The Fates of Challengers in US House Elections: 
The Role of Extended Party Networks

Abstract
Extended party network (EPN) theory characterizes political parties in the US as dynamic networks of interest groups that collaboratively back favored candidates for office. Electoral predictions derived from EPN theory have yet to be tested on a large sample of races. We operationalize EPNs in the context of organized interest contributions to US House election campaigns. Drawing on EPN theory, we deduce that support by a partisan community of interests is a signal an aspect of high challenger quality. Using data from the 1994-2010 election cycles, we apply a network analytic method that detects EPN support of challengers and find that those who are integrated into EPNs achieve much greater electoral success than those who are not. The effect of EPN community integration is distinct from that of campaign resources.

1. The Extended Party Network and Congressional Elections

A rich scholarly tradition exists in studying the organizational forms of political parties and how such characteristics potentially shape key political outcomes (Ostrogorski 1902; Schattschneider 1942; Key 1949; Gibson et al. 1983).¹ That tradition is being renewed. Recent research using network analysis conceptualizes political parties as dynamic, dispersed systems of interconnected interest groups, centered on traditional formal party organizations, which Koger, Masket, and Noel (2009) term extended party networks. According to this theoretical framework, the central functions of the political party are to select and support candidates who, based largely on their backgrounds, are deemed likely to advance the party coalition’s policy agenda once in office (Cohen et al.

¹ Ostrogorski (1902) reflected on the nature and impact of urban machines; V.O. Key, Jr. (1949) observed the debilitating effects of one-party factionalism on democratic accountability; Schattschneider (1942) argued that disciplined, hierarchical parties would present voters with clear choices; and Gibson et al. (1983) demonstrated how the organizational strength of local and state parties affected electoral outcomes.
2008; Masket 2009; Herrnson 2009; Koger, Masket, and Noel 2009; Skinner, Masket, and Dulio 2012; Bawn et al. 2012). This stands in contrast to the dominant, politician-centered explanation for party formation (Aldrich 1995), which attributes the origins of political parties to the need for legislators to compromise and cooperate in formulating and promoting legislation. An important implication of the extended party networks theory is that candidates, especially challengers, who are targeted by partisan coalitions of interests are inherently more appealing to the party, on a policy basis, than those who do not receive the support of the network. By extension, challengers who are backed by a significant contingent of the extended party network will gain support from voters who take cues from visible groups and figures in the party network (i.e., partisan elites) (Zaller 1992, Lupia 1994, Dominguez 2011) and should therefore have better prospects on election day than those who do not, regardless of the material resources available to the campaigns.

The research that has addressed party networks has focused mostly on identifying patterns of connectivity among party organizations and interest groups (Kolodny and Dwyre 1998; Herrnson; Grossman and Dominguez 2009; Koger et al. 2009; Skinner, Masket and Dulio 2012; Heaney et al. 2012). These studies reveal partisan affinities among interest groups with respect to information flows (Koger et al. 2009; Koger et al. 2010; Skinner, Masket and Dulio 2012) and electoral or legislative activity (Grossman and Dominguez 2009). To the degree that research has examined the actual impact of these networks on political outcomes it has been confined to looking at the link between endorsements of prominent politicians and the likelihood that a candidate wins a party nomination or general election (Cohen et al. 2008). These studies rely on a relatively
small sample of candidates in presidential nominations (Cohen et al 2008) or local legislative elections (Masket 2009). Such studies provide preliminary evidence of an electoral influence of extended party networks. However, the electoral implications of extended party network activity have yet to be tested on a large and representative sample of electoral contests.

To directly test electoral predictions derived from extended party networks theory we turn to campaign finance, which is a central mechanism by which disparate interest groups attempt to influence electoral outcomes. We focus on outcomes in US House elections from 1994 to 2010. Political contributions by organizations provide a robust measure of the intensity of support for candidates, while allowing us to distinguish behaviors among a broad population of groups seeking to influence numerous federal elections. We draw on the framework of network analysis to operationalize the extended party network using data on group contributions to, and independent spending for, candidates for the U.S. House of Representatives. We do this through a ‘community detection’ (Newman 2006) algorithm that is informed by the structure of advocacy that underlies the theory of extended party networks. We detect communities that include unique subsets of both donors and candidates.

