Congressional Staff and the Extended Party Network in the U.S. House of Representatives

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ABSTRACT

Standard accounts of congressional behavior treat legislators as individuals whose actions are the result of the interaction of member-specific characteristics and institutional factors. However, members of Congress do not act alone but instead depend on professional staffers who are intimately involved in every aspect of the institution. In this paper, we use a novel dataset of comprehensive longitudinal employment records from the House of Representatives to show that Congressional staff — whose careers often cross multiple offices — help disseminate legislative expertise within parties and develop and reinforce the voting patterns of legislators. Specifically, results from a series of heteroskedastic Bayesian spatial autoregressive models indicate that legislators who exchange important staff members across congresses are more similar in their legislative effectiveness and voting patterns than we would otherwise expect. These findings suggest that staff play a key role in Congress and in the “extended party networks” of the contemporary era.

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1. INTRODUCTION

Research on Congressional behavior typically conceptualizes legislators as goal-oriented individual actors who pursue their preferences subject to the constraints imposed by institutional rules and norms. This standard account embeds two key assumptions. First, it assumes that members of Congress can be adequately represented as unitary actors and that the activities and decisions taken by and on behalf of those legislators are made by those members alone. Second, the standard account typically takes the preferences of members as given and infers that other influences on their behavior occur through institutional processes such as party caucuses or agenda control.

In this article, we break with the traditional approach to the study of Congress, which treats legislators as acting in isolation, and focus on professional staff. To date, contemporary scholarship has devoted relatively little attention to the influence or effects of staff on legislators, focusing instead on legislators as individuals (e.g., Mayhew 1974) or as members of parties (e.g., Aldrich 2011). We argue instead that members of Congress should also be considered as managers of and influenced by the numerous professionals who serve on their personal staffs (Salisbury and Shepsle 1981b). Staff provide essential advice and assistance to legislators and play a prominent role in the operations of Congress, including the construction, negotiation, and passage of legislation.

Further, we argue that the Congressional staff should be viewed as key components of the “extended party network,” the characteristic party structure in contemporary American politics (Koger, Masket, and Noel 2009). Multiple actors and institutions ranging from staffers to interest groups and lobbyists play key roles in these informal intra-party networks, which now play an influential role in party politics. In this sense, staff function as key players in the party, transferring expertise and policy agendas between party members, coordinating efforts in support of legislation, and generally bolstering the party-in-government as it pursues the task of creating and passing legislation. These informal staff networks link legislators together and shape their behavior in a
manner that is largely outside the scope of standard theories of Congress.¹

We provide quantitative support for the key role of Congressional staff by analyzing a uniquely detailed dataset of U.S. House of Representatives employment records. These data allow us to identify members who exchanged one or more senior or policy staffers and estimate spatial autoregressive models of their legislative effectiveness (Volden and Wiseman 2014) and voting patterns (Poole and Rosenthal 2007). We find that representatives who exchanged high-level staff are more similar in their legislative effectiveness and voting behavior than we would otherwise expect conditional on numerous explanatory variables. These results suggest that staff play a key role in transmitting legislative expertise and developing policy positions within Congressional parties and thus in the operations and effectiveness of the institution as a whole.

2. THE ROLE OF STAFF IN THE U.S. CONGRESS

Members of the contemporary U.S. Congress face overwhelming burdens. A typical congressional office must handle numerous tasks on a near-daily basis including responding to constituent requests and inquiries; participating in and tracking legislative debates; writing, amending, and voting on legislation; handling press inquiries; and raising money and otherwise preparing to run for re-election. These tasks are critical to the success of the member and to the functioning of the legislative branch itself. However, they are also time-consuming and demand significant levels of technical knowledge and task-specific expertise that very few individuals can develop on their own. How can members meet all of these demands for their time and attention simultaneously?

In reality, members themselves can not and do not perform all of these tasks, but instead rely heavily on their staffs. As Hall notes, “Faced with the press of excessive obligations and the frequent prospect of needing to be two places at once, members have responded by relying increasingly on staff...and much of what members do in person is prefigured by the options and information that staffers supply” (1996, 28). The role of legislators has thus changed to include

¹This approach also differs from research on direct inter-member relationships in legislatures (e.g., Kingdon 1989; Fowler 2006a; Masket 2008; Rogowski and Sinclair 2012). The closest analogue is the Ringe, Victor, and Gross (2013) study of staff ties in the European Parliament.
managing — or being managed by — a large team of professionals. As Salisbury and Shepsle (1981b, 559) put it, “each member of Congress has come to operate as the head of an enterprise—an organization consisting of anywhere from eight or ten to well over one hundred subordinates.”

This heavy reliance on staff is a relatively recent development (Hammond 1984, 1996). As late as the 1940s, staff resources were scarce. The number of professional staff in Congress and the importance of their duties then grew rapidly. Between the end of World War II and the 1970s, for instance, personal staffs increased fivefold (Malbin 1980). Staff growth continued through the 1980s until being scaled back in the 1990s (Hall 1996). However, the decline was concentrated among committee staff (Ornstein et al. 2013); personal staff sizes have remained relatively stable.

2.1. Staff influence

Of course, the mere presence of staff does not itself imply that they are influential. After all, Capitol Hill staffers are hired, fired, supervised, promoted, and paid by members. Moreover, staffers’ future employment prospects are closely aligned with the political success of their employers (Salisbury and Shepsle 1981a; Bertrand, Bombardini, and Trebbi 2014), which suggests that delegation to staff may result in limited agency loss. DeGregorio (1995), for instance, argues that members primarily delegate important tasks to long-term, “loyal” staffers who can be trusted to pursue member goals rather than staffers’ own preferences.

Nonetheless, researchers and observers have long argued that Hill staff are not mere ciphers who execute their members’ will while exerting no agency of their own (e.g., Price 1971). Given the complexity and scope of activities undertaken by members’ offices, it would be impossible for legislators to monitor all the activities of their staff closely or to operate effectively without the assistance of staff. Even critics of staff delegation acknowledge that “Congress could not function in today’s world without the staff on which it has come to depend” (Malbin 1980, 4).

Further, past studies find that staff play an influential role in the legislative process, especially senior and policy staff. Senior staffers (chiefs of staff, legislative directors, etc.) play a critical role in shaping the strategies of members and the operations of their offices. For instance, the Congressional Research Service describes the typical responsibilities of chiefs of staff as follows.
An incumbent in this position typically acts as the Member’s chief policy advisor, and may also undertake political advising. An incumbent may also

- develop and implement all policy objectives, strategies, and operating plans for a Member’s office;
- manage and direct all activities and staff of the Member’s Washington, DC, and field offices;
- coordinate the activities of the Member with the leadership of the appropriate chamber and committees; and
- oversee the Member’s office budget.

Policy staff (legislative aides, policy advisers, etc.) play a somewhat narrower, but still very influential, role in the legislative process, as the Congressional Management Foundation’s description of the responsibilities of legislative assistants makes clear (2015):

- Formulates legislative initiatives for assigned issue areas which include:
  - devising a legislative plan;
  - drafting the plan into legislative form;
  - planning, coordinating and scheduling introduction of legislation in the House (or offering it on an appropriate vehicle if it is in an amendment);
  - gathering support for a bill or amendment from other Members, as well as appropriate interest groups;
  - working with committees on legislation;
  - coordinating legislative support to get the bill passed in the House.
- Tracks legislation and other developments in his or her assigned issue areas and briefs the Member for floor work, committee work, work in the district, and outside House-related activities;
- Monitors legislative developments within committees;
- Plans and coordinates co-sponsorship and support of other legislation;
- Monitors legislation on the House floor, providing the Member with information on each vote;
- Writes Floor speeches for the Member

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We provide additional details about how we identify senior and policy staffers below.
Press accounts and past research make clear that staffers at both levels are given significant responsibilities and enjoy substantial autonomy. That is, while staffers are responsive to their members, they also exert considerable independent influence (e.g., Fox and Hammond 1977; Malbin 1980; DeGregorio 1988; Hall 1996). For instance, in her examination of policy leaders in Congress, DeGregorio concludes that “staffers comprise a goodly share of the leadership elite” (1995, 507). Similarly, Salisbury and Shepsle (1981b, 559) state that the organizations that legislators now lead “constrain and shape the behavior of the members in ways that help make the Congress itself a ‘loosely coupled’ collection of these enterprises.”

