Identifying Central Actors: A Network Analysis of the 2009-2010 Health Reform Debate

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Identifying Central Political Actors: A Network Analysis of the 2009-2010 Health Reform Debate

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Abstract

The fragmented design of American institutions intentionally diffuses authority among political actors. As a result, tracing the (often changing) distribution of power is essential to better understanding the policymaking process. In this paper, we capitalize on the current health care debate’s multidimensionality and its high salience, as reflected in the extensive media coverage it has attracted. Through network analysis of daily news articles from five news sources that vary in approach and audience, we assess the centrality of each Member of Congress to the health care debate in general, as well as at each stage of this recent policy debate. We examine alternative explanations for Members’ centrality and the processes that establish interdependencies, or ties, among members: service as a party leader, chairmanship or membership on one of the committees of jurisdiction over health care; party affiliation; proximity to the median Member; and occupational experience in the health field. Our findings suggest that power and influence stems from each of these sources, particularly partisanship, committee membership, leadership, and ideology—although the relative importance of these factors was found to shift throughout the stages of the health reform debate.
1 Introduction

The election of Barack Obama and solid Democratic majorities in both houses of Congress suggested a political environment ripe for comprehensive health care reform. Influenced by failed attempts in 1992, reformers this time around were much more attuned to the politics of health care reform, in contrast to the Clinton White House’s greater focus on policy design (Hacker 2008; Skocpol 1997). In addition, the Obama White House allowed for a much greater role for Congress in drafting the legislation than the Clinton team had, providing only general guidelines rather than a completed bill. As a consequence, this reform effort has faced a different set of challenges than in 1992, as party leaders have had to build winning coalitions at various stages of the process.

How have the politics surrounding health care reform played out in the 111th Congress? Who are the central actors in the current health care reform efforts? Congressional research suggests that legislators vary in their capacities to wield influence in the policymaking process (Cox and McCubbins 1993; Krehbiel 1998). Drawing on the extant literature on policymaking in the U.S. Congress and using network analysis of media coverage, we identify who the key actors have been in the health care debate and explain why some legislators have been more central than others and the processes that produce interdependencies among legislators. Our findings confirm a key role for party leaders and committee chairs in the policymaking process, as well as highlight key differences between the two chambers in terms of which Members are most central to the policymaking process.

2 Theoretical Foundations

Who the central actors are in the policymaking process is a fundamental question of the congressional literature (Brady and Volden 1998; Krehbiel 1998), as well as in American politics more generally. The complex, decentralized policymaking process in the United States creates opportunities for many different actors to influence the scope and nature of legislation as well as the final outcome. Whether determining the scope of the legislation, the individual elements (or provisions) of the bill, or rules of deliberation and debate, political actors have multiple avenues to influence the policymaking process.
2.1 Sources of Policymaking Power

Although all legislators remain equal in the weight of their votes, there are several reasons why legislators’ centrality on health care reform would vary, thereby providing some with a greater capacity to influence the scope and nature of the legislative process. First, there are the personal attributes of legislators, or the bodies of knowledge, experiences or background brought to the chamber by each member of Congress. For example, legislators might be sought out for their professional expertise in the area of health care if they are former providers or experts in the field. Second, institutional attributes, especially as they relate to the position of the legislator and his or her prerogatives, may shape a legislator’s capacity to influence the policymaking process and the debate surrounding health care reform. Theories of agenda control inform us that particular institutional arrangements may give some a greater capacity to wield influence in the legislative process (Cox and McCubbins 2005). In particular, Cox and McCubbins (1993) argue that the majority party acts as a cartel usurping power vis--vis structuring the rules and procedures to favor the majority party. This suggests that members of the majority party may have a greater capacity to wield influence and, therefore, may be more central players on key issues, such as health care reform.

Similarly, members of key committees of jurisdiction, committee chairs and party leaders (Rohde 1991) also have institutional sources of power in the policymaking process, which in turn may be parleyed into real influence over various aspects of the legislation. The institutional rules and procedures of the House and Senate present different opportunities for leaders and rank-and-file members to wield influence in the policymaking process. Much of the literature focusing on party leaders and their capacity to skew policy outcomes in favor of the majority party has focused on the U.S. House of Representatives (Cox and McCubbins 1993; Aldrich and Rohde 2000). The institutional basis of power of the majority party leadership in the U.S. House is much more centralized and therefore conducive to cartelization. Partisan theories of legislative politics argue that the majority leader’s appointment of committees and their chairpersons, scheduling of legislation, and control of the Rules Committee, which establishes the parameters of debating legislation on the floor, collectively shape the nature of the legislative agenda and members’ capacity to wield influence during the policymaking process.
Finally, nonpartisan theories of legislative politics argue that pivotal legislators ultimately hold the most power within the policymaking process. Following the median voter theorem, nonpartisan theories argue that the floor ultimately dominates the policymaking process and particularly the “pivotal members” (or those veto points) determine whether policy changes or the status quo remains. In practical terms, this suggests a key role for the 218th House member and the 60th Senator (without taking into account budget reconciliation options) as those in favor of health care reform seek to build a winning coalition. As the size of the issue space increases (from a unidimensional policy space to multidimensional), predictability becomes much more difficult and instability of voting coalitions may result (McKelvey 1975; Riker 1982). Multidimensionality offers opportunities for strategic actors to change the dominant dimensions of consideration and thereby reconstitute coalitions in support and opposition of legislation. The interjection of the issue of the federal funding of abortion into the issue of health care reform is an example of expanding the scope and dimensions of conflict over the issue and has the potential to influence whether legislation can garner enough votes to pass.

