

# Political Homophily and Collaboration in Regional Planning Networks

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*We study the extent of political homophily—the tendency to form connections with others who are politically similar—in local governments’ decisions to participate in an important form of intergovernmental collaboration: regional planning networks. Using data from a recent survey of California planners and government officials, we develop and test hypotheses about the factors that lead local governments to collaborate within regional planning networks. We find that local governments whose constituents are similar politically, in terms of partisanship and voting behavior, are more likely to collaborate with one another in regional planning efforts than those whose constituents are politically diverse. We conclude that political homophily reduces the transaction costs associated with institutional collective action, even in settings where we expect political considerations to be minimal.*

Interest in political networks has grown substantially in recent years. An emerging political science literature seeks to understand the structure, properties, and consequences of networks comprised of political actors such as legislators (Caldeira and Patterson 1987; Fowler 2006), legislative staffers (Victor and Ringe 2009), political activists (Heaney and Rojas 2009), convention delegates (Heaney et al. 2010), and interest groups (Grossman and Dominguez 2009). Building on a large body of theoretical and empirical work on social networks, one of the leading hypotheses is that actors with similar characteristics will be more likely to form network ties than actors with different characteristics. This phenomenon, known as homophily, is consistently identified as an important determinant of network structure (McPherson, Smith-Lovin, and Cook 2001). In this article, we assess the importance of a specific form of homophily that is of particular interest to political scientists—the extent to which actors with similar *political* characteristics are more likely to collaborate—in the area of land-use planning.

Land-use planning is arguably one of the most important functions of local governments as it fundamen-

tally shapes a community’s physical development, social structure, tax base, and quality of life (Levy 2009). Land-use planning involves the creation of land-use plans and zoning ordinances that specify the kinds of development and redevelopment allowed in specific areas, as well as plans for transportation systems, public facilities, physical infrastructure, open space, and environmental amenities. Land-use planning is mainly conducted by individual local governments (i.e., cities, villages, towns, counties, etc.), resulting in policies that are responsive to actors within a given jurisdiction but that often create externalities and inefficiencies for others in the region (Kwon and Feiock 2008).<sup>1</sup> A classic example of this dilemma is when City A’s decision to allow high-density development creates congestion and lowers property values in a neighboring City B, yet City B has little or no power to influence the land-use decisions within City A’s boundaries.

*Regional land-use planning* is advocated as a way of mitigating some of the negative consequences of local land-use planning. Regional planning involves the creation of intergovernmental networks; participation in these networks encourages local governments to work

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<sup>1</sup>Local governments derive these powers from state constitutions and legislation. The U.S. Supreme Court has upheld these powers in numerous cases, notably *Village of Euclid, Ohio v. Ambler Realty Co.*, 1926.

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together to share information and develop land-use policies that address regional goals. Advocates contend that by providing an explicit mechanism for reducing negative externalities (and perhaps increasing positive externalities), regional planning produces more efficient, effective, and equitable decisions about how to share the costs and benefits of development across the region (Benjamin and Nathan 2001; Friedmann and Weaver 1980; Norris 2001).

We study regional land-use planning efforts as a lens through which to understand the role of homophily in political networks. The core theoretical contribution of our research is to integrate social network theory and the concept of political homophily into the “institutional collective action” approach to local government collaboration (Clingermaier and Feiock 2001; Feiock 2007, 2009).<sup>2</sup> ICA argues that collaboration emerges from a political contracting process where local policy actors weigh the potential benefits and transaction costs of various forms of interaction. The benefits and transaction costs of collaboration are thought to derive primarily from the policy problems being addressed (e.g., affordable housing, open space management, transit systems), the economic benefits to the potential participants, and the internal characteristics of the individual local governments (Feiock 2007).

However, while the ICA perspective acknowledges that local government officials pay attention to the electoral consequences of collaboration, it does not directly address the partisan or ideological aspects of decision making. Intergovernmental collaboration requires political actors to make policy decisions in an often highly contentious political environment. It is therefore important to consider whether and how broader political and ideological considerations shape local governments’ decisions about participation in regional planning networks, over and above the factors traditionally considered in the transaction-cost approach.

Specifically, we argue that similarities on politically relevant characteristics between two or more local governments (i.e., political homophily) reduce the transaction costs of engaging in collective action and hence increase

the probability of collaborating in regional planning networks. This political logic of collaboration represents an important extension of the ICA approach to intergovernmental collaboration, and our analysis provides compelling empirical evidence for the claim that politically similar governments tend to work together.

However, our argument goes beyond simply inserting political considerations into the ICA framework. We argue that the political processes analyzed in this article are pervasive even in the face of institutional arrangements designed to minimize partisan and ideological concerns. For example, many cities, including those in California that form the basis of our empirical analyses, are “reform” cities with nonpartisan elections and manager-council forms of government. Furthermore, our study takes place in the context of regional planning institutions designed to create collaboration across political boundaries and partisan and ideological cleavages. Both manager-council forms of government and regional planning institutions are believed to reduce the influence of ideology and partisanship in the policy process and focus on finding efficient policy solutions. Yet our results demonstrate that the political logic of local collaboration remains, even in the presence of these institutions.