In what ways, precisely, do staff exert influence? Though existing research has suggested many possible ways in which staff could affect the legislative process, we focus below on two areas identified in previous research: providing expertise in the legislative process and championing specific policy goals.

First, staff can help members navigate the often complex process of moving legislation through Congress, providing “a thread of continuity, institutional memory, and expertise within the institution” (Romzek and Utter 1997, 1252). For instance, Schiller (1995) finds that staff size is associated with the number of bills introduced by senators and Whiteman (1995) uses detailed interviews to argue that staff play a crucial role in gathering information and building support for legislation. Similarly, Leal and Hess (2004) suggest that hiring inexperienced staff may hamper the effectiveness of minority legislators.

A somewhat smaller stream of research has argued that staff are not only sources of Capitol Hill experience, but help determine the content of legislation or influencing members’ voting decisions. Price (1971), for instance, argued that staff do not just act as neutral experts but instead play an entrepreneurial role in influencing policy. Similarly, Malbin (1980) contends that staffers exert independent influence in the policymaking process, labeling high-powered Hill staffers “unelected representatives” who can distort the democratic system. Others have gone on to argue that staff can influence policy by both championing specific policies and legislation (Degregorio 1996) and by building networks of support in pursuit of legislative aims (Whiteman 1995). Most recently,
Wilson (2013) suggests that staff characteristics may affect legislators’ issue priorities. However, staff may also serve as an “extension” of their member when it comes to developing positions, casting votes, and pursuing policy goals, in part because they often hold similar views (Kingdon 1989, 207–208). Kingdon initially argued that staff have little influence on members’ voting decisions except among junior members or those in competitive districts (1973). Though he observes a striking correlation between legislators’ votes and staff positions when staff are involved in voting decisions, he attributes this association largely to self-selection in job-seeking and hiring (1989, 204). He reevaluated this view in a later edition, conceding “the real possibility that staff influence on legislative voting decisions is greater now than this chapter’s portrayal would suggest” as well as the potential for staff influence on the member’s legislative advocacy efforts (1989, 206–207). We examine both possibilities below with falsification tests that allow us to evaluate whether similarities in voting patterns appear to reflect self-selection rather than staff influence.

2.2. The changing nature of staff in a partisan era

Our theoretical framework diverges from past studies of Congressional staff in considering staffers as a key component linking legislators within the contemporary parties. Though staff primarily serve the needs of legislators and the institution, we believe that they are also an important part of the party-in-government — a view that is consistent with a growing body of research on non-hierarchical linkages between members of contemporary parties and their allies (see, e.g., Bernstein and Dominguez 2003, Koger, Masket, and Noel 2009, Herrnson 2009, Koger, Masket, and Noel 2010, Desmarais, La Raja, and Kowal 2014, and Nyhan and Montgomery 2015). Formal party leadership and organizations like the Republican Study Committee and the Democratic Study Group of course play a critical role in coordinating party activities in Congress, but staff assist parties in disseminating legislative expertise among co-partisan legislators, developing shared policy positions, and helping to support legislation that advances party goals (see also Karol 2014).

This theoretical approach is consistent with important changes in the operations of Capitol Hill. First, working conditions have become increasingly unattractive, making staff positions less appealing to those who lack strong partisan allegiances. While Salisbury and Shepsle (1981a, 383)
could write that, “The pay is good and... it is often far higher than alternative employment would bring,” the period in which staff were well-paid is long gone. Even in 1995, the Congressional Management Foundation noted that “Staff typically work exceedingly long, unpredictable hours that leave little time for outside activities; receive lower pay than both private sector and federal executive branch staff... and have virtually no job security” (1995, 1). Staff salaries have continued to decline since then in real terms (Petersen, Chausow, and Wilhelm 2014).

Further, increasing polarization in Washington has permeated every aspect of the legislative process, which is likely to make a career as a staffer less attractive to non-partisans while increasing its appeal to party loyalists (Karol 2014). The incentives to demonstrate party loyalty are especially high given the possibility of staff working for aligned groups such as interest groups and political campaigns or joining lobbying firms, which offer lucrative salaries in a sector that is increasingly organized along partisan lines (Confessore 2003; Cain and Drutman 2014). Incentives have also likely changed on the hiring side, where members looking for new staff are likely to consider not just expertise but loyalty to the party and its policies. Those staffers who have valuable connections within the party are likely to be attractive to members who want to move into leadership, run for higher office, or advance legislation with the support of partisan allies (e.g., Wolffe 2009).

Staff have therefore become increasingly motivated by partisan and ideological concerns. For instance, commitment to the party is a more important predictor of whether staff leave Capitol Hill than personal commitment to individual members (Jensen 2011). Similarly, we show below that while it is common for staffers with long careers to move between offices, crossing party lines is extremely rare. While similar data are not available for the 1970s, existing accounts make clear that partisan and ideological motivations were weaker in that era. For instance, Salisbury and Shepsle (1981a, 394) state that “Ideological commitment may dominate personal loyalty for some, and in such cases staff careers may be brief and turnover considerably higher.”

2.3. Hypotheses

While many of the works cited above examine the influence of staff on member actions, the literature on congressional staff has never formally tested whether staff who move between offices
help diffuse legislative expertise and policies among legislators within parties. We directly test these claims by constructing the network of members formed by staff ties. Our aim is not just to describe this network and its properties, but to assess the extent to which we observe the diffusion of legislative expertise and policy positions by staff (and to distinguish these processes from self-selection).

What are the principal mechanisms through which staff affect member behavior? We believe that high-level staff members are key players in the “extended party network” in Congress and help shape the actions of the party-in-government in two important respects.

Most importantly, as senior and policy staff in a party move between offices, they bring with them specific knowledge, relationships, and expertise from their previous office that will in turn influence the behavior of their new boss. When Barack Obama was elected to the U.S. Senate, for instance, he hired Pete Rouse, the former chief of staff to Majority Leader Tom Daschle, because of his deep institutional knowledge and connections (Wolfe 2009; Kim 2010). Rouse played an important role in shaping Obama’s legislative career as chief of staff, helping the first-time senator successfully navigate the chamber as a high-profile newcomer and build relationships with influential legislators (Bacon 2007).

In some cases, senior and policy staff who move between offices within a party may also facilitate deeper levels of coordination and collaboration between members and their staffs, which will increase their similarity of their records. For instance, in the 108th Congress, Rep. Richard Pombo (R-CA) became chair of the House Resources Committee, a position that is now frequently selected based on party loyalty and fundraising (Deering and Wahlbeck 2006; Cann 2008). Pombo’s former legislative director and deputy chief of staff was serving as legislative director for another member, George Nethercutt (R-WA), who touted his connections to Pombo during his 2004 Senate campaign, stating that the House Resources chair “understands my feelings” and “will work with me to get a bill” to protect an area known as Wild Sky northeast of Seattle (Daly 2004). The staff tie between Pombo and Nethercutt was likely a key mechanism of this relationship.

These mechanisms are likely to influence two major outcomes of interest. First, senior and pol-
icy staff are likely to influence the effectiveness of their new office (either positively or negatively) by altering the ways that their new members’ offices approach the legislative process and fostering working relationships between their former and current employers. In this way, staff play a crucial role in disseminating specific practices and approaches to moving legislation through the chamber and influencing the lawmaking process.

Second, staff not only influence how effective members are in pursuing their legislative goals but the content of the positions that members take and the goals they pursue. Legislators face difficult information constraints that require them to take positions on hundreds or thousands of proposals. Many of these proposals are obscure and/or technical, which may increase legislators’ reliance on staff and other sources in determining which vote to cast or position to take. In addition, other proposals require complex calculations about the substantive costs and benefits of a proposal as well as the potential political consequences of supporting or opposing it. In either case, staff provide advice to members that is likely to reflect what they told their previous boss. In some cases, staffers may even consult or coordinate with their former colleagues or prior employer directly about a bill or upcoming vote. These influences could make legislators who have employed the same staffer likely to vote more similarly than we might otherwise expect. We formalize these expectations as follows:

**Hypothesis 1:** Member offices that are linked by high-level staff will be more similar in terms of legislative effectiveness than we would otherwise expect.