2.2 Institutional Powers

The institutional arrangements of the US Senate deviate substantially from those of the US House, and therefore the politics surrounding the policymaking process often work differently. In practical terms, business on the Senate floor typically is considered under unanimous consent (Oleszek 2004). Although the Senate majority leader possesses some scheduling power, the institutional foundations for majority party power in the US Senate are much less expansive. In terms of agenda control, the Senate majority leader lacks the strong parliamentary prerogatives that the Speaker of the House possesses over which issues are brought under consideration by the full chamber. Committee gatekeeping powers in the Senate are also much less effective, as Rule XIV enables senators to bypass the committee system completely and to place the legislation directly on the Calendar. This is particularly useful to senators who fear that the relevant committee will quash the bill or think that unfavorable language will be attached to the bill during committee markup. This rule also provides for senators to re-introduce their bills with the exact same provisions to be placed directly on the Senate Calendar if a committee fails to act on a referred bill.
Thus, these rules empower individual senators over the committees of jurisdiction and leaders, in contrast to the House. Senators are typically permitted to raise almost any policy issue at any time and may offer non-germane amendments. In addition, for most legislative vehicles, a supermajority must agree before debate on any issue, or else it can be ended by parliamentary maneuver (i.e., a filibuster). This provision of Senate rules confers considerable rights upon the minority party-rights unparalleled in the US House.

According to Binder (1997), “Unlike the House - in which partisan majorities have been able to mold chamber rules to their liking - no such majoritarian character has taken root in the Senate. Control of the Senate agenda has never been structured to reflect the interests of a partisan majority.” This suggests an inability of the Senate majority party to effectively exert negative agenda control—keeping undesirable items off the agenda. Taken together, the rules and procedures of the Senate suggest that the floor dominates the policymaking process. However, contrary to the conventional wisdom that the majority party in the Senate will have a much lower capacity to set the legislative agenda, recent empirical research (Campbell, Cox and McCubbins 2002; Gailmard and Jenkins 2007) demonstrates that the majority party is remarkably effective in keeping matters that divide the majority party off the floor for final vote. This suggests that institutional variation between the House and Senate may not lead to markedly different policy outcomes; however, this does not mean that the policymaking process and party strategies will be identical for each chamber.

2.3 Phases of the Legislative Process

The fragmented design of American political institutions intentionally diffuses authority among political actors. Consequently, the institutional design consisting of checks and balances within a system of separation of power, along with the diffusion of power within the legislative chambers resulting from the rise of the committee system, makes large-scale reforms, such as an overhaul of the health care system, especially prone to gridlock (Binder 2003; Brady and Volden 1998). Indeed, some have argued that health care legislation is uniquely prone to gridlock (Steinmo and Watts 1995; Volden and Wiseman 2009).

Although popular accounts of large-scale reforms often focus on the final stage of the legisla-
tive process (i.e., roll call votes and policy outcomes), decisions made during the pre-floor stages of the process shape what happens later in the policymaking process. Indeed, the committee system confers benefits to members who have opportunities to shape the contents of legislation through amendments during the mark-up. These benefits accrued by members of committees of jurisdiction offer incentives for legislative specialization and entrepreneurship (Baumgartner and Jones 1993; Kingdon 1984; Walker 1974). Oliver (2004) has argued that entrepreneurs in the area of health policy are particularly important due to the complexity of the issue and the polarized views around the issue. Distributive theories of legislative politics (Adler and Lapinski 1997; Shepsle 1979; Weingast and Marshall 1988) argue that the committee system offers opportunities for strategic legislators (high-demanders) to self-select onto committees based on constituency-related concerns; however, Krehbiel (1991) argues that ultimately the median voter on the floor controls the fate of policy and therefore legislation reported by committees must be crafted in a way that will build winning coalitions on the floor.

To capture these dynamics of the health care policymaking process, we examine the process from June 2009, when the first drafts of legislation emerged in the U.S. House (i.e., the Tricommitee bill crafted by the chairmen of the Energy and Commerce, Ways and Means, and Education and Labor committees in consultation with the House Speaker) and the Senate Health, Education, Labor and Pensions (HELP) Committee, through the present-day negotiations involving reconciling differences between the bills passed by the House and Senate. During each of these stages, we expect different sets of legislators to exert influence over health care reform.

Phase 1 of the process covers June and July 2009, which represents the time in which the HELP committee legislation and the House Tricommitee legislation were introduced in each chamber and voted “do pass” by the committees of jurisdiction (i.e., the HELP Committee in the Senate and the Ways and Means, Energy and Commerce and Education and Labor Committees in the House). The only committee that had failed to act at this stage was the Senate Finance Committee—which is crucial because it is the Senate committee that actually establishes how the reform will be paid for. At this stage, the Senate Finance Committee, led by Chairman Max Baucus and Ranking Republican Chuck Grassley, were still attempting to draft a bipartisan bill with the “gang of 6”, a

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1The Senate Finance Committee health reform bill (constructed separately from the HELP Committee bill) was put forth in mid-September 2009
group of six Senators on the Finance Committee who met frequently during the early stages of the process and tried to find bipartisan ground to move forward on health care reform.