We test our *political homophily hypothesis* using data from a unique survey of local government officials in five California regions. We first use Geographic Information System (GIS) methods to visualize and characterize the regional planning networks in each region in a spatially explicit manner. We then construct measures of political distance (i.e., how similar or different pairs of jurisdictions are on various political characteristics), as well as the similarity of demographic and population characteristics and the geographic proximity between local jurisdictions in each region, and link these patterns to each area’s regional planning network. Our hypotheses are tested using exponential random graph models of network structure.

## Political Homophily and Regional Planning

Regional land-use planning is a form of collective action; it involves autonomous local governments voluntarily incurring some costs for the benefit of the region.<sup>3</sup> As such, we expect the logic of institutional collective action (ICA) to influence the structure of regional planning networks

<sup>2</sup>Throughout this article, we use the term “collaboration” to refer to any explicit and mutually recognized joint policymaking interaction between local government actors. The literature on intergovernmental collaboration identifies interactions with varying degrees of formality, including sharing information and personnel, joint research and funding proposals, interagency task forces, shared permitting, and other diverse activities (Bardach 1998). The survey data that form the basis of our empirical analysis use the terms “collaborate” and “collaboration” and do not distinguish between these more informal and formal interactions. Conceptually, we expect that many different forms of collaboration take place within regional planning networks. Future research will further investigate the nature of these different forms of interaction.

<sup>3</sup>As with any collective action problem, there may also be private benefits to the individual actors. Still, the presence of individual costs and collective benefits creates conditions for the classic collective action dilemma (Olson 1965).

(Feiock 2007, 2009). ICA argues that collaboration will emerge when the benefits of collective action outweigh the transaction costs of searching for mutually beneficial solutions, bargaining over different policies, and monitoring and enforcing any resulting agreements (Feiock 2009; Maser 1998). But the existing literature has placed little emphasis on how the inherently *political* calculus of regional planning is linked to the benefits and transaction costs of collaboration. Participants in regional planning efforts are political actors—mayors, city council members, county supervisors, planning commission members, and administrative staff—who agree to share information and resources, and who make joint land-use decisions with neighboring jurisdictions and the organizations that comprise a regional planning network. These local political actors may then be held accountable by their local constituents for land-use decisions over which the collective, and not just they, themselves, have ultimate control. Political science research has demonstrated that variations in political costs and benefits *within* individual jurisdictions help explain the extent to which political actors are willing to engage in regional policy and planning activities (Feiock and Kim 2000; Gerber and Gibson 2009; Lubell, Feiock, and de la Cruz 2009; Lubell, Feiock, and Ramirez 2005). However, little research to date seeks to describe or understand how political relationships *between* actors affect these costs and benefits.

Our political homophily hypothesis provides a link between these notions of transaction costs from ICA and insights from social network theory about relationships between political actors. Specifically, we can think about various forms of political homophily as affecting the transaction costs of collective action. The costs of searching for mutually beneficial policy decisions are lower when local jurisdictions whose citizens are politically similar also have similar policy preferences and ideas about the appropriate role of government, in planning as well as other areas. People who self-identify as Democratic and/or as politically liberal may favor specific planning-related policies such as affordable housing, higher-density development, and public transit (National Association of Realtors 2011, 30), as well as a more expansive role for government (Gallup 2010). Those who self-identify as Republicans and/or as politically conservative may favor different policies and in general a more limited government role. It is reasonable to expect that, all else constant, government leaders in cities with politically similar populations will prefer to pursue similar policies.<sup>4</sup> Two cities

<sup>4</sup>This assumes that local government officials will seek to pursue policies that are favored by their residents. While Page and Shapiro (1983) have demonstrated a link between public opinion

that are politically similar may therefore find it easier to identify and agree upon mutually beneficial policies, while two cities that are politically distant may find little common ground.

Political similarity also reduces the bargaining costs of regional planning, which involves a form of redistribution—in this case, redistribution of the costs and benefits from development and other land uses—between residents of different cities within a region. For example, regional land-use plans that incentivize development in one city and limit it in another may result in net benefits for some residents in the region and net costs for others. Alesina and La Ferrara (2005) and Alesina and Giuliano (2009) show that survey respondents are less supportive of redistribution when the recipients are different from themselves; we expect the same biases to hold with respect to regional planning. In addition, even if they can agree on regional policies in the short term, local government officials may be reluctant to commit to a long-term regional planning effort with cities whose residents' political orientations are very different, and hence whose preferences are likely to diverge over future policies. To the extent that local residents oppose collaboration with politically distant communities, local officials who participate nonetheless risk the loss of electoral support, or even the threat of a recall effort.<sup>5</sup> Anticipating these potential political costs, local decision makers may prefer to act independently, rather than risk being punished electorally by their constituents for cooperation.

In sum, political similarity affects the political calculus of collaboration, in particular by decreasing the search costs of discovering and bargaining over the distribution of costs and benefits from joint activities. The political

and policy at the national level, the question is less settled at the local level, in part because “reform” council-manager governments are expected to moderate partisan politics. However, even non-partisan elected officials must abide by electoral imperatives and thus respond to citizen preferences. Appointed city officials with a planning background or other professional training also adopt professional norms regarding providing the best service to their citizens (Teodoro 2011). The tendency for local governments to provide different bundles of public goods and taxes in anticipation of residents voting with their feet is a core hypothesis in urban politics (Peterson 1981; Tiebout 1956).