**Hypothesis 2:** Member offices that are linked by high-level staff members will vote in a more similar manner than we would otherwise expect.

However, past research provides little guidance about the exact level of seniority or status required for a staffer’s influence on a member to be measurable. Should we expect to detect effects only when examining senior staff (e.g., chiefs of staff and legislative directors) alone or should we also consider the influence of policy staff (e.g., legislative assistants and policy advisers assigned
to specific areas)? Lacking clear theoretical guidance, we test our hypotheses for the networks formed by senior staff ties as well as the networks formed from both policy and senior staff ties. As we discuss below, our empirical results suggest that only senior staff ties have a significant influence on members’ legislative effectiveness. By contrast, the effects of staff on voting patterns are measurable only when we include both senior and policy staff. These results can be understood theoretically in light of the differing responsibilities of senior and policy staff members. Senior staff play a broader role in organizing member offices and exercise greater responsibility in key tasks such as negotiating with other members’ offices and coordinating with party leadership. It is thus plausible that they would have a particularly strong influence on members’ ability to move their policy priorities through the legislative arena. These tasks often fall outside the purview of policy staffers; including them in the staff ties network may serve simply to dilute the effect of senior staff. By contrast, policy staff are likely to be important in shaping members’ broader record of roll call votes on the hundreds of matters that come before the chamber. These matters are the primary focus of activity for policy staff and may receive less attention from senior staff in isolation. As a result, it may be necessary to consider the ties formed by policy staffers in order to find a measurable effect.

Finally, an alternative interpretation of these hypotheses is that staff may tend to choose to work for members with similar policy views (and vice versa). It is also possible that high-quality staff choose to work for more effective members (and conversely for low-quality staff and ineffective

3Our focus is restricted to the senior and policy staffers who previous research and press accounts identify as key players on Capitol Hill. We do not expect administrative or constituent service staff to influence the effectiveness or voting of legislators.

4Such a decision also requires us to make a tradeoff between the strength of the staff-based connections between members we measure and the number of connections that we can use to test our hypotheses. If we define a staff tie narrowly, the ties we isolate will be stronger but fewer will be observed, whereas a broader definition will encompass more ties at the cost of capturing ties that are weaker on average. It is unclear a priori which approach is preferable.
members). We conduct falsification tests below to assess the extent to which our results appear to reflect self-selection by staff and legislators rather than staff influence on legislator behavior.

3. DATA AND METHODS

Having laid out our theoretical expectations, we now specify how we operationalize staff ties between party members in the U.S. House of Representatives and provide details about the Bayesian heteroskedastic spatial autoregressive models that we use in our statistical analyses.

3.1. Congressional staff and network data

In early 2012, we licensed a dataset of everyone who held a position in Congress (including members and staffers) since 1993 from CQ First Street, an electronic database that was created by digitizing the print CQ Press Directories from 1993 to 2009 and then updating the data during the subsequent period. We subset the data to records for the personal staffs of members of the House of Representatives during the 103rd to the 111th Congresses, the period for which we have complete data at the Congress level.5

We then coded position titles in the CQ data using pattern and string matching procedures to identify the senior and policy staff will be most likely to affect Congressional voting patterns and legislative effectiveness. Those staffers identified as “chief of staff,” “director” (e.g., “executive director,” “staff director,” “legislative director”), “administrative assistant,” or variants of those titles (including deputies) were coded as senior staff based on official position descriptions and titles for House offices from the Congressional Research Service (Petersen 2010). Other staff whose titles described them as legislative aides, advisers, or fellows; included legal terms such as “attorney” or “counsel”; or listed issue areas for which they were responsible in a non-correspondence role were

5The size of the staff population is largely stable over time during the period covered by our data (12,427–13,099 per Congress). We exclude committee staff due to the difficulty of linking them to specific members (e.g., Salisbury and Shepsle 1981b, 561).
We then merged the data on senior and policy staff to House member data from Volden and Wiseman (2014) and Poole and Rosenthal (2007). Among the 3,974 member-Congress observations in our data during this period, staff data were missing for only 113 cases (2.8%).

From these data, we constructed adjacency matrices for each Congress representing the number of staff ties between members for the 105th to the 111th Congresses, which allows us to test if members who share ties in the network are more similar than we would otherwise expect relative to those who are not connected directly by staff ties. If we have \( n \) members in a given Congress, the edge weight \( W_{i,j} \) between members \( i \) and \( j \) in the \( n \times n \) adjacency matrix \( W \) is simply the total number of senior and policy staff who worked for both members during the current Congress or one of the previous two congresses. For statistical reasons, these ties are thus undirected — we assume that two offices that have exchanged staffers will be more similar. This approach reflects our expectation that staff have lasting effects on the voting patterns and legislative effectiveness of members. For instance, if a staffer works for member \( i \) in Congress \( t - 1 \) and then leaves to work for member \( j \) in Congress \( t \), we expect that the influence of the staffer will make \( j \) behave more like \( i \) in Congress \( t \) by bringing her expertise and priorities (which have left a mark on \( i \) that persists at time \( t \)) to the office of \( j \). In addition, the staffer working for \( j \) may continue to communicate and coordinate with \( i \)’s staff during Congress \( t \), further aligning their activities and priorities.

As discussed above, theory does not provide clear guidance about the exact level of seniority or position required for a staffer’s influence on a member to be measurable. We therefore construct

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6Although there is likely to be some heterogeneity in staff organization and responsibilities, this approach has significant face validity and is consistent with prior research (Petersen 2010; Drutman 2012). The full list of coded titles and coding rules are available upon request.

7We omit Shelley Sekula Gibbs, who served for less than two months of the 109th Congress, as well as those for which the outcome measure of interest was missing in the analyses below.

8Because of our use of this lag, we analyze the 105th—111th Congresses below.

9Spatial regression models require symmetric adjacency matrices.
two adjacency matrices $W$ for each Congress:

- **Senior staff only:** Ties exist among members who both employed the same staff member(s) as “chief of staff,” “director” (e.g., “executive director,” “staff director,” “legislative director”), “administrative assistant,” or their variants.

- **Policy and senior staff:** Ties exist if members have employed the same individual(s) as a senior staff member (using the terms above); a legislative aide, adviser, or fellow; a legal aide or adviser; or staff listed as responsible for specific issue areas.

In the empirical analyses below, we report results from both approaches.

To address potential threats to inference, we also construct “placebo” adjacency matrices $W$ for each Congress that we use in falsification tests in the results section (described further below). The results from these matrices allow us to estimate whether our results appear to be driven by self-selection by members and staff. First, we identify all staff who are not senior or policy staff members and thus unlikely to influence the legislative effectiveness or voting record of each member. If adjacency matrices constructed these placebo staff ties show high levels of spatial autocorrelation, it would suggest that the relationships we observe are driven by self-selection (lower-level staff are also likely to display homophily with members but are unlikely to directly influence legislative effectiveness or voting patterns). Second, for legislative effectiveness scores, we construct otherwise identical matrices to those above reflecting future senior or senior/policy staff ties — the matrices include ties in a Congress that will be formed in one of the next two congresses but not those that exist in the current Congress or the previous two (as in the standard measures). Again, significant levels of spatial autocorrelation in legislative effectiveness for future ties would indicate self-selection by staffers and legislators rather than a causal effect.\textsuperscript{10}

\textsuperscript{10}It is not possible to use the future staff ties approach as a falsification test for DW-NOMINATE because scores on the measure are so highly autocorrelated.
3.2. *Descriptive statistics and example network*

Our analyses below focus on senior or senior/policy staff who work for more than one member. We first note that these sorts of staffers are relatively uncommon. Despite high levels of personnel turnover in House offices (e.g., Drutman 2012), most staff members who leave a position on a legislator’s personal staff exit the chamber rather than taking another job in the House. During the period covered by our data, only 12% of the staff who served at the senior or policy leadership level during the period covered by our sample held an equivalent position for two or more House members. However, transitions between House offices are more frequently observed among long-term staff — for instance, 44% of those who served in five or more Congresses in our data worked for more than one member.