Phase 2 of the process covers the August recess period in which Members held numerous town-hall meetings back in their districts/states on the issue of health care reform. Phase 3 of the process includes September and October 2009. During this period, the Senate Finance Committee introduced their version of health care reform and voted “do pass” moving it through to the next stage of the process. Phase 4 of the process (November and December 2009) involves finalizing the language of the legislation (in the Senate, merging the HELP bill and SFC bill) and each chamber voting on its respective bills. Phase 5 of the process (January and February 2010) involved reconciling the House and Senate versions of health care reform and assessing the viable strategies for passing health care reform legislation. Finally, the sixth phase of the process (March 2010) included the House voting on (and passing) the Senate’s version of health care reform and both chambers passing the reconciliation package, which included some “fixes” to the Senate health reform legislation.

3 Legislatures as Networks

Legislatures represent interdependent actors making decisions under a complex set of rules and procedures. Collective action produces an inherent interdependence among individual legislators, who must engage in bargaining and coalition formation to pass legislation. Whether through cosponsoring bills or committee service, there are a variety of ways for legislators to form networks with one another, and political science research is just beginning to explore the richness that social network analysis (SNA) tools provide to investigate this topic (Esterling 2007; Gimpel, Lee and Pearson-Merkowitz 2008; Koger, Masket and Noel 2009; Whiteman 1995). Indeed, political scientists have increasingly incorporated the interdependence of actors into empirical models to understand political phenomenon that include: the flow of information in networks and vote choice (Fowler 2006c; Houghton 2000; Huckfeldt and Levine 1995; Straits 1991) interest group coalitions (Box-Steffensmeier and Christenson 2009; Grossmann and Dominguez 2009; Robbins and Tvetovat 2008; Robbins 2009), the use of legal precedents in Supreme Court decisions (Fowler et al. 2007; Fowler and Jeon 2008), and topics in international relations, such as global economic
networks (Smith and White 1992; Cao 2007) and transnational responses to natural disasters (Kamran 2009).

Current congressional literature incorporating social network analysis lags behind other fields. However, some research has examined the social connectedness of legislators through their cosponsorship of legislation. Most notably, Fowler (2006a) develops a measure of “connectedness” from bill cosponsorships which he utilizes to predict roll call voting upon controlling for ideology and partisanship. Fowler (2006b) and Cho and Fowler (2010) use the same measure in subsequent studies to predict overall legislative influence and the productivity of different congresses, respectively. In addition, Porter and Friend (2007) have studied legislator linkages and connectivity through the committee system. Finally, Victor and Ringe (2009) examine legislative networks that develop through the caucus system, which represent informal structures in the U.S. Congress.

Despite the fact that (SNA) is a relatively new method in terms of empirical studies of the inner workings of Congress, the idea that networks are important to policymaking is far from new. In early work, Wildavsky (1974) pointed out the importance of relationships among political and administrative actors in British treasury policy, while Heclo (1978) described the idea of ‘iron triangles,’ or coalitions of congressional committees, bureaucratic agencies, and interest groups that establish control over particular policy areas. Later work continued to place networks of actors at the core of models of the policymaking process (Sabatier and Jenkins-Smith 1993) and began to use the social network modeling tools to quantify the effects of relationships among actors, such as Kruase and Granato (1990) study of the influence of an individual’s information networks on organizational power. Closest to the research presented in this paper is the work of Christopoulos and colleagues (Christopoulos 2006, 2009; Christopoulos and Quaglia 2009), who use SNA to show how interrelationships determine the level of power political actors, and policy entrepreneurs in particular, have during legislative debates in the EU.

Beyond investigating the standard measures of centrality, we also seek to understand the factors that systematically shape the formulation of ties, or interdependencies, among legislators. Network theories suggests that if two dyads have similar attributes, the probability of a tie is increased. This is commonly referred to as homophily in network theory (McPherson, Smith-Lovin and Cook 2001). Theoretically, sharing partisanship or ideological proclivities, such as Blue Dog Democrats, increases the probability of a tie appearing between legislators sharing those “at-
tributes.” Prior research finds evidence that homophily in the form of shared committee service, shared ideological viewpoints, same background and serving the same set of constituents explains congressional cosponsorship behavior (Gross 2009; Zhang et al. 2008) as well as the formation of legislative friendships (Caldeira and Patterson 1987).

$H_1$: Legislators of the same party will be more likely to form connections or ties with one another.

$H_2$: Legislators with professional backgrounds in the health care industry or medicine will be more likely to form connections or ties with one another.

Social network theory also suggests that proximity among actors may shape the formation of relationships. Proximity among actors enhances the opportunity for actors to interact. To examine the effect of proximity in structuring ties among legislators during the course of the health care reform debate, we assess whether services on committees of jurisdiction for health care reform enhances legislators’ ties with one another.