<sup>5</sup>The perception of this electoral threat may be greater than the reality, as it is difficult to identify definitive instances where constituents successfully mobilized against an elected official in response to a city's decision to participate in a regional planning effort. Nevertheless, politicians may act on the basis of perceptions and may be highly risk averse when it comes to avoiding potentially controversial decisions that may incite organized electoral opposition. Appointed officials may be sensitive to these electoral pressures as well, as they typically serve at the pleasure of elected officials who may dismiss the appointees if the appointees' actions jeopardize their boss's electoral security.

calculus that reinforces these dynamics is not typically considered in the ICA literature, which focuses mostly on the economics of regional public good provision. Based on consideration of these political dynamics, *we hypothesize that political similarity will increase (and political differences will reduce) the probability that two cities collaborate in a regional planning network.*

## Demographics, Population Growth, and Geographic Homophily

Testing for political homophily in regional planning networks requires controlling for other factors that may influence the benefits and costs of intergovernmental collaboration. Three classes of attributes traditionally considered in the planning literature are socioeconomic characteristics, population size and growth patterns, and geographic proximity.

### Homophily and Socioeconomic Characteristics

An extensive planning literature identifies the socioeconomic characteristics of a community's population as important determinants of that jurisdiction's land-use planning preferences (Levy 2009). More affluent populations tend to prefer certain types of land-use patterns—limiting growth, maintaining low density requirements, preserving land for recreation and open space—that are different from those preferred by poor populations—increasing densities, supplying affordable housing, etc. (Fischel 1985, 2001; Lubell, Feiock, and de la Cruz 2009; but see National Association of Realtors 2011, which finds that people in the highest income group may now prefer higher densities in the context of smart growth development). We expect socioeconomic similarity to represent an important category of homophily drivers. When two or more cities have populations with similar socioeconomic profiles, they may perceive the benefits of cooperation to be higher since they can combine their efforts to achieve similar planning goals; when they have very different populations, they may perceive greater conflict over their land-use policy preferences.

We also consider racial/ethnic composition as a second demographic category. Numerous scholars and observers have documented the distinctive patterns of political behavior—particularly voting—by California's racial and ethnic minority groups (e.g., see Barreto and Ramirez 2004; Segura and Fraga 2008; Tolbert and

Hero 1996). These studies find that while minorities are, on average, more liberal and more likely to support Democratic candidates and policy positions than white voters, there are important exceptions to this general tendency (Barreto and Ramirez 2004).<sup>6</sup> Latino voters in particular, who have been targeted by recent anti-immigrant ballot proposals but also aggressively courted by political candidates of both parties, are seen as a critical, distinctive, and growing political bloc, especially in California. From the perspective of local government officials, the size of the minority population in other cities may serve as an important indicator of the degree of preference similarity, above and beyond socioeconomic characteristics. *We therefore hypothesize that similarity in demographic characteristics will increase the probability that two cities collaborate in a regional planning network.*

### Homophily and Population Size and Growth

In addition to political and demographic characteristics of a jurisdiction's population, we expect variables related to population size and growth to further shape a jurisdiction's preferences for land-use and development policies, and hence the transaction costs of participating in regional planning networks. Population and growth-related variables that shape land-use preferences may include population size, population density, urbanization patterns, and recent growth trends. For example, a city's size may affect its preferences for land-use policy due to its underlying governmental capacity. Larger cities tend to have more extensive government operations, in both absolute and per capita terms, and so may be better able to service a growing population than smaller cities with limited governmental and fiscal capacity. Cities with high-density, highly urbanized, and rapidly growing populations may prefer land-use policies that limit and manage growth, while those with ample developable land and/or stagnant populations may prefer land-use policies that encourage growth and new development. *We therefore hypothesize that similarity in population size and growth will increase the probability that two cities collaborate in a regional planning network.*

### Homophily and Geographic Proximity

Finally, we expect geographic proximity to increase the benefits and reduce the costs of regional planning. Two

<sup>6</sup>In our data, the correlation between a city's nonwhite population and percent registered Democrat in 2004 is  $r = .67$ . The correlation between percent Latino and percent registered Democrat is  $r = .66$ .

(or more) cities that are located physically close to one another often share geographic features that pose common challenges or opportunities for development; decision makers can learn and model behavior from similarly situated peers and engage in repeated interaction. In addition, land-use decisions in one community will often have geographic spillovers into neighboring cities, especially those that share common borders. Jointly planning for and regulating growth and development in closely located cities will allow parties on both sides to better manage and internalize these spillovers. In addition, decision makers in neighboring cities may be more likely to know one another and be more aware of common circumstances and opportunities. Shorter distances make it easier to meet, discuss common issues and interests, and generally facilitate cooperation. This proximity will lead to greater ease of forming network ties. *We therefore hypothesize that geographic proximity will increase the probability that two cities collaborate in a regional planning network.*

## Research Design: Regional Planning in California

To test our hypotheses, we utilize an Internet/telephone survey of land-use, environmental, and transportation policy stakeholders in five study regions in California conducted from March to November 2006.<sup>7</sup> Each of the regions featured a regional collaborative planning process that was designed to encourage collaboration among local governments and other stakeholders (see Table S1). We chose the regions by asking a small group of practicing land-use and transportation professionals to identify some of the most innovative and successful regional collaborations in California; the study regions are therefore not meant to be a random sample or to reflect a quasi-experimental design. Rather, the regions provide a prime opportunity for a quantitative case study of political homophily in the context of strong existing collaborative institutions designed to moderate the role of political incentives. A hallmark of these institutions is the effort to build policy networks across ideological, geographic, institutional, and other boundaries (Schneider et al. 2003).