We find a consistent pattern of campaign finance community structure that strongly coheres with the theory of extended party networks. That is, challengers are integrated into either highly partisan, well-resourced communities exhibiting dense overlapping ties (i.e., the extended party network) or a large catch-all community that is defined by disparate support and no partisan or ideological identity. We use challenger incorporation into a dense partisan community to operationalize extended party network
integration. Our results indicate that integration of a challenger into these dense communities of contributors appears salient to their electoral success, an effect that goes well beyond campaign spending.

We connect the phenomenon of party network support to the conventional understanding of a ‘quality challenger’ (Bond, Covington, and Fleisher 1985; Berkman and Eisenstein 1999; Lazarus 2008). Scholars of congressional elections have long sought to identify the attributes of a challenger that lead to competitive electoral prospects. However, as Bond, Covington and Fleischer (1985, p. 512) note, “Much of what distinguishes a formidable opponent from a ‘duck soup’ challenger is not readily observable”. From the theory of extended party networks, we deduce that a challenger who receives support from several like-minded contributors is integrated into the extended party network and this should constitute an additional, strong signal of challenger quality, because voters reliant on partisan cues will see party networked backed challengers as offering preferable policy stances (Arceneaux and Kolodny 2009; Dominguez 2011). What is missing is a way of linking the activity of networked interest groups with overlapping political agendas (i.e., political parties as conceived by Cohen et al. (2008)) to the electoral fates of the candidates they target. This study provides such an analysis, and offers a new empirical measure that directly operationalizes the support of networked interest groups.

2. The Extended Party Network

Despite the well-documented resurgence of congressional political parties (Herrnson 1988; Aldrich 1995; Heberlig and Larson 2012), contemporary research addressing congressional election outcomes offers little to say about the impact of party
organizations, or any coordinated political efforts beyond individual campaigns (see, e.g., Lazarus 2008; Woon and Pope 2008; Jones 2010). Of course, partisanship (e.g., of candidates, districts, the presidency and Congress) plays an essential role in every account explaining outcomes in congressional elections (Jacobson 1989; Canes-Wrone, Brady, and Cogan 2002; Woon and Pope 2008). This dichotomy – the prevalence of partisanship and the absence of party organization – fits well with the politician/candidate centered understanding of political parties. That is, parties arise in response to the needs of policymakers, mainly legislators serving in the same body, to coordinate policy agendas in order to win individual gains through mutual support (Aldrich 1995). Thus, according to the dominant theoretical understanding of the genesis of political parties, parties are organizations born out of service to legislators, with the central organizational focus being the top-down enforcement by the party leadership of adherence to a unified policy agenda and deterrence of intra-party conflict (Cox and McCubbins 1993).

The theory of extended party networks, offered by Cohen et al. (2008) and Bawn et al. (2012), holds that parties arise from the benefits that organized interests realize from aggregating agendas and coordinating resources in pursuit of electoral and policy goals. Specialized interests that are relatively rich in resources typically have very narrow policy objectives (e.g., support entitlement programs for retirees, zone more offshore space for oil drilling, oppose gay marriage). Substantial resources would be wasted if organized interests pursued separate candidates corresponding to each individual group’s agenda. To avoid this waste, policy demanders in pursuit of separate agendas that are compatible or at least not contradictory, agree to pool resources in support of candidates who will represent combined agendas. This combination of agendas
becomes the party platform and the separate interest communities become the coordinated base of support and activism for the party.

A common collective action motivation underlies party formation in both the candidate-centered and extended party network theories of political parties. That is, parties arise because there are several political actors in pursuit of narrow policy objectives, who will rarely achieve success if they go it alone. The party forms as a collective action solution in which each actor achieves more than would be possible in solitary pursuit, in exchange for supporting the goals of other members of the party. The two theories diverge when it comes to (1) the actors who require a collective action solution and (2) who benefits from party formation. In the candidate-centered theory, policymakers form a coalition (i.e., party) in order to achieve policy objectives that appeal directly to their constituents and therefore secure re-election (Aldrich 1995). In the party network theory, active special interests benefit from coordinating and standing behind candidates in the form of a party, and thus secure benefits for their group members (Cohen et al. 2008).