$H_3$: Legislators who serve on committees of jurisdiction for health care reform issue will be more likely to form connections or ties with one another.

Research on congressional norms argues that legislators’ perspectives of their role in Congress shapes their behavior (Matthews and Stimson 1975, 1977). Freshman and rank-and-file members often abide by a norm of deference to the more seasoned Members of the chamber and of their party. Legislative leaders, on the other hand, serve in the role of policy gatekeepers. Thus, legislative leaders have a high propensity to form ties with each other and rank-and-file members have a strong likelihood of forming ties with one another given their similar roles.

$H_4$: Legislators who serve in a leadership capacity will be more likely to form connections or ties with one another, and rank-and-file members will be more likely to possess connections or ties with one another.

Ideology is also an important indicator of legislative behavior and may shape the formation of relationships among legislators (Gross 2009; Krehbiel 1998; Poole and Rosenthal 1997). Research on cosponsorship networks, for example, have noted the significant role of ideology in shaping legislators’ propensity to form ties with one another (i.e., cosponsor each others’ legislative proposals) (Gross 2009). The pivotal politics theory of lawmaking suggests that ideology is all the more important at the floor stage of the legislative process as “pivotal” members heighten in pro-
file.

\( H_5: \) Ideology will structure the formulation of ties among legislators at the “floor stages” of the health care debate, particularly Phases 4 and 6 of the process.

Given the different institutional arrangements outlined in the previous section, we also expect differences in how these factors play out in the House and Senate. Therefore, we include interactions among some of our key predictors and a dummy variable for the chamber (House or Senate).

### 4 Data and Analysis

To study the centrality of actors throughout the health care policymaking process, we utilize data from newspaper articles covering the issue of health care reform from June 2009 through February 2010. One may question the use of media coverage to capture the legislative process due to the fact that journalists are strategic actors who pick and choose stories and sources (Cook 1998; Graber 2009). Yet we argue that the norms that govern this process of selection in fact allow us to capture the power dynamics surrounding a prominent issue such as health care reform. In an extensive study of press coverage of Congress, Cook (1989, 52) finds that the tendency toward ‘pack journalism’ and the desire to not miss the ‘big story’ leads reporters to focus on sources that are “crucial to moving the process along.” Cook explicitly notes that an MC does not need to be a designated institutional leader to fall into this category in the eyes of journalists; instead, any member who is central to advancing the policy process as a whole (rather than simply advancing a personal cause) will attract coverage (Cook 1989, 1998). These “persons in a position to know” (Cook 1998, 151) may include party and committee leaders, swing voters, spokespersons for particular voting blocs, or any MC who is central to the policymaking process on a particular bill. In other words, one should expect to find that MCs receive media coverage in proportion to their influence within a particular policy debate\(^2\).

Another potential concern with the use of media coverage to capture actor centrality is the ar-

\(^2\)We do not think this assertion would hold for any piece of legislation that enters the legislative agenda, as many bills receive no or only cursory media coverage. However, health care reform is both an ongoing topic of interest to journalists (Graber 2009) and a policy that will affect the vast majority of Americans, which makes it particularly newsworthy (Cook 1989). As a result, the health care debate should attract a sufficiently large volume of media coverage that we can use newspaper articles as a valid source of data about power dynamics
gument that the media place disproportionate attention on the president due to his standing as a publicly prominent individual actor (Graber 2009), which could lead us to overestimate President Obama’s role in the health care debate. On the other hand Graber (2009) notes that the imbalance between the president and Congress evens out when one takes into account coverage of the legislative process. From this, we argue that although individual MCs may not receive much coverage overall, those key to a particular stage of a policy debate are likely to be used as sources in line with the norm of focusing on ‘those in the know’ discussed above. In fact, Arnold (2004) finds a statistically significant relationship between the volume of coverage members received in the CQ Weekly Report - a Washington publication that reflects ‘insider politics’ and the importance assigned to political actors by legislative specialists (Arnold 2004) - and their coverage in newspapers local to their districts. Arnold further notes that journalists for mainstream news outlets will turn to ‘insider publications’ as a check on their own perceptions of what and who is newsworthy, providing further justification for the idea that media coverage adequately captures the dynamics of the legislative process.

Finally, the media are often accused of focusing too often on the sensationalistic aspects of politics at the expense of coverage of the actual workings of the legislative process. Yet Morris and Clawson (2005, 310) find that while the press does place a lot of weight on “maneuvering, conflict, and compromise” in stories about a policy debate, these battles are typically based in issue content and valid procedural concerns rather than scandals and personality conflicts. Indeed, Morris and Clawson (2005) further note that covering the conflict and compromise endemic to the policymaking process is important to explaining to the public why major policy change does not occur quickly or easily. Thus, although it is certainly the case that conflict drives notions of newsworthiness, and thus the volume of coverage, the norms that drive this type of coverage work in our favor, as the media should track the politically important battles and alliances that are of interest in this paper.