<sup>7</sup>The research occurred in two phases. The first phase (3/06–5/06) collected data in the Merced and Tri-County regions. The second phase (9/06–11/06) collected data for the Sacramento, San Diego, and Riverside regions. The respondents were first contacted by email, and then nonrespondents were contacted via telephone. Some of the nonrespondents opted to complete the survey on the Internet, while others completed a telephone interview.

The survey population consisted of participants in the respective collaborative processes: all stakeholders in the region identified as participants in Environmental Impact Reports in the California Environmental Quality Act database and planning staff and/or elected officials from all city and county governments within the region. The sample frame sought to encompass the broad range of policy actors associated with land-use, transportation, and environmental planning activities throughout the region, including but not limited to the specific collaborative processes under study (see Table S2 for a summary of the regional processes). There were a total of 752 respondents, with response rates of 46% (127 respondents) for the Merced region, 41% (111 respondents) for the Tri-County region, 25% (116 respondents) for the Riverside region, 42% (291 respondents) for the Sacramento region, and 30% (107 respondents) for the San Diego region.<sup>8</sup> All respondents were invited to participate in an online version of the survey, which was completed by 506 respondents (67% of returned surveys). The remaining 246 respondents (33%) opted instead to complete the survey through a telephone interview.

This article focuses exclusively on the survey responses from city and county respondents, including both elected and appointed officials, and administrative staff. Of the 752 individuals surveyed, 376 respondents (50% of the sample) self-identified as representing a city or county when asked, “What organization or category of stakeholder do you represent in regional land-use and transportation planning?” Among the representatives of local governments, 128 individuals (17% of the sample) represent city governments as an elected or appointed official; 138 individuals (18% of the sample) represent city government staff; 50 individuals (7% of the sample) represent county governments as an elected or appointed official; and 96 individuals (13% of the sample) represent county government staff. This survey question allowed respondents to nominate multiple local governments and/or stakeholder categories (staff versus elected/appointed officials); therefore, there is some overlap in these categories. For example, a small number of respondents indicated being both elected officials and staff. Altogether the survey produced at least one observation for 75 of the 91 (82%) different county and city governments in the five regions.

Our analysis of these survey data proceeds in two parts. First, we construct collaborative networks from the survey data for the five regions separately and combined,

<sup>8</sup>The lower response rates in Riverside and San Diego can be at least in part attributed to the 2003 completion of the planning effort in Riverside and the fairly narrow focus on the North County area of San Diego.

create spatially explicit maps of those networks, and compute and report network statistics to provide a general understanding of the structure of those five regional networks. Second, we conduct an exponential random graph model (ERG model, or simply ERGM) analysis to investigate the political homophily hypothesis while controlling for other network effects that may influence patterns of regional collaboration. Results from this ERGM analysis are consistent with an analysis of collaboration in local government dyads using logistic regression (presented in the supplemental information).

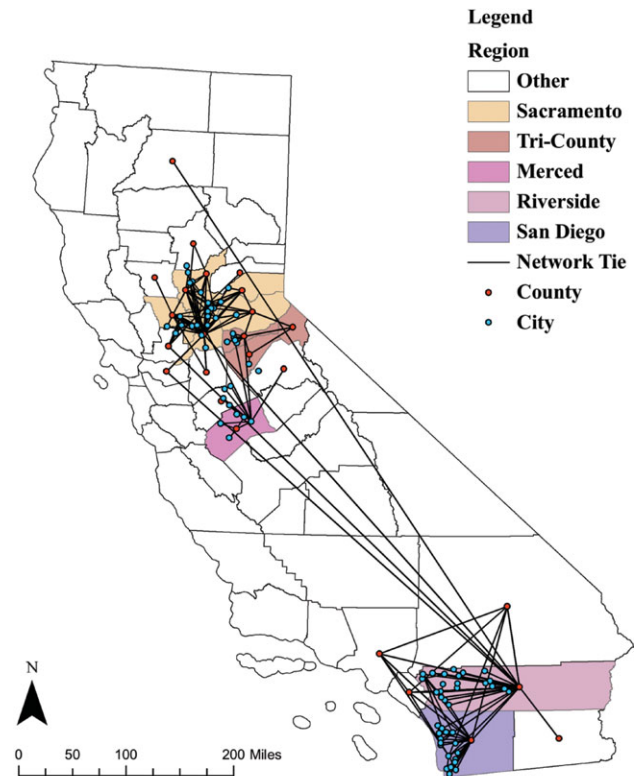
### Mapping Local Government Planning Networks

To identify collaboration networks, we asked each survey respondent to “identify organizations/stakeholders that you have collaborated with in the past three years regarding regional land-use issues.”<sup>9</sup> Respondents to the online survey were presented with a roster of 53 possible organizations, including city- and county-elected/appointed officials and administrative staff. Telephone interview respondents were asked to name their collaborators without the use of specific prompts. If any respondents indicated collaborating with local government officials, they were then prompted to write in or mention the name or names of that local government. Note that the survey question did not focus specifically on a particular regional planning effort, but rather focused more generally on land-use planning issues. Hence, the resulting collaboration networks span a broad range of potential partners and policy activities.

