decision-maker [A <sup>u</sup> ]	1.17**	0.75**	-4.43**	-2.41**
Bundesrat public decision maker [A <sup>b</sup> ]	0.57**	0.32**	4.13**	2.63**
Similarity (GO) [S <sup>GO</sup> ]	4.74**	5.16**	7.26**	9.01**
Similarity (OP) [S <sup>OP</sup> ]	2.88**	0.70	3.62**	5.23**
Dissimilarity (GO) [D <sup>GO</sup> ]	0.94	0.57	-3.31**	-5.81**
Dissimilarity (OP) [D <sup>OP</sup> ]	0.85	0.03	2.49*	0.08
A <sup>u</sup> S <sup>GO</sup>	-1.24	-3.69**	5.55	4.28
A <sup>u</sup> S <sup>OP</sup>	-1.55	2.48**	1.71	4.88
A <sup>u</sup> D <sup>GO</sup>	-1.87	1.35	0.33	-0.40
A <sup>u</sup> D <sup>OP</sup>	-2.07	-1.37	5.46	23.63**
A <sup>b</sup> S <sup>GO</sup>	-2.04	-1.64	-5.63*	-9.14**
A <sup>b</sup> S <sup>OP</sup>	-3.64**	0.95	-5.38	-9.50*
A <sup>b</sup> D <sup>GO</sup>	-0.93	-4.13*	0.47	2.77
A <sup>b</sup> D <sup>OP</sup>	3.69*	1.61	-9.15*	-23.70**
N	14875	15375	15750	15750
Log-likelihood/p > chi <sup>2</sup>	-6923/0.00	-6815/0.00	-3093/0.00	-4421/0.00
<i>Sector Model 3</i>				
Constant [1]	-1.97**	-1.99**	-3.70**	-2.97**
Corporatist sector [T <sup>c</sup> ]	0.39**	-0.04	1.51**	1.23**
Non-corporatist sector [T <sup>n</sup> ]	2.05**	1.50**	2.64**	2.05**
Similarity (LA) [S <sup>LA</sup> ]	3.38**	2.03**	3.43**	3.37**
Similarity (SO) [S <sup>SO</sup> ]	4.17**	3.88**	6.43**	5.39**
Dissimilarity (LA) [D <sup>LA</sup> ]	-0.67	-1.50**	-3.18**	-4.92**
Dissimilarity (SO) [D <sup>SO</sup> ]	5.52**	4.95**	3.92**	4.32**
T <sup>c</sup> S <sup>LA</sup>	-0.40	1.88*	0.48	5.24**
T <sup>c</sup> S <sup>SO</sup>	2.19*	1.94*	-3.16**	-6.13**
T <sup>c</sup> D <sup>LA</sup>	-0.87	1.60	-6.90*	-6.63**
T <sup>c</sup> D <sup>SO</sup>	-2.63	2.60	0.00	-15.54**
T <sup>n</sup> S <sup>LA</sup>	-5.63*	-4.34	4.80	-6.34*
T <sup>n</sup> S <sup>SO</sup>	-1.85	-0.22	-4.34**	0.12
T <sup>n</sup> D <sup>LA</sup>	-9.23*	-0.94	3.39	-0.57
T <sup>n</sup> D <sup>SO</sup>	-7.64**	-8.27**	1.24	-5.96*
N	14875	15375	15750	15750
Log-likelihood/p > chi <sup>2</sup>	-6814/0.00	-6679/0.00	-2947/0.00	-4229/0.00

\*  $p < .05$ ; \*\*  $p < .01$ .

qualifies these results. Supporting HS3a, labour policies reduce the effect of corporatist actors' preference on sending information network formation, but labour policies insignificantly increase the effect of corporatist

actors' preference on the support network formation (HS3b). In sum, we find evidence for policy leadership in almost all cases of information contacts, in particular for receiving information with regard to governmental proposals. Sector segregation, however, is particularly relevant for the choice of exchange contacts, especially for exchange contacts among members of the non-corporatist sectors in the case of social policies.