3. Extended Party Networks and Challengers
   in Congressional Elections

The main challenge in achieving successful coordination among groups in the extended party network is the identification of candidates for office who (1) have strong electoral prospects, and (2) will deliver on the shared party agenda (Bawn et al. 2012). Bawn et al. (2012) highlight that the parties cannot simply commit resources to candidates in the hopes of convincing them to adhere to a party platform, since there is a principal-agent problem in which the party’s constituent groups cannot effectively
monitor legislators. This is why the party network needs to focus its energies on bolstering the prospects of candidates who would enter office with \textit{a priori} credible and agreeable policy stances (Cohen et al. 2008). From this characterization of extended party network activity, we deduce that candidates who are targeted by the party network exhibit a previously unmeasured form of candidate quality – credible policy coherence with a salient party agenda. Since incumbency offers access to party and other resources, we do not attempt to differentiate between extended party network support and the incumbency advantage (Mayhew 1974; Fenno 1978; Levitt and Wolfram 1997; Abramowitz, Alexander, and Gunning 2006). Rather, we focus on challengers, and consider whether the conception and analysis of extended party networks can build upon the established measures used to identify a quality challenger (Jacobson 1978).

Through the support of several like-minded organizations, the extended party network sends a strong signal that a challenger offers a credibly preferable policy stance relative to the incumbent. This is an aspect of challenger quality – offering stances on major policy issues that are credible and preferable to the extended party network – that would significantly bolster a challenger’s chances of success \textit{and} induce extended party network support. Of course, we are not arguing that extended party network approval is all that drives electoral outcomes – many voters will directly evaluate candidates and make their own decisions. However, as Bawn et al. (2012, p.57) note, “Some voters who care nothing about the interests of the various groups are nonetheless attracted to their parties because of the ‘values,’ such as social order or equality, that they perceive in their program.” This represents the mechanism that underlies our expectation that extended party network support will predict the success of challengers, above and beyond the
effects of campaign spending. That is, extended party network support indicates that a challenger offers credible policy stances that are preferable, relative to the incumbent’s positions, to a community of interests within the extended party network and will “give offense to no one [in the party]” (Cohen et al 2008, p. 83). In other words, extended party network support is a strong indication of challenger quality.

Extended party network integration offers a substantial complement to the conventional measure of challenger quality, which is whether or not a candidate has held elective office (Woon and Pope 2008; Lazarus 2008). Lazarus (2008) finds that the key strength exhibited by politically experienced challengers is that they more frequently self-select into winnable races. In further support of this perspective, Carson et al. (2012) demonstrate that state legislators whose districts are more ideologically similar to their congressional district are more likely to run for Congress and be successful. Whereas political experience offers the advantage of candidate-generated assessment of electoral prospects, extended party network support offers a partisan interest community generated signal that a challenger offers policy stances that are both credible and preferable to the incumbent’s. In what follows, we operationalize ‘extended party network support’ using campaign finance data and examine whether this network contributes to our understanding of challenger success in congressional elections.

4. Empirical Analysis

We focus on the electoral predictions regarding extended party network integration of challengers. There are two fundamental tasks before us in our empirical analysis; (1) measurement of whether a challenger is integrated into a partisan network of organized supporters and (2) comparison of the electoral outcomes for challengers within
and outside the extended party network. In the analysis that follows, we show that the network analytic methodology referred to as community detection (Newman 2006) is very well suited to identifying groups of highly interwoven contributors and candidates. We then show that strong integration into a party network community substantially increases the likelihood of a challenger’s success.

4.1 Data

Data on political action committee (PAC) and formal party committee contributions to all candidates for the U.S. House of Representatives and data on all House election outcomes from the 1994 to the 2010 cycles form the bases of our empirical analysis. From here on we include the formal party committees in our broad references to ‘PACs’. We also gather data on additional district and candidate attributes up to the 2008 elections.

Figure 1 paints the conventional picture of the challenger-incumbent divide in contributions from organized interests. It illustrates overall contributions received from PACs to incumbents and challengers. These data echo the common wisdom regarding challenger funding; challengers, on average, receive very little from organized interests (Herrnson 1995). Over the entire period, the median amount received by incumbents is approximately 100 times the median amount received by challengers. This stark inequality has led researchers to conclude that successful challengers owe their success to forces outside of systematic organized party support (Jacobson 2009). However, we will

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2 We gather data on contributions from OpenSecrets.org. We focus on this time period because we had significant data quality concerns based on our own quality checks, for the data predating 1994 (e.g., incorrect coding, missing data).

3 We are indebted to Gary Jacobson for providing data used in his book (Jacobson 2009), which covers the 1994-2008 election cycles.
show that, for select challengers, a certain pattern of interest contributions; non-trivial support coming from several PACs that all give to the same candidates, provides a reliable indication of a challenger’s prospects.