In addition, it is worth noting that House staffing patterns display a remarkable degree of stability over this period, increasing our confidence in our ability to generalize across congresses in the data. Figure 1a shows that members average approximately 16–19 unique staff members per Congress (including Washington, D.C. and district staff) and 5.5–7 staff at the senior or policy leadership level from the 105th to the 111th Congresses. The levels of and stability in House personal staff sizes we observe during this period are consistent with a recent Congressional Research Service (CRS) analysis (Petersen, Reynolds, and Wilhelm 2010). In all, we found no evidence of any systematic changes in staffing patterns in this period. Due to the relatively infrequent within-chamber office switching among senior staff noted above, we observe only a modest number of ties between members created by staff change as displayed in Figure 1b. However, the frequency of these staff ties between House members is quite stable (the expected number of connections for a randomly chosen legislator ranges from 0.37 to 0.51 during our sample period). Almost all of these ties have a weight of one, indicating a single senior or policy staffer who went from one office to another (the maximum tie weight is 1 for 95–99% of all members by Congress who have

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11The interquartile range is 5–7 for policy staff and 2–3 for senior staff. Policy and senior staff totals at the member-Congress level are almost perfectly uncorrelated with the outcome measures we analyze below (results available upon request).
Figure 1: Stability in House staff levels and ties

(a) Average staff size per member  
(b) Average staff ties between members

Data from CQ First Street for the 105th to the 111th Congresses. Includes all personal staff in the House of Representatives. Ties represent senior or policy leadership staff who previously worked for another member during that congress or one of the two previous congresses.

at least one tie to another member). Likewise, most members who have a staff tie are linked to only one other member (61%–80% by Congress). Thus, we also found no evidence for any significant patterns in staff ties across this period.

As expected, cross-party linkages are exceptionally rare in our data. Fewer than 50 of the 12,938 unique staffers who served on the personal staffs of House members at the senior or policy level during this period worked for different legislators on both sides of the aisle. The member-to-member ties created by staff connections that we analyze below should thus be interpreted as potential channels of within-party influence, which is consistent with our theoretical expectations.

To provide intuition about the networks of legislators linked by staff that we analyze, we provide an illustrative example in Figure 2, which shows the network of non-isolate House members linked by senior or policy staff in the 107th Congress. As expected, connected legislators are overwhelmingly segregated by party. In fact, the parties are disjoint; we observe no links between

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12It was not possible to construct usable issue-specific adjacency matrices. When we examined ties among staff with the most commonly listed issue specialties, the resulting matrices had only a handful of ties per Congress (results not shown).

13We treat Bernie Sanders as a Democrat for the purposes of this analysis.
Democratic and Republican legislators via shared senior or policy staff. Also, though the networks are not fully connected, we see large connected components of both Republicans (white nodes) and Democrats (black nodes) as well as isolated dyads and smaller components in each party.

### 3.3. Spatial autoregression

Our hypothesis is that party members who are linked by shared senior or policy staff will have more similar legislative effectiveness scores (Volden and Wiseman 2014) and first dimension DW-NOMINATE scores (Poole and Rosenthal 2007) than we would otherwise expect. To test this claim, we estimate spatial autoregressive models (a standard approach in the networks literature — see, e.g., Nyhan and Montgomery 2015) for each Congress from 105th to the 111th. This choice is driven by our interest in the effects of this network on the member-level outcomes that are the primary focus of Congressional research.\(^{14}\)

Specifically, we estimate a Bayesian heteroskedastic spatial autoregressive model with covariates (LeSage and Pace 2009).\(^{15}\) For a continuous outcome \(y\), we assume that

\[
y = X\beta + \rho Wy + \epsilon \tag{1}
\]

\[
\epsilon \sim N(0, \sigma^2 V) \tag{2}
\]

\[
V_{ii} = v_i, i \in [1, \ldots, n], V_{ij} = 0 \forall i \neq j \tag{3}
\]

where \(n\) is the number of observations, \(X\) is an \(n \times p\) covariate matrix, and \(W\) is an \(n \times n\) weight matrix with zeros along the diagonal. \(V\) is a diagonal matrix containing variance scalar parameters, which allow for individual observations to be divergent from the behavior of their neighbors (LeSage and Pace 2009). In essence, adding these scalar terms to the error distribution

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\(^{14}\)We do not, for instance, use exponential random graph models (ERGMs) because the goal of those models is to understand how and why networks are formed. Though that is a valuable topic for future research, our goal here is to estimate the effect of staff ties on legislative behavior.

\(^{15}\)All analyses were conducted in Matlab using \texttt{sar.g} (LeSage and Pace 2009).
Figure 2: The staff network of House members in the 107th Congress

Data from CQ First Street. Democratic legislators (and Bernie Sanders, who caucused with the party) are indicated by black nodes and Republicans by white nodes. Ties represent senior or policy staff who previously worked for another member during that congress or one of the two previous congresses. Isolates are excluded.
is equivalent to assuming a Student-t prior distribution for the errors.\textsuperscript{16}

The model is fully specified by placing priors over the model parameters, $\rho$, $\beta$, $\sigma$ and $V$. We specify standard uninformative reference priors on the regression coefficients ($\beta$) and variance term ($\sigma$). Further, we place a uniform prior on the spatial autocorrelation coefficient, $\rho \sim U(-1, 1)$. Finally, the prior distribution for the variance scalar parameters is $\pi(r_v) \sim iid \chi^2(r), i \in [1, \ldots, n]$. In this case, we use the default hyperprior recommendation from LeSage and Pace (2009) and set $r = 4$, which allows for a modest degree of heteroskedasticity in the data generating process.

Within this context, the spatial adjacency matrix $W$ we study represents the strength of the ties between members $i$ and $j$ in a unipartite network, which we measure as a simple count of the number of staff currently employed in member $i$’s office that were previously employed in member $j$’s office in the current congress or previous two congresses and vice versa.\textsuperscript{17} The values for $W_{i,j}$ are thus the number of staff who worked for both $i$ and $j$ in the Congress in question and the two previous ones after being row-standardized, which normalizes the matrix so that each row sums to exactly one for members that have one or more shared staff members and to zero otherwise (a standard procedure in this literature; see, e.g., Ward and Gleditsch 2008; LeSage and Pace 2009).\textsuperscript{18}

In our statistical model, the key parameter is the spatial autocorrelation coefficient $\rho$. This term measures the tendency of members who are linked by staff to behave more more similarly than

\textsuperscript{16}Our spatial regression approach is preferable to a mixed-effects model (e.g., Ringe, Victor, and Gross 2013) for this application because we wish to model spatial autocorrelation directly rather than treating it as a nuisance parameter. Moreover, our approach provides a directly interpretable estimate of the global level of autocorrelation among connected members.

\textsuperscript{17}It is not possible to account for indirect ties using weights based on network distance because the party networks formed by staff ties are not fully connected and many distances are thus infinite.

\textsuperscript{18}The weight $W_{c,d}$ representing the tie between members $c$ and $d$ is set such that $\sum_d W_{c,d} = 1$ for all who exchange at least one staffer with another office ($\sum_d W_{c,d} = 0$ otherwise). Though little variation exists in office-level staff totals, this standardization ensures that our inferences are not distorted by any tendency of specific members to share a larger number of staffers.
we would expect by chance alone after controlling for other relevant factors such as party, district preferences, seniority, and gender. Our theory implies that $\rho > 0$, which means that members who share staff will be more similar than otherwise expected. We emphasize that the $\rho$ parameter does not imply a directional relationship. For instance, the positive spatial coefficients we report below do not mean that members who exchange staffers have higher legislative effectiveness or DW-NOMINATE scores than other members. Instead, positive $\rho$ values indicate that members linked by staffers are more similar in their behavior than we would otherwise expect conditional on the covariates in our models. Thus, $\rho$ should be understood as the predicted change in the outcome variable for a given member as the scores for all of her “neighbors” in the network increase by one unit (Ward and Gleditsch 2008, 38).