### *Reasons for Information and Exchange Contact Choices*

Besides testing the significance of our hypotheses, we are also interested in the more detailed reasons for network formation. Table 4 shows the regression coefficients of independent variables on network formation in the final versions of our base model, policy leadership and sector model. In Tables 5a–c we generalize these findings by listing the predicted probabilities of forming network contacts derived therefrom. Looking at the coefficients in the base model, similarity is significantly better than dissimilarity in explaining network formation, and exchange network formation in particular. Dissimilarity, however, positively determines information network formation, but contributes negatively to the formation of exchange relations (Table 4). According to Table 5a the combinations of high similarity with both low and high dissimilarity have high probabilities for network choice in the base model, while low similarity combined with high or low dissimilarity make network contacts less likely. For the base model, we thus find very few differences between the type of network relationship or the respondent's perspective, which means that similar preferences mostly contribute to the explanation of actors' choices of all kinds of relationships. Moreover, due to the negative contribution of dissimilarity, it is not sufficient to base our explanation of exchange relations on a complementary version of both measures. We must propose an additional distinction concerning the value of resources channelled by policy network relationships. As actors generally tend more towards providing information than exchanging resources, we presume the latter to be more expensive. Information is provided even in the case of dissimilarities, while the choice of costly exchange contacts presupposes similarities between actors trying to influence the outcome of political events.

The coefficients of the policy leadership model modestly confirm the results of the base model results on similarity and dissimilarity (Table 4). Moreover, the role of core decision-makers significantly increases the propensity of information network formation, whilst similarly decreasing exchange network choices. Looking at the corresponding predicted probabilities in Table 5b, we find network formation with core decision-makers to be highly probable when distance between actors' preferences is characterized by high similarity and low dissimilarity.

Otherwise, if actors strongly disagree with core decision-makers or if they have low dissimilarities with non-public actors, the choice of network contacts is unlikely. (Exchange) contacts to Bundesrat actors are also more likely in cases of high dissimilarity, particularly with respect to opposition proposals. Again, little variation is uncovered between the type of relationship.

Compared to the policy leadership model, dissimilarity and similarity fit positively into the sector model (Table 4). Corporatist sector membership still increases network formation, indicating that sector segregation saves internal transaction costs, particularly in the case of exchange network formation. With regard to information networks, corporatist membership reinforces the positive effect of similarity, whereas dissimilarity proves insignificant. Accordingly, members of corporatist sectors are especially able to save transaction costs in cases of similar preference. Returning to exchange networks, all significant interaction effects with non-corporatist membership decrease or even reverse the former positive effect of similarity and dissimilarity on network formation. Since non-corporatist sector membership contributes even more to network formation, it is less supported between all members of the corporatist sectors in which prominent peak organizations exist. Table 5c shows that the combination of high similarity and high dissimilarity increases the probability of information contacts among all actors, while high similarity and low dissimilarity is important for all network relations among members of the corporatist and non-corporatist sectors. Moreover, there is a difference between doing a favour and getting support, because the latter relationship is only likely between non-sector members in cases of low similarity and low dissimilarity. Hence, sector segregation stresses the differences between the kinds of relationship, but low (dis-)similarity makes network choices unlikely.

### **Conclusion: Finding Evidence for Policy Network Formation**

One of the more general results of this study on the formation of policy networks concerns the social dynamic effect that can be checked by network analysis. In contrast to our expectation we find that the interviewee's perspective has only minor implications for network formation. Our data thus prove very robust against different respondents' attitudes. Many of our hypotheses, either on distance between actors' preferences or the impact of institutional settings, are supported by our results. Overall, we find that a shorter actor distance increases the likelihood of network choice. On closer inspection of our similarity and dissimilarity results, however, we reject more dissimilarity hypotheses on exchange network