4.2 Network Analysis

In order to identify candidates backed by the extended party networks, we seek to operationalize our conceptual understanding of the extension of a party. As noted above, in abstract terms, we understand a party extension to be a collection of organized interests that concentrate their support efforts around candidates who can credibly represent their shared agenda. The concept of a ‘community’ within the network analytic framework (Zhang et al. 2008) maps very closely onto our understanding of a party extension; a mapping we explain in greater detail below. Before delving into our community detection approach, we must define the network to which we will apply community detection. We construct a bipartite network. A bipartite network is one in which there are two ‘types’ of nodes (i.e., actors) and ties can only connect two nodes of different types (i.e., there are no intra-type ties). The two types of nodes in the networks we construct are PACs and
candidates for the U.S. House. The ties are weighted by the amount contributed up to July 1st of the election year. We measure the network early in the election cycle to minimize the risk that our inferences are driven by PACs giving to sure-thing challengers.  

A simple illustration of the networks we construct suggests that integration into the partisan organized interest network is critical to the success of challengers. We can explore the basic bivariate relationship between interest network integration and challenger success through the graphics in Figure 2. The plots depict the structure of the network for three cycles (2006, 2008, 2010), including all contributions made up to July 1st in the respective election year. Ties are anchored in the positions assigned to PACs in the node placement algorithm, but in the interest of clarity, PACs are not drawn as nodes in the network. Coloration indicates partisanship and incumbency status. The first column of graphics depicts all candidates and the second column only displays those who win election. We use the force-directed node placement algorithm developed by Fruchterman and Reingold (1991) to position nodes in two-dimensional space. This algorithm iteratively re-arranges nodes using positioning forces whereby all nodes repel each other and nodes that are connected attract each other.  

Thus, two candidates appearing close to each other receive similar contribution amounts from a similar set of contributors. Ties are colored in semi-transparent white. Bright white emerges when ties overlap. Thus, the bright white core in the center of each network plot represents the densely interconnected candidates in the campaign finance network.

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4 Our inferences are robust to measuring the network at any point in the later half of the election year. In the first two quarters of the election year, there are not enough networked challengers to provide a feasible sample size for the matching-based inference.

5 We use the R package iGraph to produce these figures.
Figure 2: Contribution network visualizations. Networks depict PAC nodes (invisible) connected to candidate nodes, which are colored based on party and incumbency status. Coloration differentiates four groups: Dem incumbents (royal blue), Dem non-incumbents (light blue), Rep incumbents (red), Rep non-incumbents (orange). Nodes are placed based on the algorithm of Fruchterman and Reingold (1991), with edges weighted by the amount contributed.
Figure 2 provides initial evidence that interest network integration is associated with challenger success. In all three cycles, nearly all of the non-incumbents who are victorious are closer to the core of the network than are non-incumbents who lose. Though compelling visual evidence, this is not sufficient to identify an influence of interest communities. It may simply be the effect of contributions – a high level of which would certainly land a challenger in the center of the campaign finance network. To identify the effect of network integration, we need to (1) derive a precise measure of whether or not a candidate is integrated into an interest community of supporters and (2) carefully explore other explanations for the success of challengers with networked support.

### 4.3 Community Detection as Party Network Extension Detection

Community detection is the process of identifying groups of nodes, within which ties occur with greater frequency and intensity than they do across communities (Newman 2006). In our case, we have two node types – PACs and candidates. The only ties in our data are those from PACs to candidates. Thus, community detection within the context of our data constitutes the identification of groups containing both PACs and candidates, within which the PACs give more to the candidates in that group than they do to other candidates and the candidates in that group receive more from the PACs in that group than they do from other PACs. An illustrative picture of a bipartite network with three communities is given in Figure 3. There are still cross-community ties, but ties within communities occur with much greater intensity.
Network partitioning methods (i.e., community detection) can be categorized as either hard or soft clustering; referring, respectively, to whether nodes are assigned to one community or to each community with some probability (i.e., fixed or mixed membership). Soft clustering methods are straightforward to express within a probabilistic framework as mixture distributions (Imai and Tingley 2012). Soft clustering methods offer an important advantage in terms of tuning the analysis. One important step in the community detection process is to determine how many communities exist in the network. If the community detection algorithm is formulated as a mixture distribution, then we can use the Bayesian Information Criterion (BIC) to determine the

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number of communities in the network (Fraley and Raftery 1998). Another major advantage for the mixture modeling approach is that it permits community membership of each node to be treated as missing data and inferred using the Expectation-Maximization algorithm (Gruen and Leisch, 2008).