Constructing the collaboration network requires a reasonable definition of network boundaries. Limiting the network boundaries to the specific cities covered by each regional process is insufficient because many local government respondents named governments outside of their regions as collaborative partners. For example, one of our sample regions is Merced County, and thus Merced County and any cities within it are automatically included within the boundaries of the regional network. However, respondents from the Merced region also named cities outside of Merced County, and local governments outside of Merced named cities within the county as collaborative partners.

<sup>9</sup>It is important to recognize that this question does not distinguish between more formal and informal types of collaboration, where more formal modes may involve greater costs and risks to the actors. In network jargon, this gradient could be operationalized with valued ties; this is a good candidate for future research.

**FIGURE 1 Statewide Regional Planning Network**



Source: UC Davis Regional Land-Use and Transportation Planning Survey, March-Sept 2006.

Hence, our network boundaries are empirically defined by allowing cities or counties outside a particular region to “opt in” to a regional network by naming a jurisdiction in the region as a collaborative partner. Cities and counties outside the region could also be “selected in” to the regional network if a respondent from a jurisdiction within the region named it as a collaborative partner. Hence, the network boundaries have a strong regional basis as defined endogenously by the study respondents themselves. But the network boundaries do not include every single jurisdiction in California, because that would artificially increase the pool of potential network partners considered by a particular local government.

The resulting regional networks are geographically displayed in Figure 1. The network ties are drawn between the centroids of the geographic boundaries of each jurisdiction.<sup>10</sup> The greater density of connections

<sup>10</sup>Each jurisdiction is represented in our dataset as a polygon that is determined by its geographic boundaries. The centroid of a polygon is its center of gravity or “the point on which it would balance when placed on a needle” (Weisstein 2012).

TABLE 1 Network Statistics

	REGION					
	Combined Network	Merced	Tri-County	Sacramento	Riverside	San Diego
Network size	102	14	16	37	43	18
Density	0.10	0.14	0.16	0.15	0.08	0.20
Average degree	3.9	2.0	2.5	5.5	3.2	3.7
Maximum degree	23	10	8	23	23	13
Avg. clustering	0.66	0.64	0.69	0.70	0.62	0.77
Mean path length	3.0	2.0	2.4	2.3	2.3	1.7
Size of large component	55	13	14	37	36	15
% in large component	54%	93%	88%	100%	84%	83%
Expected path length	3.40	3.81	3.03	2.12	3.23	2.21
Expected clustering	0.04	0.14	0.16	0.15	0.07	0.21

within a region shows how the networks are regionally focused, which is to be expected given our study design. But the networks also exhibit a substantial number of cross-regional connections, mostly to neighboring regions, but with a few long-distance connections. For example, Sacramento region jurisdictions have three collaborative ties with Riverside region jurisdictions. Visual inspection of the networks suggests that many of these long-distance connections are between counties; given the importance of counties in statewide land-use discussions and decision-making processes, it is reasonable to expect counties to have greater opportunities to make long-distance connections. However, based on discussions with regional stakeholders, these long-distance connections generally do not represent costly forms of collaboration like building and sharing the management of infrastructure. Rather, in the spirit of epistemic communities (Haas 1992) and the diffusion of innovations (Rogers 1962), these long-distance connections are more likely to involve sharing of information, data, and analytical tools (e.g., population and growth models) focused on issues of joint interest to those jurisdictions.

Table 1 reports descriptive network statistics for each of the five separate regional networks and the combined five-region network. *Network size* refers to the number of local government nodes included in the network. *Density* refers to the proportion of possible collaborations that are actually observed in the network, reflecting the overall intensity and frequency of collaboration. *Degree* refers to the number of collaborative partners mentioned by each local government; thus, *average degree* refers to the expected number of collaborative relationships maintained by any given local government, whereas *maximum*

*degree* is a measure of whether any one particular local government maintains a disproportionate number of collaborative ties. *Clustering* (also known as the clustering coefficient) is defined for a given local government (node *A*) as the proportion of all possible collaborative relationships that are observed among *A*'s collaborators. Clustering reflects the degree of redundancy in network relationships and has been proposed as one measure of bonding social capital within policy networks (Henry, Lubell, and McCoy 2011). *Path length*, or the degree of separation between nodes, refers to the minimum number of "hops" along collaborative ties that are required to travel from one node to the other. *Average path length* is therefore one measure of the overall connectivity of the network, where large average path lengths correspond to more widely dispersed networks. The *size of large component* refers to size of the largest set of nodes where all local governments are connected with each other via some finite path.

The networks have a fairly low density overall, ranging from .08 to .16. However, this does not mean that the networks are disconnected and unable to function effectively at the regional level. Instead, the networks exhibit characteristics similar to "small-world networks," with a relatively low average path length coupled with a high-clustering coefficient (Watts 1999). This means that despite the existence of local subgroup structures, there are enough links between subgroups to enable information to flow across the broader network. In our case, these between-group linkages are provided by some of the longer physical distance relationships where local governments are connecting beyond their immediate geographic neighbors and between the five regional networks across the state.