**Table 5.** Predicted Probabilities of Network Formation

Similarity	Dissimilarity	Formal Role	Type of Proposal	Send	Receive (trans.)	Favour	Support (trans.)
<i>(a) Base Model</i>							
High	Low			.996	.985	.997	.999
	High			.999	.996	.976	.843
Low	Low			.145	.136	.040	.068
	High			.536	.346	.005	.001
<i>(b) Policy Leadership Model 3</i>							
High	Low	Core PDM <sup>a</sup>	Government	.938	.564	.994	.999
			Opposition	.633	.878	.089	.993
		Bundesrat PDM	Government	.789	.867	.928	.437
			Opposition	.104	.502	.301	.011
		Non	Government	.942	.960	.982	.998
			Opposition	.717	.221	.601	.923
	High	Core PDM	Government	.858	.898	.899	.872
			Opposition	.338	.652	.996	.999
		Bundesrat PDM	Government	.791	.158	.430	.036
			Opposition	.916	.837	.000	.000
		Non	Government	.976	.977	.677	.612
			Opposition	.856	.225	.948	.928
Low	Low	Core PDM	Government	.315	.231	.000	.005
			Opposition	.315	.231	.000	.005
		Bundesrat PDM	Government	.201	.162	.716	.470
			Opposition	.201	.162	.716	.470
		Non	Government	.125	.124	.039	.060
			Opposition	.125	.124	.039	.060
	High	Core PDM	Government	.154	.671	.000	.000
			Opposition	.120	.072	.579	.999
		Bundesrat PDM	Government	.203	.005	.129	.041
			Opposition	.959	.499	.003	.000
		Non	Government	.268	.200	.001	.000
			Opposition	.251	.127	.329	.065
<i>(c) Sector Model 3</i>							
High	Low	Corp. sector	Social	.991	.977	.745	.077
			Labour	.801	.867	.847	.998
		Non-corp. sector	Social	.916	.960	.738	.989
			Labour	.101	.058	.999	.020
		Non	Social	.900	.869	.938	.918
			Labour	.803	.510	.434	.598
	High	Corp. sector	Social	.999	.999	.993	.000
			Labour	.462	.879	.000	.009
		Non-corp. sector	Social	.570	.467	.997	.950
			Labour	.000	.005	.999	.000
		Non	Social	.999	.998	.998	.998
			Labour	.675	.188	.030	.010
Low	Low	Corp. sector	Social	.170	.115	.100	.148
			Labour	.170	.115	.100	.148
		Non-corp. sector	Social	.519	.385	.259	.285
			Labour	.519	.385	.259	.285
		Non	Social	.122	.120	.024	.048
			Labour	.122	.120	.024	.048
	High	Corp. sector	Social	.787	.996	.849	.000
			Labour	.041	.126	.000	.000
		Non-corp. sector	Social	.115	.021	.983	.071
			Labour	.000	.052	.300	.001
		Non	Social	.972	.950	.556	.794
			Labour	.066	.029	.001	.000

<sup>a</sup> PDM = public decision-maker

formation than similarity hypotheses on information network formation. We frequently find strong support for our first specifications predicting institutional settings to reduce the effect of distance between actors' preferences on information network formation. The expected reasons for exchange contact formation, by contrast, are often insignificant or negatively related. One reason is that similarity also proves the best predictor for the choice of exchange relations. Another reason becomes apparent when we look at institutional settings more specifically.

The view of the neo-institutionalists with interaction effects between formal settings and distance between actors' preferences is supported by decreasing the importance of those preference distances in network choice. As the relevance of distance between preferences is reduced, the formal role of public decision-makers has a higher impact on the choice of network ties, and for information networks in particular. Turning to the sectoral perspective, sector segregation is particularly relevant for the formation of exchange networks. Dissimilarity within the same sector tends rather to exclude network formation, even though the interaction between similarity and either corporatist or non-corporatist sectors also reduces the former positive effect on network formation. To explain these findings, we introduced the additional argument of different resource values. While exchange relations imply the transfer of costly resources, transaction cost savings must be offered by sector segregation. Less costly information resources are provided to public decision-makers, whether they are engaged in strong or weak bicameral decision-making or not. Comparing the results of our different models, we show that membership of corporatist sectors seldom influences network formation. Even though corporatist actors are primarily concerned with labour policies, the internal interaction in non-corporatist sectors is significantly higher. Compared to the sector model, the neo-institutionalists' policy leadership model indicates that government proposals not only reduce the effect of dissimilar preference on exchange formation but also weaken the role of Bundestag actors.