In the analyses below, we report posterior means and standard deviations for $\rho$ separately for the 105th to the 112th Congress. We also report pooled estimates for these posteriors across all congresses using the procedure outlined by Gelman et al. (2004). We take this cross-sectional approach out of necessity. Despite advances in analyzing spatial autocorrelation in panel data, all methods of which we are aware assume that the spatial weights matrix $W$ is constant across time periods. In our case, however, we calculate a new weights matrix for each Congress to allow for changes in staff ties over time. We therefore estimate a series of separate cross-sectional models and pool our estimates over time, which offers a useful way to combine our inferences across congresses while still allowing the network of member-staff relationships to evolve over time.\(^{19}\)

While the spatial autocorrelation coefficient $\rho$ is the parameter of primary interest in our analysis, we also report the other key structural parameters below that are denoted $\beta$ in Equation (1). However, some caution is needed in interpreting these coefficients. In a standard linear regression model in which $y = X\beta + \epsilon$, the expected change in $y$ resulting from a one unit change in some covariate $r$, denoted $X_r$, is captured by the regression parameter $\beta_r$. (Under the strict linearity assumption in OLS, the partial derivative $\frac{\partial y}{\partial X_r}$ is just $\beta_r$.) By contrast, the predicted value of $y_i$ in the

\(^{19}\)Likewise, it is not possible to test whether the influence of staff ties varies significantly in particular subsets of the data in the spatial autoregressive framework we employ.
spatial autoregressive model specified in Equation (1) is a function of not only the covariate values for unit \(i\) but also the covariate values of adjacent units in the spatial weight matrix \(W\) (LeSage and Pace 2009, 38). In other words, the level of effectiveness we expect to observe for member \(i\) is related to the level of effectiveness we expect to observe for all units adjacent to member \(i\) in the adjacency matrix described above. To see this, we can re-write Equation (1) above as:

\[
y - \rho W y = X\beta + \epsilon \\
(I_n - \rho W)y = X\beta + \epsilon \\
y = (I_n - \rho W)^{-1}X\beta + (I_n - \rho W)^{-1}\epsilon
\]  

(4)

In this model, the change in the vector \(y\) associated with a one unit change in covariate \(r\) (which we denote as \(S_r(W)\)) is:

\[
\frac{\partial y}{\partial x_r} \equiv S_r(W) = (I_n - \rho W)^{-1}I_n\beta_r
\]

(5)

To facilitate interpretation in our analysis below, we therefore follow LeSage and Pace (2009) in reporting the average direct effect for covariates we discuss. The average direct effect is the change in \(y_i\) associated with a one unit change in covariate \(r\) for that same unit \(i\). This quantity can be calculated as \(E(D) = n^{-1}\text{tr}(S_r(W))\). The total average effect, or the average effect of a one unit change on covariate \(r\) on the entire system, can be calculated as \(E(T) = n^{-1}1_n'(S_r(W))1_n\). Finally, we also report the average indirect effect, a quantity that represents the average effect of changes in covariate values across units and can be calculated as \(E(I) = E(T) - E(D)\).

3.4. Outcome variables

To test the influence of staff on legislators’ contribution to the legislative process (Hypothesis 1), we use legislative effectiveness scores (LES), which were created by Volden and Wiseman (2014) to capture members’ ability to propose new bills and move them through the legislative process. This composite measure includes information about the number of significant and substantive

\[^{20}\text{While it is possible in principle to estimate this model using maximum likelihood, we use a Bayesian approach and calculate effects directly using draws from the full posterior distribution.}\]
bills members sponsor, whether those bills receive action at the committee stage or beyond, and whether the bills passed the House or became law.\textsuperscript{21} In general, these scores capture the “proven ability to advance a member’s agenda through the legislative process and into law” (Volden and Wiseman 2014, 18; see also http://www.thelawmakers.org/#/method).

We also wish to test the extent to which staff ties are associated with the positions members take, including how they vote in roll calls on the floor. Hypothesis 2 is therefore tested using first-dimension DW-NOMINATE scores (Poole and Rosenthal 2007), which capture members’ general tendencies to support the positions of the Democratic or Republican parties in roll call votes (Aldrich, Montgomery, and Sparks 2014).\textsuperscript{22}

4. RESULTS

Having described our data and statistical approach, we next turn to presenting our main results. We begin by focusing on the role of staff in influencing legislative effectiveness and then assess their role in the policy positions that party members take.

4.1. Legislative effectiveness

Our first hypothesis is that member offices who are linked via staff members will be more similar in their legislative effectiveness than we would otherwise anticipate. Following Volden and Wiseman (2014), we predict members’ legislative effectiveness scores (LES) using models that also include covariates for the number of years members have served consecutively in the House, majority party status, gender (e.g., Volden, Wiseman, and Wittmer 2013), whether they are a committee and/or subcommittee chair, whether they serve on a power committee (Appropriations, Rules, and Ways and Means), and whether they are in the majority or minority leadership. Note that including a control for majority party status implicitly controls for party affiliation because we

\textsuperscript{21}In the 105\textsuperscript{th}–111\textsuperscript{th} Congresses, LES scores ranged from 0 to 18.6. The mean value is 0.996 with a standard deviation of 1.526.

\textsuperscript{22}Though several alternative measures exist, they are all highly correlated. We focus on DW-NOMINATE here because it is the most widely used.
estimate a separate model for each Congress as described above.\footnote{Controlling for party affiliation is statistically equivalent to controlling for majority party status in the models we estimate for each congress. We thus control for majority status, which is more relevant to our outcome of interest (Volden and Wiseman 2014).}

As noted above, our main interest is in the spatial autoregressive term $\rho$, which indicates the degree to which party members who are connected by staffers are more similar in their level of legislative effectiveness than we would expect by chance alone. We begin by considering the network of ties created by the movement of senior staff members between offices (e.g., chief of staff, legislative director, etc.). These results are shown in Table 1.\footnote{Although there is some congress-level variation in our estimates of $\rho$ in each of our tables, we observe no consistent pattern that can be clearly linked to changes in party control or electoral outcomes. We therefore focus on the pooled results below.} The spatial autoregressive coefficient $\rho$ is positive in each congress except for two, indicating that members who are linked via senior staff ties are more similar in their legislative effectiveness conditional on the covariates in the model than we would otherwise expect. Further, while not all of the spatial autoregressive coefficients are reliably greater than zero, the pooled estimate of $\rho$ is 0.043 with a 95% credible interval of $[0.009, 0.096]$, indicating that network effects are reliably greater than zero overall. Senior staff appear to influence the legislative effectiveness of the offices in which they work.

To make the substantive implications of these results clearer, it is helpful to present the estimated effect of partisan staff connections in a particular model. If we focus on the 108\textsuperscript{th} Congress, the expected direct effect of an increase in legislative effectiveness for committee chairs is 1.855 with a 90\% credible interval of $[1.374, 2.354]$ (compared with not serving as chair). However, the chairmanship effect is likely to have spillover benefits to other legislator who are linked via staff ties to the member in question. Allies of that legislator whose offices are led by former staffers of the chair may be more likely to have their bills make it through the committee, for instance. Alternatively, legislators may benefit from ties to the committee chair via former staffers who now work for him or her. The estimated indirect effect of being a committee chair, which takes into
Table 1: Legislative effectiveness results (senior staff ties)