We characterize each PAC as drawing donations for candidates in a given community from its community-specific Poisson distribution. Thus, if there are \( k \) communities and \( m \) PACs, we infer \( k \times m \) Poisson distributions. The amount contributed from PAC \( i \) to candidate \( j \), denoted \( y_{ij} \), is modeled as a mixture of Poisson distributions. A total of \( k \) Poisson rate parameters (\( \lambda \)) are estimated for each PAC, and \( k \) community membership probabilities (\( p \)) are estimated for each candidate. The probability of \( y_{ij} \) is thus expressed as

\[
P(y_{ij}) = \sum_{t=1}^{k} p(y_{ij}, \lambda_t),
\]

where \( p(\cdot) \) is the Poisson probability mass function. In each election cycle, we estimate the model with \( k \) from 5 to 50 and select the \( k \) that results in the lowest BIC.\(^7\) Finally, for the purpose of post hoc analysis, we assign each candidate to the community of which he or she is most likely to be a member and assign each PAC to the community for which it

\(^7\) It might seem appropriate to begin the community detection at \( k=2 \), simply capturing the two political parties. However, the algorithm fits quite poorly and exhibits convergence problems with \( k < 5 \). This is because, at minimum, there are five distinct connection patterns we see in the data: (1) some candidates (i.e., ‘duck soup’ challengers) receive meager or disparate PAC support, (2) some (i.e., strong Republican challengers) receive primary support from conservative ideological groups, (3) some (i.e., strong Democratic challengers) receive primary support from liberal ideological groups, (4) some (i.e., Republican incumbents) receive primary support from right-leaning access-oriented donors and (5) some (i.e., Democratic incumbents) receive primary support from left-leaning access-oriented donors.
has the highest Poisson mean parameter. For each election, this results in a partition of the set of PACs and candidates into communities that contain a mixture of candidates and PACs. These memberships and attributes of these communities are used to determine whether candidates are integrated into extended party networks.

The communities we identify, in six of the election cycles, are illustrated in Figure 4. Several patterns can be garnered from these illustrations. First, there is a clear partisan divide in communities, with communities that contain mostly Democratic candidates having different support bases than communities with mostly Republican candidates. Also, in recent elections (i.e., since 2004), we see that communities with 20—80% challengers constitute the best-funded communities on one of the partisan sides (e.g., in 2010 the two best-funded Republican communities have more challengers than incumbents). The one regularity that we see as particularly important is the presence of a bi-partisan, very wide (i.e., large membership) and very short (i.e., poorly funded) community in each cycle. This appears as a nearly flat line in the center of each plot in Figure 4. Though it might be possible to derive more nuanced measures of networked support, we see the classification of a candidate into this wide/flat community as a clear, simple and stark indication of a lack of substantial networked support. In our empirical analysis going forward, we classify a candidate as having networked support if he or she is not assigned to the largest (in terms of membership) and most weakly funded (in terms of median Poisson mean among PACs) community.

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8 To define interval measures of networked support, we considered the median Poisson mean in the respective community and the number of PACs assigned to the respective community. We found that both of these offered minimal predictive contribution beyond our simple classification scheme.
Figure 4: Community visualizations. Each shape corresponds to a community. Height is proportional to median contributions to a candidate in the community, width is proportional to the number of candidates in the community. Coloration depicts partisan balance. Position in 2d space is determined by multidimensional scaling of contributor similarity matrices. Rectangles contain 80% or more incumbents. Diamonds contain 20-80% challengers. Ellipses contain 80% or more challengers. Bold outlines indicate fewer than 20% incumbents.
The recurrence of a poorly funded large community across election cycles is further illustrated in Figure 5. The left graph shows median contributions received for candidates in each community from 1994-2010 elections; the right graph shows how many members are in communities (with the dashed lines indicating communities with candidates that are completely outside the extended party networks). In every election cycle, there is a large (> 300 candidate) and poorly funded (< $50k median funding) community. Though overall PAC funding of communities increases over time, the growing community of non-networked candidates remains supported at a staggeringly low level. Though the scale and structure of communities that emerge from the campaign finance process vary over time, one constant is that there is a large community of candidates who receive trivial and idiosyncratic support from PACs. These are the candidates we see as operating outside of the extended party networks.