We conclude that the formation of policy networks depends not only on the type of relationship but also on the view of institutional settings. Actors form information and exchange contacts because of their preferences on political events, but institutional settings significantly influence their network choices of specific relationships. Until now, few policy network studies have distinguished between different perspectives on institutional settings and various relationships when referring to the impact of policy networks on public policy-making. With reference to our findings, the type of relationship must be distinguished in future when analysing public policy-making using policy network analysis. Concerning the perspective on institutional settings, we find strong support for the application of the policy leadership model when dealing with information contacts between

public decision-makers and other policy domain participants. The sector model, however, seems more appropriate for the analysis of exchange contacts in public decision-making. Thus, the specification of both institutional approaches not only provides better insight into the impact of policy networks on public decision-making, but also reveals the differences between the kinds of relationships themselves.

**APPENDIX**

**Measurement of Symmetric and Asymmetric Similarities and Dissimilarities**

We measure the (asymmetric) similarity  $S$  of actor  $i$  to actor  $h$  by two elements, their positions  $y$  and interests  $x$  in political events  $j$  with respect to the set of political events  $M$ :

$$S_{ih} = \frac{1}{|M|} \sum_{j \in M} (x_{ij} + x_{hj}) \chi(x_{ij}) \left( 1 - \frac{|y_{ij} - y_{hj}|}{2} \right) \chi(y_{ij}) \chi(y_{hj})$$

where  $\chi$  denotes the characteristic function meaning  $\chi(x_{ij}) = 0$  iff  $x_{ij} = 0$  and  $\chi(x_{ij}) = 1$  iff  $x_{ij} \neq 0$ . Accordingly,  $\chi(y_{ij}) = 0$  iff  $y_{ij} = 0$  and  $\chi(y_{ij}) = 1$  iff  $y_{ij} \neq 0$ .

We measure the (asymmetric) dissimilarity  $S$  of actor  $i$  to actor  $h$  by two elements, their position  $y$  and their interest  $x$  in political events  $j$  with respect to the set of political events  $M$ :

$$D_{ih} = \frac{1}{|M|} \sum_{j \in M} (x_{ij} + x_{hj}) \chi(x_{ij}) \left( \frac{|y_{ij} - y_{hj}|}{2} \right) \chi(y_{ij}) \chi(y_{hj})$$

We measure the (symmetric) similarity  $S$  of actor  $i$  and actor  $h$  by two elements: their position  $y$  and their interest  $x$  in political events  $j$  with respect to the set of political events  $M$ :

$$S_{ih} = \frac{1}{|M|} \sum_{j \in M} (x_{ij} + x_{hj}) \chi(x_{ij}) \chi(x_{hj}) \left( 1 - \frac{|y_{ij} - y_{hj}|}{2} \right) \chi(y_{ij}) \chi(y_{hj})$$

We measure the (symmetric) dissimilarity  $S$  of actor  $i$  and actor  $h$  by two elements: their position  $y$  and their interest  $x$  in political events  $j$  with respect to the set of political events  $M$ :

$$D_{ih} = \frac{1}{|M|} \sum_{j \in M} (x_{ij} + x_{hj}) \chi(x_{ij}) \chi(x_{hj}) \left( \frac{|y_{ij} - y_{hj}|}{2} \right) \chi(y_{ij}) \chi(y_{hj})$$

**Regression Model Equations**

We test hypotheses H1, H1a, and H1b for all four networks (sending (*se*) and transposed receiving (*rt*) information networks, doing a favour (*fa*) and transposed giving support (*st*) exchange networks) using the following base model. For a description of all variables, see Table 2.

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta_1 S_{ih} + \beta_2 D_{ih} \quad \text{where } z = se, rt, fa, st$$

For policy leadership hypotheses, we specify two versions of (dis-)similarity, since asymmetric (information) network relationships presuppose public decision-makers to be alters, while public decision-makers can be either ego or alter, in cases of symmetric (exchange) relationships. Hypotheses HP1, HP1a, and H1b are tested using policy leadership model 1:

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 A_h + (\beta_1 + \beta'_1 A_h)S_{ih} + (\beta_2 + \beta'_2 A_h)D_{ih} \quad \text{where } z = se, rt$$

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 A_{ih} + (\beta_1 + \beta'_1 A_{ih})S_{ih} + (\beta_2 + \beta'_2 A_{ih})D_{ih} \quad \text{where } z = fa, st$$