To evaluate whether a particular network is a small-world network, it is useful to compare the observed clustering and average path length relative to what is asymptotically expected in a random graph (Watts 1999). The small-world properties of our networks are demonstrated by higher clustering coefficients and lower average path lengths than what would be expected from a random network (last two rows of Table 1). In a random network, each dyad contains a tie with probability equal to the network density. Thus, comparing the observed path lengths and clustering coefficients with their expected values yields a sense of whether the observed properties are a result of network self-organization and endogenous choices to collaborate or not collaborate. Although it is beyond the scope of this article to assess how the structure of local networks influences the effectiveness of regional collaboration, there is an ongoing debate within the network science literature as to how small-world networks influence the evolution of cooperation (Cassar 2007; Santos, Rodrigues, and Pacheco 2005).

### Constructing Local Government Homophily Variables

The empirical analysis now turns to testing our hypotheses about whether (and to what extent) several variables related to the similarity between local governments predict connections between dyads within the network. Given how our data were collected and the requirements of the analysis software, we construct a series of *distance* variables that are the inverse of similarity. Thus, our hypothesized homophily effects will cause the probability of network formation to *decrease* as our independent distance variables *increase*.

The primary independent variable is political distance. We also test and control for the effects of socioeconomic and population/growth differences and geographic distance. Table S2 summarizes how we constructed each of our independent variables. To clarify, every pair or dyad of local governments within our network boundary represents a potential network connection. These dyads are the units of analysis upon which construction of the distance variables is based.

Given the complex and multidimensional nature of political attitudes/opinions, we employ several *political distance* variables in our analyses. The first is based on October 2004 party registration data from the California Secretary of State, *Report of Registration*, reported for each city or county in our sample. We calculate *Registration Distance* as the six-dimensional Euclidian distance between jurisdictions  $p$  and  $q$  on the basis of registra-

tion for six political parties: % Republican, % Democrat, % Green, % American Independent, % Libertarian, and % Peace and Freedom. The formula for Euclidian distance between two points  $p$  and  $q$  on  $n$  dimensions is  $\sqrt{\sum_{i=1}^n (p_i - q_i)^2}$ . This variable ranges from 0.51 to 65.89 in our sample. We also compute the simple distance for each dyad of the percent of voters registered as Democrats. This measure is correlated with *Registration Distance* at  $r = .99$ .

We use 2004 (as opposed to 2008) registration data in our primary political distance measure for two reasons.<sup>11</sup> First, it is measured prior to the survey data-collection period of March through November 2006. Respondents were asked about current and previous collaborations. To the extent that cities and counties considered political distance in these decisions, we expect them to have relied on already available/published data. Second, we expect that the 2004 data more closely reflect the underlying steady-state partisanship in each city or county compared with 2008. During the 2008 election cycle, the Obama campaign mobilized unprecedented numbers of new voters (Falcone and Moss 2008; Hayes 2008). Little is known about these new registrants, particularly whether their registration decisions convey the same sort of deep-seated partisan identification of their previously registered counterparts (Murray 2008).<sup>12</sup>

We capture *socioeconomic distance* with two variables: *Latino Distance* and *Income Distance*. *Latino Distance* is the difference between dyad members in the percentage of the total population that is Latino according to the 2000 Census (see Table S2 for the specific Census source tables). *Income Distance* takes the absolute value of the difference between each pair of jurisdictions on median household income (in thousands of dollars) from the 2000 Census. These absolute value differences are equivalent to Euclidean distance in one dimension.

We capture *population size and growth patterns* with four variables: *Population Distance*, *Growth Distance*, *Urbanized Distance*, and *Government Type*. *Population Distance* is the log of the absolute difference between each pair's population sizes; *Growth Distance* is the square root

<sup>11</sup>In theory, we could have used registration data from any year close to the survey data-collection period. However, we believe the presidential election-year figures will be more complete and accurate proxies for a city's or county's underlying partisan composition since many people register or reregister immediately preceding a presidential election.

<sup>12</sup>Despite these theoretical arguments in favor of the 2004 registration data, we also construct and analyze comparable variables using 2004 presidential election returns as well as 2008 party registration and election returns; analyses based on these alternative operationalizations of political distance produce similar but slightly noisier results (see supporting information).



of the absolute value of the difference of percent population change;<sup>13</sup> *Urbanized Distance* is the absolute value of the difference of percent urbanized; and *Government Type* is a dummy variable for city-county dyads.

Finally, *geographic distance* is calculated using ArcGIS 9.3 as the distance in miles (divided by 10) between the centroids of the relevant local government jurisdictions. We also use GIS to construct a dummy variable to indicate whether city-city dyads are neighbors (i.e., whether they share a common border).

## Exponential Random Graph Analysis of Collaborative Ties

We use ERGM to test for the effect of political distance on collaboration. ERGM allows researchers to model observed network structures as a function of actor-level variables, dyadic variables (such as political distance), and higher-order network effects that are hypothesized to influence the formation of collaborative ties (see Robins et al. 2007a for a lucid introduction to ERGM). Rather than view the formation of each collaborative linkage in the network as an independent process occurring within the dyad, ERGM assumes that the probability of collaboration between any two local governments is conditional on the structural properties of the network in which a particular dyad is embedded. In ERGM, the dependent variable is the entire (observed) network, while independent variables are the local network configurations that are hypothesized to influence the choice to form or not form collaborative ties in the local government dyads. These parameters define a probability distribution of all possible networks for a given set of nodes, which in our case are local governments. The observed network is viewed as a random draw from this probability distribution. ERGM then simulates thousands of networks and uses maximum likelihood to determine which parameters of the model