We use articles from five sources, four of which are prominent national or Washington newspapers which are likely to provide significant coverage of the political context of the health care debate: the New York Times, Washington Times, Washington Post, and Wall Street Journal. The fifth paper, Roll Call, is an ‘insider’ publication that offers more detail on the legislative process although, as discussed above, it should be the case Roll Call and the mainstream outlets should offer similar
portrayals of the balance of power in the policymaking process. From these sources, we identified 2573 articles focused on health care reform during this time period. Table 1 details the number of these articles, by source, month, and phase of the debate.

[Table 1 about here.]

After obtaining the articles through Lexis-Nexis, we parsed each article using Perl and the text-mining package in R, called tm. Because our primary interest is which Members of Congress appear in the articles, we created a dictionary containing all Members’ names, including all voting Members, Delegates, new members and those who retired mid-session. Using the tm package, we parsed the articles, processing each term and matching the terms in the articles to our dictionary containing the names of legislators. We then constructed the affiliation matrix 539 legislators x 539 legislators in which the cells indicate the frequencies with which a legislator appears with another legislator in newspaper articles concerning health care reform. Affiliation matrices were constructed for each of the phases of the policymaking process and overall (i.e., for all newspaper articles).

To assess legislator centrality within the health care reform debate, we assume a bi-modal social network that represents the affiliation of a set of actors with a set of “events,” in this case news articles about health care reform (Wasserman and Faust 1994). Affiliation networks consist of a set of actors (e.g., legislators) and a set of events (e.g., news articles). Rather than simply ties between pairs of actors, affiliation networks describe collections of actors (i.e., subsets of actors). Connections among members of one of the modes are based on linkages established through the second mode (Wasserman and Faust 1994). Assuming an \( m \times n \) matrix, \( A \), where \( m \) legislators appear in \( n \) news articles about health care reform, if legislator \( i \) appears in article \( j \) the matrix entry \( a_{ij} \) is equal to 1. Otherwise, it equals 0. From these data, we can construct the affiliation matrix \( F \) as follows:

\[
F = (AxA^T)
\]

We can draw relational properties among legislators from the affiliation matrix (columns and
rows represent legislators). We then employ a method of determining which individuals are the most powerful or influential based on news coverage of health care reform. This is referred to in the network literature as centrality. The concept is based in graph theory, which seeks to describe the most important node in a graph. Each individual legislator in the graph is represented by a node. Connections between individual actors (i.e., legislators appearing together in the same article covering health care reform) are represented by an undirected link. An individual legislator’s importance is a function of these links in the context of the graph.

5 Results

Who are the most influential legislators, and what are the properties of the networks that describe the health care reform debate? All of the relationships among legislators are symmetric (i.e., undirected) since the ties between nodes simply represent legislators’ appearance in the same newspaper article on health care reform. Despite the lack of data on directional relationships among the actors, the mapping of the full network of affiliations does provide important information about the most central players in health care reform. The various summary measures of network properties tell us different things. Reciprocity measures the extent to which any legislator out by another legislator returns the favor. More formally, reciprocity is the fraction of pairs of nodes within the graph that are symmetric. In this case, the links are undirected and thus we arrive at a perfect fraction of symmetry, or 1. Unfortunately, our data cannot speak directly to the direction of the relationship, such as one legislator influencing another legislator’s vote.

Figure 1 displays the network maps of the health care reform debate. The nodes of the network represent members of Congress (both chambers), and the ties that connect members represent their appearance together in articles about health care reform. Isolates have been omitted to simplify the figures, although we distinguish among legislators of each party by color (Democrats in blue and Republicans in red). We examine the networks across the 6 phases of the policymaking process as described above. All of the relationships among legislators are symmetric, or undirected, because they merely represent co-appearance in a news article on health care reform. All Members appearing are considered equally, despite the fact that one Member may appear first or more often in a particular article. The network diagrams in Figure 1 suggest a fairly well-connected network.
in which Members of both parties share connections. There does not appear to be any severe po-
larization between Republicans and Democrats in terms of which legislators appear most central
to health care reform.

[Figure 1 about here.]

We can look at the centrality, transitivity, and density of networks and their ability to evolve over
time as descriptive features of legislative networks on the health care debate. Table 2 displays
these summary statistics. At the structural level, the density of the network is the number of
edges divided by the number of possible edges in the graph. In substantive terms, we might think
about density as the connectedness of the entire network of legislators. The density across the
phases of the health care reform debate range from .01 to .15 overall. This suggests that many of
the legislators are not as connected to the other legislators as they could be.

[Table 2 about here.]

Transitivity serves as a summary measure of the networks taking into consideration the indirect
relationships among the actors. It tells us the extent to which two legislators indirectly linked by
a third legislator are also directly linked to each other. This is almost always the case in legisla-
tive networks. It appears that in legislative networks being a friend of a friend also means you
are a friend. The minimum value is 0.46, while the maximum is 0.76 overall. The transitivity
scores for the network were particularly high during the third and fourth phases as the legislation
moved from committee to consideration on the floor of each chamber (September through De-

cember 2009). As legislation moves from committees to the floor, a greater number of legislators
have the capacity to affect the fate of health care reform and therefore there is greater potential
for legislators to become part of the interconnected network influencing health care reform. The
general centralization score provides an average value of the centrality of all the legislators in
the network. Centralization is simply the difference between the maximum and mean node cen-
trality score conditional on the number of nodes. As we show below, the centrality scores vary
considerably across legislators, where some members do not really appear in any substantively
meaningful way in any of the newspaper articles on reform while others, such as Senators Baucus
and Speaker Pelosi, have very high centrality. The overall centralization score for the network is
3.98, with the minimum of 0.38 during the August recess period and maximum of 1.29 during the first two months when the bills were being formulated.