We test hypotheses HP2, HP2a, and HP2b using policy leadership model 2:

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 A_h^u + \beta''_0 A_h^b + (\beta_1 + \beta'_1 A_h^u + \beta''_1 A_h^b)S_{ih} + (\beta_2 + \beta'_2 A_h^u + \beta''_2 A_h^b)D_{ih} \quad \text{where } z = se, rt$$

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 A_{ih}^u + \beta''_0 A_{ih}^b + (\beta_1 + \beta'_1 A_{ih}^u + \beta''_1 A_{ih}^b)S_{ih} + (\beta_2 + \beta'_2 A_{ih}^u + \beta''_2 A_{ih}^b)D_{ih} \quad \text{where } z = fa, st$$

In order to test HP3, HP3a, and HP3b with policy leadership model 3, the set of proposals is divided into two subsets, the set of government (GO) and the set of opposition (OP) proposals. Actors (dis-)similarities are calculated on the two sets, separately, and coefficients are estimated for both actors' (dis-)similarities with respect to government and opposition proposals:

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 A_h^u + \beta''_0 A_h^b + (\beta_1 + \beta'_1 A_h^u + \beta''_1 A_h^b)S_{ih}^{GO} + (\beta_2 + \beta'_2 A_h^u + \beta''_2 A_h^b)D_{ih}^{GO} + (\beta_3 + \beta'_3 A_h^u + \beta''_3 A_h^b)S_{ih}^{OP} + (\beta_4 + \beta'_4 A_h^u + \beta''_4 A_h^b)D_{ih}^{OP} \quad \text{where } z = se, rt$$

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 A_{ih}^u + \beta''_0 A_{ih}^b + (\beta_1 + \beta'_1 A_{ih}^u + \beta''_1 A_{ih}^b)S_{ih}^{GO} + (\beta_2 + \beta'_2 A_{ih}^u + \beta''_2 A_{ih}^b)D_{ih}^{GO} + (\beta_3 + \beta'_3 A_{ih}^u + \beta''_3 A_{ih}^b)S_{ih}^{OP} + (\beta_4 + \beta'_4 A_{ih}^u + \beta''_4 A_{ih}^b)D_{ih}^{OP} \quad \text{where } z = fa, st$$

Hypotheses HS1, HS1a, and HS1b on the impact of sector segregation are tested using sector model 1:

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 T_{ih} + (\beta_1 + \beta'_1 T_{ih})S_{ih} + (\beta_2 + \beta'_2 T_{ih})D_{ih} \quad \text{where } z = se, rt, fa, st$$

In order to test hypotheses HS2, HS2a, HS2b we specify sector model 2:

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 T_{ih}^c + \beta''_0 T_{ih}^n + (\beta_1 + \beta'_1 T_{ih}^c + \beta''_1 T_{ih}^n)S_{ih} \\ + (\beta_2 + \beta'_2 T_{ih}^c + \beta''_2 T_{ih}^n)D_{ih} \quad \text{where } z = se, rt, fa, st$$

Hypotheses HS3, HS3a, and HS3b are tested using sector model 3, where we divide the policy set into subsets, the set of labour (LA) and the set of social (SO) proposals. Actors' (dis-)similarities are based on the two sets, separately, and the effects of (dis-)similarities are estimated for both labour and social proposals:

$$\ln\left(\frac{P(z_{ih} = 1)}{1 - P(z_{ih} = 1)}\right) = \beta_0 + \beta'_0 T_{ih}^c + \beta''_0 T_{ih}^n + (\beta_1 + \beta'_1 T_{ih}^c + \beta''_1 T_{ih}^n)S_{ih}^{LA} \\ + (\beta_2 + \beta'_2 T_{ih}^c + \beta''_2 T_{ih}^n)D_{ih}^{LA} + (\beta_3 + \beta'_3 T_{ih}^c + \beta''_3 T_{ih}^n)S_{ih}^{SO} \\ + (\beta_4 + \beta'_4 T_{ih}^c + \beta''_4 T_{ih}^n)D_{ih}^{SO} \quad \text{where } z = se, rt, fa, st$$

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