<table>
<thead>
<tr>
<th></th>
<th>105</th>
<th>106</th>
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<th>109</th>
<th>110</th>
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<th>Pooled</th>
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<tbody>
<tr>
<td>Seniority</td>
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<td>0.023</td>
<td>0.024</td>
<td>0.025</td>
<td>0.024</td>
<td>0.016</td>
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<td></td>
</tr>
<tr>
<td>Majority party</td>
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<td>0.281</td>
<td>0.344</td>
<td>0.414</td>
<td>0.374</td>
<td>0.288</td>
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</tr>
<tr>
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<td>(0.078)</td>
<td>(0.075)</td>
<td>(0.073)</td>
<td>(0.068)</td>
<td>(0.074)</td>
<td></td>
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</tr>
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<td>0.036</td>
<td>-0.027</td>
<td>0.052</td>
<td>0.135</td>
<td>0.050</td>
<td>-0.043</td>
<td></td>
</tr>
<tr>
<td>(0.091)</td>
<td>(0.088)</td>
<td>(0.081)</td>
<td>(0.081)</td>
<td>(0.081)</td>
<td>(0.077)</td>
<td>(0.083)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Committee chair</td>
<td>2.693</td>
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<td>1.991</td>
<td>1.844</td>
<td>1.477</td>
<td>2.869</td>
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<td>(0.346)</td>
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<td>Committee subchair</td>
<td>1.107</td>
<td>0.991</td>
<td>0.728</td>
<td>0.693</td>
<td>0.561</td>
<td>0.308</td>
<td>0.328</td>
<td></td>
</tr>
<tr>
<td>(0.144)</td>
<td>(0.12)</td>
<td>(0.116)</td>
<td>(0.114)</td>
<td>(0.116)</td>
<td>(0.094)</td>
<td>(0.101)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power committee</td>
<td>-0.033</td>
<td>-0.052</td>
<td>0.041</td>
<td>-0.051</td>
<td>-0.149</td>
<td>-0.203</td>
<td>-0.056</td>
<td></td>
</tr>
<tr>
<td>(0.074)</td>
<td>(0.070)</td>
<td>(0.070)</td>
<td>(0.072)</td>
<td>(0.069)</td>
<td>(0.066)</td>
<td>(0.075)</td>
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<td></td>
</tr>
<tr>
<td>Majority leadership</td>
<td>-0.208</td>
<td>-0.200</td>
<td>0.320</td>
<td>1.136</td>
<td>0.768</td>
<td>0.317</td>
<td>0.666</td>
<td></td>
</tr>
<tr>
<td>(0.254)</td>
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<td>(0.265)</td>
<td>(0.34)</td>
<td>(0.258)</td>
<td>(0.174)</td>
<td>(0.201)</td>
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</tr>
<tr>
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<td>-0.024</td>
<td>-0.050</td>
<td>-0.099</td>
<td>-0.163</td>
<td>-0.136</td>
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<td>(0.199)</td>
<td>(0.208)</td>
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<td>(0.182)</td>
<td>(0.193)</td>
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<td></td>
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<td>Constant</td>
<td>0.055</td>
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<td>0.215</td>
<td>0.206</td>
<td>0.201</td>
<td>0.296</td>
<td>0.302</td>
<td></td>
</tr>
<tr>
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<td>(0.063)</td>
<td>(0.069)</td>
<td>(0.066)</td>
<td>(0.067)</td>
<td>(0.058)</td>
<td>(0.066)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff connections (ρ)</td>
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<td>-0.051</td>
<td>0.019</td>
<td>0.194</td>
<td>0.093</td>
<td>0.022</td>
<td>0.094</td>
<td>0.043</td>
</tr>
<tr>
<td>(0.043)</td>
<td>(0.05)</td>
<td>(0.078)</td>
<td>(0.060)</td>
<td>(0.053)</td>
<td>(0.055)</td>
<td>(0.061)</td>
<td>(0.021)</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.457</td>
<td>0.471</td>
<td>0.313</td>
<td>0.313</td>
<td>0.263</td>
<td>0.420</td>
<td>0.359</td>
<td></td>
</tr>
<tr>
<td>N</td>
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<td>442</td>
<td>438</td>
<td>438</td>
<td>446</td>
<td>444</td>
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</tr>
</tbody>
</table>

Bayesian heteroskedastic spatial autoregressive models (LeSage and Pace 2009) estimated in Matlab using `sar_g` on legislative effectiveness scores (Volden and Wiseman 2014). House staff data from CQ First Street for the 105th–111th Congresses. Ties represent senior staff who previously worked for another member during that congress or one of the two previous congresses. Standard deviations of the parameter posteriors are in parentheses.

account the effects on other members connected to the chair via the staff network and is calculated by subtracting the direct effect from the total effect, is 0.445 with a 90% credible interval of [0.136, 0.842], which represents a 0.29 standard deviation increase in that Congress.

Table 2 shows the results of an identical model when the staff ties we consider among members are expanded to include the policy staffers described above (e.g., legislative aides) in addition to the senior staff considered in the previous analysis. In this case, the results are more ambiguous. Legislative effectiveness does not seem to be reliably transmitted through the broader group of senior and policy staff (pooled estimate of ρ = 0.015 with a 90% credible interval of [−0.014, 0.038], which is consistent with our expectations but not statistically conclusive). The weaker relation-
Table 2: Legislative effectiveness results (policy/senior staff ties)

<table>
<thead>
<tr>
<th>Seniority</th>
<th>0.047</th>
<th>0.024</th>
<th>0.023</th>
<th>0.024</th>
<th>0.024</th>
<th>0.025</th>
<th>0.016</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.008)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Majority party</td>
<td>0.351</td>
<td>0.434</td>
<td>0.286</td>
<td>0.328</td>
<td>0.429</td>
<td>0.365</td>
<td>0.285</td>
</tr>
<tr>
<td></td>
<td>(0.079)</td>
<td>(0.077)</td>
<td>(0.079)</td>
<td>(0.077)</td>
<td>(0.075)</td>
<td>(0.07)</td>
<td>(0.078)</td>
</tr>
<tr>
<td>Female</td>
<td>0.027</td>
<td>0.036</td>
<td>-0.022</td>
<td>0.055</td>
<td>0.131</td>
<td>0.052</td>
<td>-0.053</td>
</tr>
<tr>
<td></td>
<td>(0.088)</td>
<td>(0.088)</td>
<td>(0.083)</td>
<td>(0.084)</td>
<td>(0.08)</td>
<td>(0.078)</td>
<td>(0.085)</td>
</tr>
<tr>
<td>Committee chair</td>
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<td>2.381</td>
<td>2.003</td>
<td>1.824</td>
<td>1.471</td>
<td>2.863</td>
<td>2.186</td>
</tr>
<tr>
<td></td>
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<td>(0.399)</td>
<td>(0.252)</td>
<td>(0.243)</td>
<td>(0.43)</td>
<td>(0.234)</td>
<td>(0.339)</td>
</tr>
<tr>
<td>Committee subchair</td>
<td>1.108</td>
<td>1.001</td>
<td>0.727</td>
<td>0.691</td>
<td>0.549</td>
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<tr>
<td></td>
<td>(0.144)</td>
<td>(0.123)</td>
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<td>(0.117)</td>
<td>(0.114)</td>
<td>(0.093)</td>
<td>(0.102)</td>
</tr>
<tr>
<td>Power committee</td>
<td>-0.030</td>
<td>-0.051</td>
<td>0.042</td>
<td>-0.062</td>
<td>-0.146</td>
<td>-0.206</td>
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<td>(0.071)</td>
<td>(0.071)</td>
<td>(0.065)</td>
<td>(0.075)</td>
</tr>
<tr>
<td>Majority leadership</td>
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<td>-0.22</td>
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<td>0.776</td>
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<td>(0.33)</td>
<td>(0.26)</td>
<td>(0.17)</td>
<td>(0.205)</td>
</tr>
<tr>
<td>Minority leadership</td>
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<td>-0.136</td>
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<td>-0.165</td>
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<td>(0.163)</td>
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<td>0.205</td>
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<td>(0.065)</td>
<td>(0.068)</td>
<td>(0.065)</td>
<td>(0.069)</td>
<td>(0.06)</td>
<td>(0.066)</td>
</tr>
</tbody>
</table>

Staff connections ($\rho$) | 0.023 | -0.023 | -0.003 | 0.071 | -0.037 | 0.025 | 0.035 | 0.015 |
|                         | (0.031) | (0.031) | (0.042) | (0.033) | (0.039) | (0.031) | (0.035) |

R² | 0.4559 | 0.4716 | 0.3148 | 0.3114 | 0.2637 | 0.4190 | 0.3559 | 0.013 |

N | 444 | 437 | 442 | 438 | 438 | 446 | 444 |

Bayesian heteroskedastic spatial autoregressive models (LeSage and Pace 2009) estimated in Matlab using sar_g on legislative effectiveness scores (Volden and Wiseman 2014). House staff data from CQ First Street for the 105th–111th Congresses. Ties represent senior and policy staff who previously worked for another member during that congress or one of the two previous congresses. Standard deviations of the parameter posteriors are in parentheses.

ship among this broader group of staff may be the result of the disproportionate role senior staff seem to play in moving specific bills through the legislative process. Policy staffers may be more influential, as we find below, in shaping roll call voting by members.