<sup>13</sup>In the SIENA software used for the ERGM analysis, dyadic covariates may only take on integer values between 0 and 255, inclusive, due to the way memory is allocated internally by the program (Snijders et al. 2007). Since some cities had very large rates of growth (i.e., above 300%) and others have very little growth (i.e., close to 0%), this variable must be transformed to comport with data limitations in SIENA. Taking the square root preserves more variance in the low range of absolute differences, while still allowing us to include the high range of growth differences in the analysis. The square root is preferable to both linear rescaling and to taking the log of the absolute difference, since most observations have very small values relative to the largest differences; thus, the requirement that dyadic covariates have integer values would make it difficult to observe variance within the small range of values, where most of the observations reside.

create a distribution of networks that have the same average values as the observed network. The ERGM results reported here are convergent (have a good fit) because the average count of network configurations in the simulated family of networks is not significantly different from those in the observed network.<sup>14</sup>

Table 2 presents the results of an ERGM analysis of political distance on collaboration. These ERG models only estimate network relationships for cities within the five regional boundaries. Cross-regional ties are fixed as “structural zeros”; that is, they are not considered a stochastic variable in the ERGM estimation.<sup>15</sup> The direction and significance of the ERGM coefficients are interpreted analogously to a logit model, with the signs of the coefficients on the distance variables indicating increasing or decreasing probabilities of collaborative relationships within local government dyads.<sup>16</sup> For comparison, we report analogous logit estimates in the supporting information section.

Each column in Table 2 represents a separate ERGM that includes various combinations of our distance variables. The first column reports the effect of political distance effects only; the second column reports the effects of political distance plus demographic and socioeconomic distance; and the third column reports results from the full model, including political distance, demographic and socioeconomic distance, population distance, and geographic distance effects. All three models include network effects, which are discussed in more detail below.

<sup>14</sup>Model convergence is assessed by comparing the average value of simulated network statistics against the “target” values within the observed network—this deviation of simulated values from their targets yields a t-statistic, which is used to assess model convergence. Snijders et al. (2007) suggest that t-statistics should be less than 0.15 in absolute value before one can safely say that convergence has been obtained for ERG models. All ERG models reported in this article are convergent with t-statistics no more than 0.10 in absolute value—this is a more conservative threshold for assessing model convergence.

<sup>15</sup>However, a given city can belong to more than one region (i.e., it can opt in or be selected in), and so those cross-region ties are included in the analysis.

<sup>16</sup>ERGM coefficients are interpreted as the log-odds of a collaborative linkage being formed (versus not formed) if the formation of that link would create the associated network configuration. For continuous variables such as political distance, coefficient estimates reflect the increased or decreased probability of collaboration for every unit increase in the independent variable. Specifically, if a given political distance variable has parameter estimate  $b$ , and the odds of collaboration when political distance is zero is  $a$ , then increasing political distance by  $d$  units will multiply the odds-ratio of collaboration by  $e^{bd}$  (yielding an odds-ratio of collaboration equal to  $a \cdot e^{bd}$ ).

**TABLE 2 Dyadic Collaboration between Local Government in Five California Regions. Exponential Random Graph Model (ERGM), DV = Collaboration between Pairs of Local Governments**

Variable	ERG Model 1	ERG Model 2	ERG Model 3
<b>Political Distance</b>			
Party Registration	-.026*** (.008)	-.019** (.009)	-.016* (.009)
<b>Socioeconomic Distance</b>			
Percent Latino		-.018*** (.006)	-.020** (.008)
Median HH Income		-.018** (.007)	-.021** (.009)
<b>Population Size and Growth Distance</b>			
Total Population			-.030 (.046)
Growth 1990–2000			-.002 (.010)
Percent Urban			-.011*** (.004)
City-County			.869*** (.220)
<b>Geographic Distance</b>			
Distance (10 miles)			-.149*** (.033)
Neighbors			1.624*** (.276)
<b>Network Effects</b>			
Alternating k-stars	-.563*** (.149)	-.590*** (.144)	-.390** (.177)
Alternating k-triangles	1.253*** (.148)	1.231*** (.151)	.982*** (.164)
Independent k-two-paths	.042*** (.004)	.038*** (.005)	.058*** (.013)

Note: Cell entries report ERGM coefficients, standard errors (in parentheses), and p-values.

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.10 (two-tailed tests).

### Homophily Effects on Collaboration

Several notable results emerge from Table 2. First, our political distance variable is negative and significant in all models. In other words, higher levels of political distance significantly lower the probability that two jurisdictions will collaborate in a regional planning network, even after controlling for demographic, population, and geographic factors (ERG Model 3). Put differently, jurisdictions that are very different politically are less likely to collaborate, and those that are similar politically are more likely to

collaborate. These results are consistent with our main hypothesis and imply a high level of political homophily in these regional planning networks.

Second, several of the other distance variables are statistically significant as well. Dyads with greater demographic and socioeconomic differences are less likely to collaborate (i.e., those with more similarities are more likely to collaborate). Local governments with greater differences in the percent urbanized variable are less likely to collaborate, while those with different government types (i.e., city-county dyads) are more likely to form ties. The city-county effect is an interesting exception to homophily because cities are nested within counties and many land-use decisions (e.g., annexation) require joint decision making between cities and counties. Counter to our hypotheses, population and growth differences do not have a significant effect on collaboration.