The patterns found with respect to the structure of the network and its variation across the debate motivates questions related to the individual legislators and how particular attributes, such as leadership or chamber, influence one’s position within the network. Is legislators’ influence over health care reform similar across the policymaking process? How do the positions of Representatives and Senators differ across the various phases of the process? For example, the supermajoritarian rules in the Senate (notwithstanding budget reconciliation) may lead to more influence among the moderate members in the U.S. Senate, particularly at the floor-stage of the process, relative to moderate members in the U.S. House, which can afford some Democrats to vote against the reform and still pass the legislation. Thus, we now turn to an individual-level analysis of centrality of legislators on health care reform.

5.1 Who Are the Most Central Actors?

There are various measures that provide useful insight into identifying and characterizing individuals’ centrality within the broader network. Wasserman and Faust (1994) discuss four different centrality measures derived from analysis of the relationships among the nodes in a network. In our network of the health care reform debate, degree centrality represents the number of legislators directly linked to any other legislator in the network. Recall that legislators share a link whenever they appear together in the same newspaper story about health care reform. Degree helps determine centrality in so far as legislators with a high degree can be thought of as being directly connected to other legislators. High degree interest groups are well connected in that they appear in many newspaper articles on health care reform. In the overall network, degree centrality ranges from 0 from 4424 with a mean degree centrality score of 161. This range underscores the idea that legislators can vary considerably in terms of their prominence on the issue of health care reform. Those Members with a zero on degree centrality (122 Members or 22.6% of Members in the dataset) did not appear with any other legislators in newspaper coverage about health care reform, while a couple of Members, such as Senator Max Baucus and Speaker Nancy Pelosi, had degree centrality scores of over 4000. High degree centrality can indicate that the legislator has a
high profile on the issue and may also bring together legislators with diverse interests surrounding the issue of health care reform (such as concerns about federal funding of abortion, issues surrounding employer mandates and the effect on small businesses, etc.). Figure 2a shows the 25 most central legislators on the health care debate according to the degree centrality measure.

Beyond the sheer number of connections to other members, Members may also play an important role in connecting legislators to other legislators. In other words, a legislator can serve as the middleman connecting two factors for example. Betweenness centrality measures the number of times an interest group lies on the shortest path between several other groups. Members with high betweenness may represent the party leaders or gatekeepers who are coordinating and connecting diverse interests in an attempt to build a winning coalition, likewise rank-and-file members who have high betweenness centrality may lie between the party leaders and perhaps an important coalition of legislators with whom leaders are communicating or negotiating (e.g., the Blue Dog Democrats or the pro-life Democrats). Betweenness centrality ranges from 0 to 30,786 (Speaker Pelosi) with a mean of 345. Although party leadership (Speaker Pelosi and Senate Majority Leader Reid) and Senate Finance Chairman Max Baucus remain high on betweenness centrality, notable outliers with somewhat low degree centrality but who rose considerably on betweenness centrality include Rep. Bart Stupak, who was the key Member brokering deals on behalf of pro-life Democrats with Democratic House leadership and the White House on the issue of federal funding of abortion, and Energy and Commerce Chairman Henry Waxman. The 25 most central legislators on betweenness centrality are shown in Figure 2b.

There are some limitations with degree and betweenness centrality measures, however. Degree centrality measures do not take into account the importance of other nodes, and betweenness centrality measures do not take into account the significance of particular paths. Thus, we turn to another measure, eigenvector centrality, which incorporates not only the number of ties for each node and the strength of those ties, but also the centrality of those other nodes. Figure 2c displays the 25 legislators with the highest eigenvector centrality for the overall network. Using this measure, it is clear that the most central members were more likely to be Senators than House Members, with the exception of Speaker Pelosi and, to a lesser degree, Minority Leader John
Boehner. In addition, centrality is not limited to those in the majority party.

Since we are drawing from articles about health care reform in 5 newspaper sources, we also conducted analyses separately for each news source to see if there were any notable differences in the coverage that might skew our centrality measures. We calculated degree centrality, betweenness centrality, and eigenvector centrality across the 5 newspapers. Figure 3 displays the correlation matrix from the various newspapers. The correlations for each measure of centrality were very high across the different newspapers. In many cases, the correlation was above 0.90, and the lowest correlation was about 0.71.

[Figure 3 about here.]

5.2 How related are the various measures of centrality?

In Figures 4 & 5, we examine the extent to which the measures of degree centrality and betweenness centrality provide a similar portrayal of legislators’ centrality as eigenvector centrality. We regressed betweenness centrality on eigenvector centrality, saved the residuals and plotted the measures with the size of the node corresponding to the residual and the color shading corresponding to the absolute value of the residual. Individuals in the larger font and darker blue color are particularly interesting. An actor with very high betweenness but lower eigenvector centrality may be a critical gatekeeper in the process. From Figure 5, we see that Speaker Pelosi and Ben Nelson are relatively high on betweenness centrality and somewhat lower on eigenvector centrality.