4.2. Voting record

Our second hypothesis is that legislators who are linked by partisan staff ties have more similar voting records than we would otherwise anticipate. As before, we fit a spatial autoregressive model to test whether staff connections between offices covary with the outcome in question conditional on a series of observable covariates. Obviously, however, the covariates used in our analysis of legislative effectiveness are not necessarily appropriate in modeling voting patterns. (For
Table 3: DW-NOMINATE results (senior staff ties)

<table>
<thead>
<tr>
<th></th>
<th>105</th>
<th>106</th>
<th>107</th>
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<th>111</th>
<th>Pooled</th>
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</thead>
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<td>-0.007</td>
<td>-0.007</td>
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<td>(0.002)</td>
<td>(0.002)</td>
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<td>-0.745</td>
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<td>(0.016)</td>
<td>(0.016)</td>
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<td>(0.016)</td>
<td>(0.016)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-0.057</td>
<td>-0.064</td>
<td>-0.055</td>
<td>-0.041</td>
<td>-0.031</td>
<td>-0.034</td>
<td>-0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.016)</td>
<td>(0.015)</td>
<td>(0.014)</td>
<td></td>
</tr>
<tr>
<td>District pres. vote</td>
<td>-1.551</td>
<td>-1.559</td>
<td>-1.422</td>
<td>-1.551</td>
<td>-1.78</td>
<td>-1.937</td>
<td>-1.768</td>
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</tr>
<tr>
<td></td>
<td>(0.299)</td>
<td>(0.328)</td>
<td>(0.255)</td>
<td>(0.253)</td>
<td>(0.257)</td>
<td>(0.279)</td>
<td>(0.276)</td>
<td></td>
</tr>
<tr>
<td>District pres. vote²</td>
<td>0.540</td>
<td>0.549</td>
<td>0.572</td>
<td>0.674</td>
<td>0.866</td>
<td>0.973</td>
<td>0.826</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.231)</td>
<td>(0.255)</td>
<td>(0.209)</td>
<td>(0.216)</td>
<td>(0.225)</td>
<td>(0.243)</td>
<td>(0.236)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.094</td>
<td>1.113</td>
<td>1.018</td>
<td>1.064</td>
<td>1.121</td>
<td>1.176</td>
<td>1.237</td>
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</tr>
<tr>
<td></td>
<td>(0.091)</td>
<td>(0.100)</td>
<td>(0.071)</td>
<td>(0.069)</td>
<td>(0.068)</td>
<td>(0.073)</td>
<td>(0.072)</td>
<td></td>
</tr>
<tr>
<td>Staff connection (ρ)</td>
<td>0.030</td>
<td>-0.026</td>
<td>-0.067</td>
<td>-0.044</td>
<td>0.019</td>
<td>0.038</td>
<td>0.016</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.034)</td>
<td>(0.033)</td>
<td>(0.032)</td>
<td>(0.035)</td>
<td>(0.030)</td>
<td>(0.027)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>R²</td>
<td>0.9288</td>
<td>0.9245</td>
<td>0.9282</td>
<td>0.9305</td>
<td>0.9353</td>
<td>0.9354</td>
<td>0.9450</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>442</td>
<td>436</td>
<td>440</td>
<td>437</td>
<td>437</td>
<td>445</td>
<td>442</td>
<td></td>
</tr>
</tbody>
</table>

Bayesian heteroskedastic spatial autoregressive models (LeSage and Pace 2009) estimated in Matlab using `sarg` on first-dimension DW-NOMINATE scores (Poole and Rosenthal 2007). House staff data from CQ First Street for the 105th–111th Congresses. Ties represent senior staff who previously worked for another member during that congress or one of the two previous congresses. Standard deviations of the parameter posteriors are in parentheses.

instance, there is no reason to believe that being a committee subchair is by itself related to voting patterns.) Our models of first dimension DW-NOMINATE scores (Poole and Rosenthal 2007) therefore include covariates that are plausibly associated with member voting records including seniority, membership in the Democratic party, and gender (e.g., Frederick 2010). Most importantly, we also control for district preferences, which we measure using the two-party vote received by the Democratic presidential candidate in the previous election in each member’s congressional district as well as a squared presidential vote share term that allows for potential non-linearities.

We again begin by considering the network of ties created by the movement of senior staff between offices. These results are shown in Table 3. As with the results in Table 2, the spatial autoregressive coefficients in these models are mostly positive, but the pattern is not consistent over time. As a result, the pooled estimate is very small (ρ = −0.001) and is not reliably distinguishable from zero (the 95% credible interval for this parameter is [−0.028, 0.019]). We therefore lack
Table 4: DW-NOMINATE results (policy/senior staff ties)

<table>
<thead>
<tr>
<th></th>
<th>105</th>
<th>106</th>
<th>107</th>
<th>108</th>
<th>109</th>
<th>110</th>
<th>111</th>
<th>Pooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seniority</td>
<td>-0.01</td>
<td>-0.009</td>
<td>-0.008</td>
<td>-0.007</td>
<td>-0.007</td>
<td>-0.006</td>
<td>-0.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>Democrat</td>
<td>-0.645</td>
<td>-0.669</td>
<td>-0.696</td>
<td>-0.719</td>
<td>-0.730</td>
<td>-0.720</td>
<td>-0.798</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.019)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-0.057</td>
<td>-0.062</td>
<td>-0.048</td>
<td>-0.038</td>
<td>-0.03</td>
<td>-0.034</td>
<td>-0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.016)</td>
<td>(0.015)</td>
<td>(0.014)</td>
<td></td>
</tr>
<tr>
<td>District pres. vote</td>
<td>-1.513</td>
<td>-1.59</td>
<td>-1.385</td>
<td>-1.523</td>
<td>-1.752</td>
<td>-1.896</td>
<td>-1.748</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.302)</td>
<td>(0.325)</td>
<td>(0.249)</td>
<td>(0.261)</td>
<td>(0.262)</td>
<td>(0.267)</td>
<td>(0.276)</td>
<td></td>
</tr>
<tr>
<td>District pres. vote$^2$</td>
<td>0.516</td>
<td>0.572</td>
<td>0.542</td>
<td>0.65</td>
<td>0.844</td>
<td>0.939</td>
<td>0.814</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.236)</td>
<td>(0.251)</td>
<td>(0.204)</td>
<td>(0.221)</td>
<td>(0.228)</td>
<td>(0.233)</td>
<td>(0.237)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.077</td>
<td>1.116</td>
<td>0.992</td>
<td>1.046</td>
<td>1.107</td>
<td>1.155</td>
<td>1.225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.092)</td>
<td>(0.099)</td>
<td>(0.071)</td>
<td>(0.072)</td>
<td>(0.07)</td>
<td>(0.071)</td>
<td>(0.072)</td>
<td></td>
</tr>
<tr>
<td>Staff connection ($\rho$)</td>
<td>0.024</td>
<td>0.012</td>
<td>0.047</td>
<td>0.023</td>
<td>0.036</td>
<td>0.062</td>
<td>0.026</td>
<td></td>
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<tr>
<td></td>
<td>(0.022)</td>
<td>(0.023)</td>
<td>(0.022)</td>
<td>(0.022)</td>
<td>(0.022)</td>
<td>(0.020)</td>
<td>(0.020)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.008)</td>
</tr>
<tr>
<td>R$^2$</td>
<td>0.9286</td>
<td>0.9242</td>
<td>0.9281</td>
<td>0.9302</td>
<td>0.9358</td>
<td>0.9358</td>
<td>0.9449</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>442</td>
<td>436</td>
<td>440</td>
<td>437</td>
<td>437</td>
<td>445</td>
<td>442</td>
<td></td>
</tr>
</tbody>
</table>

Bayesian heteroskedastic spatial autoregressive models (LeSage and Pace 2009) estimated in Matlab using `sar_g` on first-dimension DW-NOMINATE scores (Poole and Rosenthal 2007). House staff data from CQ First Street for the 105th–111th Congresses. Ties represent policy and senior staff who previously worked for another member during that congress or one of the two previous congresses. Standard deviations of the parameter posteriors are in parentheses.

sufficient evidence to conclude that senior staff affect members’ voting records (as represented by first-dimension DW-NOMINATE scores).