Third, geographic distance is a very important driver of collaborative ties. The variables measuring distance in miles and whether both cities in a dyad are neighbors are both highly significant, suggesting that geographic proximity increases levels of interdependence and opportunities for repeated interactions and reduces the transaction costs of collaboration.

### Higher-Order Network Effects on Collaboration

In addition to our distance variables, the model contains three network structural effects: alternating k-stars, alternating k-triangles, and alternating independent k-two-paths. These network statistics take into account the tendency for a network to exhibit transitive closure (alternating k-triangles), to cluster around central high-degree and popular hubs (alternating k-stars), and to exhibit a type of edge clustering that is a precondition for transitive relationships to emerge in the network (independent k-two-paths). All of the network structural characteristics are significant. While the network structural characteristics are included to appropriately account for interdependence, they also have some interesting substantive interpretations (Robins et al. 2007b). The negative k-star parameter suggests that popularity processes are moderated, ties are more evenly distributed across the network, and any clumping in the network is due to overlapping patterns of transitivity forming multiple cores. While some local governments are popular within a particular subgroup, there is not a tendency for actors to be popular across the entire network, which in our case encompasses much of the state of California. The

structure of our research design provides one explanation for this finding—our definition of “regional” networks is centered on five different regions and naturally creates multiple cores. However, we explicitly control for geographic proximity; thus, the networks exhibit a self-organizing principle around transitivity that goes beyond geographic clustering. Berardo and Scholz (2010) have forwarded the hypotheses that transitivity processes such as those captured by *k*-triangles suggest the presence of risky cooperation games, which is also the underlying assumption of the ICA perspective. Networks with multiple cores are also consistent with the concept of polycentric governance, where political authority is distributed throughout different groups of actors in a region. In addition, transitivity in a network is facilitated by policy brokers attempting to build political coalitions among multiple actors.

## Conclusion

This article makes a number of contributions to the literatures on local government decision making, institutional collective action, and political networks. The first is that we find evidence for a political logic of collective action that increases the likelihood of collaboration between politically similar cities. Political homophily reduces the political transaction costs of regional collaboration, and the network models suggest that political similarity increases the probability of forming network ties.

Second, we investigate, expand, and provide empirical evidence for some of the core hypotheses of the institutional collective action approach to understanding the benefits and transaction costs of local government collaboration. Local governments with similar political and sociodemographic characteristics in terms of partisanship, race/ethnicity, and income are more likely to collaborate because they have similar policy preferences and thus face fewer transaction costs associated with bargaining over collective goods. Politically similar local governments also have higher benefits of collaboration because they can learn from each other’s policy experiments.

In addition to these “choice-based” drivers of cooperation, geographic proximity is also associated with collaboration (Kossinets and Watts 2009; McPherson, Smith-Lovin, and Cook 2001). Geographically proximate jurisdictions have higher levels of interdependence and thus experience more opportunities for joint gains or avoiding joint costs. Geographic proximity may also “induce” homophily: physically proximate cities engage in repeated interactions that make collaboration more likely

and reduce the logistical costs of interaction. As with various types of nonpolitical networks (e.g., scientific collaboration), our political network models confirm the importance of geographic proximity.

Finally, we consider the implications of our findings for expanding collaboration within regional planning networks. The role of political homophily highlights a tension between democratic norms of accountability versus representation. On the one hand, the fact that local governments with similar preferences and circumstances are more likely to collaborate is consistent with local governments being accountable to citizen preferences and finding ways to effectively pursue common policy interests. On the other hand, this same tendency for homophily greatly reduces the potential for redistribution across a region. Numerous observers have remarked on the increasing sorting of people into homogenous communities and resulting inequalities across our nation’s metropolitan areas (Bishop 2008; Katz 2000; Orfield 1997). Regional planning and other forms of regionalism represent key opportunities for addressing these stark inequalities by redistributing the costs and benefits of development across the region. To the extent that cities seek out and form network ties with others that are like them, there is little to redistribute and few tools to facilitate redistribution.

However, the regional planning networks we study also exhibit a strong tendency toward transitivity, which may help ameliorate the tension between local accountability and regional redistribution. Policy brokers at the apex of transitive network structures can potentially encourage collaboration among heterogeneous actors despite the strong influence of political, demographic, and geographic homophily in driving collaboration among local governments. But these policy brokers may also be subject to some of the same political incentives driving homophily in the first place. Thus, the professional and personal norms of any policy brokers will be crucial for the capacity of regional planning to engage in redistribution. For example, if policy brokers are selected from professional planning schools and are trained to resist ideological politics and place more emphasis on technical rationality, they may reduce the more negative effects of homophily. But if policy brokers are selected through a more political process, or professional norms dictate strong adherence to local citizen preferences, then the tendency for homophily will be enhanced. This article suggests that such political incentives play an important role in the context of regional land-use planning, and how political and technical rationality interact deserves more study in local government policy, and in many other policy arenas.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

- Logistic Regression Analyses
- Discussion of Network Properties
- **Table S1:** Summary of Five Regional Collaborative Land-Use and Transportation Processes in California
- **Table S2:** Variable Construction and Sources
- **Table S3:** Dyadic Collaboration between Local Government in 5 California Regions. Multivariate Logistic Regression Estimates, DV = Collaboration between Pairs of Local Governments
- **Table S4:** Political Distance and Collaboration between Local Government in 5 California Regions. Logistic Regression Estimates, DV = Collaboration between Pairs of Local Governments