[Figure 4 about here.]

[Figure 5 about here.]

These impressions are confirmed by a simple comparison of mean centrality scores across leadership status, chambers, and party. Not surprisingly, leaders were much more central, with scores more than ten times those of other Members of Congress ($F = 68.52$). Similarly, centrality differed across chambers-for which the mean centrality score for Senators was nearly eight times larger than the mean score among House Members ($F = 92.71$). However, the average centrality among Democratic Members was only one-third larger than Republican Members’ average centrality, and
did not differ significantly ($F = 2.15$). Figure 6 presents box plots of centrality scores among legislators of each party by chamber. We see fairly consistent patterns across the various measures of centrality. These graphs suggest that members of the Senate have held a more prominent role in the health care debate, and depending on the measure of centrality used, suggest that Republican Senators are on par with Democratic Senators in terms of centrality to the health care reform debate. The House lags behind considerably, particularly House Republicans.

Next, we examine whether this pattern is consistent for legislators who hold leadership positions (specifically: Boehner, Byrd, Cantor, Clyburn, Cornyn, Durbin, Reid, Hoyer, Kyl, McConnell, Menendez, Pelosi, Sessions, and Van Hollen), versus the rank-and-file Members of Congress. In Figure 6, we present box plots comparing the median, 25th and 75th quartiles for Members of each party within each Chamber. The top panel is estimated for leaders (across three measures of centrality), while the bottom panel presents a similar plot for the rank-and-file legislators. Examining the centrality measures this way, different patterns of centrality emerge, suggesting a strong leadership effect in this process. Specifically, for leaders, these figures suggest that majority party status is more predictive of centrality and perhaps swamp the interchamber differences we saw previously. However, for rank-and-file legislators, we see the pattern reflected earlier in which Senators were much more central than House Members—with less difference by party. This finding echoes the initial finding that Speaker Pelosi was one of the most central actors despite the lower centrality for House members in general.

We also examined centrality by phase of the debate to test our expectation that particular attributes of members may have a different influence on centrality at different stages of the legislative process. Figure 8 presents the centrality score by phase for the four most central actors: Baucus, Pelosi, Reid, and Snowe. Most notably, we see a shifting in centrality among Baucus and Pelosi. Baucus was most central during Phases 1 (June and July 2009) and 3 (September and October 2009), which were the periods in which Senate debate occurred within committees—notably the Senate Finance Committee Baucus chairs. In Phase 2 (August recess) and Phases 4 and onward (when the bill had
moved out of the Senate Finance Committee to the full Senate floor), Baucus’ centrality declined. In contrast, Nancy Pelosi experienced increasing centrality during each phase of the debate.

[Figure 8 about here.]

5.3 What Factors Influence the Propensity for Legislators to Form Ties?

Finally, we turn to our model of legislative networks on the issue of health care reform. Institutional, ideological and personal differences across legislators and chambers suggest that Members possess different capacities to wield influence within the policymaking process. In particular we test six factors expected to shape the nature and extent of ties that connect legislators. First, we examine differences in centrality by party (Democrats coded 1 and Republicans coded 0). Second, we test chamber differences in centrality, using a dichotomous measure to indicate members of the US Senate (Senate = 1, House = 0). We also include a folded measure of ideology calculated as the distance between each legislator’s first dimension (common space) NOMINATE scores and the chamber median. We also included dichotomous measures indicating whether the legislator is a member of the House or Senate leadership, or a member of one of the Congressional committees with jurisdiction over health care reform. Finally, we included a dummy variable identifying those legislators who have occupational backgrounds in the medical profession (defined broadly to include physicians as well as other medical personal). Sources for these data and descriptive statistics are presented in Table 3.

[Table 3 about here.]

To systematically test how these various factors have shaped the propensity for legislators to establish connections with one another, we develop an exponential-family random graph model (ERGM) to parsimoniously examine the local selection forces that shape the global structure of the network describing the health care policymaking process. From the network graphs displayed in figure 1, it is evident that the individual nodes appear to cluster in groups. An ERGM can help us quantify the strength of these intra-group effects. The information gleaned from use of an ERGM also can be used to understand a particular phenomenon or to simulate new random realizations of networks that retain the essential properties of the original network. ERGMs, or p* models,
are preferable to conventional linear regression models since they explicitly take into account the interdependencies of actors.

The goal of network modeling is to predict the joint probability that a set of edges exists on nodes in a network to understand the extent to which systemic factors determine the processes that produce a particular network. Typically, these edges are not independent. ERGMs were developed to address the complex dependencies within relational data structures and provide a flexible framework for representing them. Dyadic dependent processes are those in which the “state of one dyad depends stochastically on the state of other dyads” (Handcock et al. 1998). If two dyads have similar attributes, the probability of a tie is increased (homophily). Additionally, legislative roles and proximity between legislators are expected to shape the propensity for legislators to form ties, or connections, with one another. Models containing only dyadic independent terms have a likelihood function that simplifies to a form that can be maximized using standard logistic regression methods. However, models for processes with dyadic dependence require computationally intensive estimation. We use the statnet package in R to estimate the ERGM via Maximum Likelihood Estimation. The results of the model are shown in Table 4.