When we consider the larger network of policy and senior staff ties, however, the data tell a very different story. These results are provided in Table 4. In this case, the spatial autoregressive coefficient is consistently positive and is reliably greater than zero in the 109th, 110th, and 111th Congresses. Moreover, the pooled estimate is 0.033 and reliably greater than zero with a 95% credible interval of [0.0174, 0.0485]. These results are especially compelling given how much of the variance in DW-NOMINATE scores is already accounted for by our covariates ($R^2 > 0.90$ in each congress). This result indicates that Congressional voting patterns are statistically associated with members’ roll call voting patterns among legislators linked by staff ties even after accounting for other factors that are predictive of member behavior.
4.3. Falsification tests

Any analysis like ours that uses observational data must address concerns about endogeneity. In particular, it is possible that our results are simply a consequence of staff seeking out members with similar characteristics to their previous bosses or members hiring staff from legislators with similar records. We therefore performed a series of falsification tests using placebo adjacency matrices of lower-level staff and future senior or senior/policy staff ties between legislators (described in section 3.1 above). If our results are spurious in this way, then we should observe significant spatial autocorrelation for both lower-level and future senior/policy staff ties.\footnote{The goal of this approach is to evaluate whether a modeling approach correctly recovers an effect that is expected to be zero based on theory (Sekhon 2009). Falsification tests thus differ from network permutation tests, which evaluate the probability of an outcome under a null distribution constructed by randomizing the set of ties among actors.}

The falsification tests we conducted using these two strategies are summarized in Table 5. The first two rows in the table report falsification tests for legislative effectiveness scores using adjacency matrices constructed from lower-level and future senior staff ties.\footnote{We focus on senior staff ties given the significant relationship we find above.} The third row reports falsification tests for DW-NOMINATE constructed using lower-level staff ties. The results provide little evidence that our results for legislative effectiveness are the result of homophily between staff and legislators. The pooled estimates are not reliably different from zero for either set of placebo ties. Moreover, the 95\% credible interval for lower-level staff ties \([-0.022, 0.033]\) does not include the pooled estimate from Table 1 (0.043). By contrast, our pooled estimates of spatial autocorrelation for DW-NOMINATE are positive and distinct from zero for lower-level staff (0.019; 95\% credible interval: \([0.003, 0.036]\)), suggesting that homophily in party loyalty is a significant factor in staff movement between offices.\footnote{As noted above, future staff ties are not an appropriate falsification test for DW-NOMINATE.} The point estimate for this falsification test is reduced almost by half compared with Table 4, which suggests that our results are not solely the result of self-selection. However, the 95\% credible interval for the falsification test does barely include our
Table 5: Placebo test results (spatial autoregressive coefficients only)

<table>
<thead>
<tr>
<th>Legislative effectiveness:</th>
<th>105</th>
<th>106</th>
<th>107</th>
<th>108</th>
<th>109</th>
<th>110</th>
<th>111</th>
<th>Pooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower-level staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.039</td>
<td>-0.021</td>
<td>0.006</td>
<td>0.024</td>
<td>-0.023</td>
<td>0.024</td>
<td>-0.010</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.031)</td>
<td>(0.049)</td>
<td>(0.038)</td>
<td>(0.035)</td>
<td>(0.035)</td>
<td>(0.033)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>Future senior staff</td>
<td>-0.073</td>
<td>-0.070</td>
<td>0.015</td>
<td>0.214</td>
<td>0.011</td>
<td>0.028</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.066)</td>
<td>(0.058)</td>
<td>(0.063)</td>
<td>(0.055)</td>
<td>(0.057)</td>
<td>(0.027)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW-NOMINATE:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower-level staff</td>
<td>0.046</td>
<td>0.035</td>
<td>0.022</td>
<td>0.007</td>
<td>0.021</td>
<td>0.004</td>
<td>0.004</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.022)</td>
<td>(0.025)</td>
<td>(0.025)</td>
<td>(0.023)</td>
<td>(0.021)</td>
<td>(0.019)</td>
<td>(0.008)</td>
</tr>
</tbody>
</table>

Cells represent spatial autoregressive coefficients from Bayesian heteroskedastic spatial autoregressive models (LeSage and Pace 2009) estimated in Matlab using `sar` (identical specifications to those in Tables 1–4; full results available upon request). House staff data from CQ First Street for the 105th–111th Congresses. Lower-level staff ties represent non-senior/policy staff who previously worked for another member during that congress or one of the two previous congresses. Future staff ties represent senior staff who worked for another member in one of the next two congresses. Standard deviations of the parameter posteriors are in parentheses.

original point estimate of 0.033, which suggests that some caution is required about interpreting the results in Table 4 as entirely causal. The relationship between staff ties and similarities in voting records is thus likely to reflect both homophily and staff influence on member behavior, though further research is needed to disentangle their relative contributions. (We discuss our interpretation of these findings further in the conclusion.)

5. DISCUSSION

These findings demonstrate that Congressional staff play a crucial role in legislative politics. Staff ties link co-partisan legislators, diffusing legislative expertise and policy positions within the Congressional parties. In this way, they play a critical role in the extended party networks that characterize the contemporary era, helping the party-in-government pursue its policy and political goals through the legislative process and thereby shaping the effectiveness and functions of the contemporary Congress as an institution.

Specifically, our results suggest that staff influence the legislative effectiveness of members of Congress. Legislators who employ senior staff that previously worked for other legislators tend to be more similar in their level of effectiveness than we would otherwise expect conditional on a
series of key covariates, including being part of the leadership, holding a committee chairmanship, serving on high-profile committees, seniority, and majority party status. The results of falsification tests using lower-level staff as well as future senior staff ties suggest that these findings are not simply the result of homophily in the hiring process.

By contrast, our falsification test results for DW-NOMINATE suggest that the similarities we observe in voting records among legislators linked by senior or policy staff are at least partly the result of homophily among members and staff who share similar views toward policy. In this sense, staff may help serve as “extensions” of members in the sense Kingdon described (1973), helping them develop and maintain a voting record that is consistent with their views and beliefs. The differences in the point estimates we observe between our primary results and the falsification tests suggest, however, that staff still play a role in shaping the voting patterns of legislators, who must cast an extensive number of votes on many issues on which they have little or no expertise and are forced to rely heavily on guidance from staff as well as other sources.

This research also contributes to the study of parties and social networks in political science. By measuring ties between legislators formed by staff, we capture a new aspect of the extended party network in Congress. The Bayesian heteroskedastic spatial autoregression models we estimate, which are also novel, allow us to estimate the extent to which the behaviors of legislators who share staff ties resemble each other conditional on a series of observable measures. Finally, we develop a novel falsification test approach that helps us assess whether these relationships can be plausibly interpreted as causal or are mechanisms for or consequences of the behaviors of interest.

As with any study, however, our findings have limitations that future research should seek to address. First, though our data is more extensive than any previously considered in the literature, it does not allow us to test for long-term changes in the roles or effects of staff in Congress. Second, we focus only on the House of Representatives due to the larger number of legislators it contains and the difficulty of adequately accounting for differences between chambers in a pooled analysis. It would be worthwhile to consider the Senate in future research. Third, as with any quantitative study, we rely on imperfect measures of our underlying behaviors of interest — in this
case, legislative effectiveness and voting patterns. Scholars might wish to examine other estimates of these quantities or other outcomes of interest such as cosponsorship (Fowler 2006a,b). Finally, it is of course not possible to eliminate all possible concerns about confounding. Future research should thus pursue other research designs that could also credible estimates of the effects of staff.

Despite these limitations, our findings still represent an important first step toward recognizing that Congressional staff may be more influential than legislative and party scholars have previously realized. Despite their low public profile, staff play a key role in the operations of Congress and the parties, especially in facilitating the flow of expertise and policy information among members.

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