Looking first at the overall model, we see that many of our explanatory variables strongly predict the processes that produced the network observed in the data, suggesting that the network of the health care reform debate is structured by multiple processes. Specifically, the first hypothesis, which states that partisanship will shape the propensity of legislators forming ties, finds mixed support in our model. To facilitate interpretation, we examine whether Democrats are more likely to develop ties with other Democratic Members throughout the health reform debate and likewise for Republicans. Our model is strongest for Republicans, showing that Republicans were more likely to be mentioned together in news articles on health care reform with other Republicans throughout the debate, while Democrats were only significantly more likely to be mentioned with other Democratic Members in the later stages of the policy debate (Phases 4-6)—although partisanship was highly statistically significant for both in the overall model.

The position or role of members also influences the structure of relationships that developed among members. In particular, Members who served as Chairs on committees with jurisdiction
over health care reform were more likely to be connected with other Chairs (i.e., these Chairmen were more likely to be mentioned together in articles on health care reform). Non-chairs were less likely to be mentioned with other Members who did not serve as Chairs on committees of jurisdiction. Legislative leaders were more likely to be connected with other legislative leaders, and rank-and-file members were less likely to be connected with other rank-and-file members. When we interacted the leadership role with the chamber to disentangle House and Senate effects, the leadership variable reversed: rank-and-file members were more likely to form ties with other rank-and-file members, whereas leaders were not more likely to form ties with other leaders. Whether or not the legislator had a background in medicine did not substantially shape the propensity of tie formation—in only three phases did the variable reach statistical significance.

Finally, the degree to which ideology structured the health care reform network varied across the phases. In line with our hypothesis, ideology had a highly significant effect on structuring the health care reform network in Phases 4 and 6 of the debate, which coincided with the floor stages of the legislative process. Ideology was also a strong predictor during the first phase of the process, which represented the committee stage of the process when the House and Senate HELP Committee first released their legislation and went through the markup process.

6 Conclusion

In this work, we have used the unique case of the 2009-2010 health care reform debate to assess centrality and the interdependencies among legislators through the policymaking process. With its prominence over the past year and the multidimensional nature of the issue, this issue offers an ideal case in which we can utilize media coverage to assess the dynamics of centrality among legislators. Using network analysis of newspaper coverage of health care reform, we identify the Congressional network surrounding the 2009-2010 health care reform debate. We find that the network was most dense in the middle of this process (Phases 3 & 4, representing September to December 2009), and it was least centralized at three points: Phase 2, which captures the August recess, and Phases 5 & 6, which captures the final phases of the health care reform debate (the endpoint being March 2010 when the legislation passed and was signed into law).

Additionally, we provide an examination of legislator centrality over the course of the leg-
islative debate over health care reform, from June 2009 to February 2010. Although the majority leaders of each chamber (Speaker Pelosi and Majority Leader Reid) were among the most central legislators, it was actually Max Baucus, chair of the Senate Finance Committee, who was the most central member overall. Following closely after these three Democratic legislators, Olympia Snowe, a moderate Republican on the Senate Finance Committee, had the next highest centrality score. These simple rankings foreshadow our later multivariate findings, which highlight the importance of multiple sources of political influence: institutional position, ideological background and personal background, in structuring legislative networks on health care reform throughout the policymaking process. In particular, these results demonstrate the multiple sources—legislator homophily, norms/legislative role orientation, and proximity—that served to structure the health care reform debate.

This study provides one of the first comprehensive examinations of the 2009-2010 health care reform debate. We examine a central question to political science: who were the most central actors over the course of the policymaking process? Using a social network perspective, we are able to systematically examine the interdependencies among legislators and derive measures describing the centrality of members over time. Future work may explore how and whether print media differed from other media, such as television coverage, when covering the health care reform debate. Although we did not find substantial differences between the 5 newspapers that we examined, different modes of communication may provide a more nuanced view of the politics surrounding health care reform.
References


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Table 2: Health Care Reform Network Properties

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Table 3: Factors Expected to Influence the Formation of Ties, Descriptive Statistics

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Notes: N=539 (including all voting members, delegates, and those who left and entered throughout the 111th Congress) Source: Data are from Poole and Rosenthal’s NOMINATE dataset (PR) or Congressional Quarterly’s Politics in America, Guide to the 110th Congress (CQ).
Table 4: Exponential Random Graph Model (ERGM) of Health Care Reform Network

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+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001
Figure 1: Health Care Reform Debate Legislative Network
Figure 2: Top 25 Most Central Members of the Health Care Reform Debate
Figure 3: Relationship of Centrality Across Newspaper Sources
Figure 4: Relationship between Degree & Eigenvector Centrality
Figure 5: Relationship between Betweenness & Eigenvector Centrality
Figure 6: Distribution of Centrality Measures
Figure 7: Centrality Scores for Leaders and Rank-and-File Members
Figure 8: Centrality by Phase, Most Central Actors