![Figure 5: Community-wise contributions and membership, 1994-2010. Each plot contains one vertical line for each community discovered in the respective election cycle. The dashed-red line corresponds to the community containing candidates completely outside of the extended party networks (i.e., the largest, worst-funded community).](image)
We have proposed community detection as an approach to identifying the integration of candidates into the extended party networks. We have yet to show that the communities into which challengers are integrated are, indeed, partisan. It is conceivable, for instance, that bipartisan communities exist with “pro-business” challengers from both parties who receive support from business interests. However, Figure 6 clearly illustrates that, insofar as these communities of contributors are supporting challengers, they are doing so on a partisan basis. We plot the aggregate partisanship of candidates in each community against the percent of community members who are incumbents. Over all election cycles, nearly every community that contains any non-incumbents is decidedly partisan. Over the nine election cycles, only a few small communities emerge that are less than 90% in one party and contain any non-incumbents. This supports our claim that the community detection algorithm reliably identifies the integration of challengers into partisan networks of interest groups.

Figure 6: Community partisan and incumbency balance, 1994–2010. Each point corresponds to a community identified in one of the 1994–2010 election cycles. The y-axis gives the percentage of candidates in one party in the community, and the x-axis gives the percentage of candidates in the community who are incumbents.
Another concern we want to directly address empirically is the possibility that we are measuring instances in which groups are piling on to challengers with high likelihood of success in a last-minute effort to gain access to these candidates. Though we can never perfectly discern a group’s motives, we can assess the aggregate dynamics in the campaign under the assumption that the likelihood of challenger success will be revealed as the campaign progresses. Figure 7 depicts the rate of change in the networked challenger classification throughout the election year.\(^9\) We see that the final spike in change, which we interpret as a last-minute shuffle toward challengers winning the horse race, occurs at some point between August and November. This is why we measure network integration on July 1\(^{st}\) of the election year.

![Figure 7: Month-to-month rate of change in networked challenger classification. Plot gives the proportion of networked/non-networked classification of challengers that changed from the previous to the current month. Plot depicts the 1994–2008 congressional elections. Darker lines represent more recent election cycles.](image)

\(^9\)This is the percentage of challengers for whom their networked challenger status is not the same as it was in the previous month.
4.4 Electoral Success Analysis

As noted above, the network plots in Figure 2 suggest a bivariate relationship between network integration and challenger success. To assure that our inference regarding network integration is not a result of confounding, we use the size of our data – covering over 3,480 races -- to narrow down to campaigns with highly comparable conditions. We use a rigorous matching approach to isolate the effect of extended party network integration.

<table>
<thead>
<tr>
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<th>Challenger Spending</th>
<th>Incumbent Spending</th>
<th>Incumbent Vote Share (t-1)</th>
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<tr>
<td><strong>ATT</strong></td>
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</tr>
<tr>
<td>Mean (treated)</td>
<td>1796270.48</td>
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</tr>
<tr>
<td>Mean (control)</td>
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<td>KS test (p)</td>
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<td><strong>ATE</strong></td>
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<td>Mean (treated)</td>
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<td>Mean (control)</td>
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<td>Mean (treated)</td>
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<td>t-test (p)</td>
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</tr>
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Table 1: Balance check for continuous variables matched with coarsened exact matching (CEM). The test statistic rows report the two-sided p-values associated with the test of the hypothesis that there is no difference between the treated and controlled samples after filtering with CEM. One-to-one CEM for estimating ATT, ATE and ATC results in matched samples of sizes 21, 26 and 22, respectively.

The purpose of matching is to derive balanced (Sekhon 2011) treated and control groups. Using the integration of a challenger into a party network community as the treatment, we identify treated and control groups that differ only trivially on variables
that have been found to predict congressional election outcomes. We use a mixture of exact and carefully tuned coarsened exact one-to-one matching (Iacus, King, and Porro 2012). In exact matching, the control case selected for each treated case must have exactly the same values on potential confounding variables as the treated case. Coarsened exact matching is a process by which matches for each treated case are selected to be within rounding error (i.e., within a bin) of the treated case.

The unit of analysis is the race, and the data span the 1994 to 2008 election cycles. We exactly match treatment and control cases on election cycle, incumbent party and political experience.\textsuperscript{10} Matching on these variables controls for the macro-political context and the traditional measure of challenger quality, respectively. Coarsened exact matching is used to match races based on incumbent vote share in the prior election, challenger spending and incumbent spending. These variables account for the conventional measures of the competitiveness of the district and resources, respectively. We start with a bin size of one standard deviation in each variable, and iteratively reduce the bin size used for the CEM by incrementing the denominator of the standard deviation (i.e., se/1, se/2,...,se/k) until hypothesis tests applied to the non-coarsened treatment and control group values indicate that there is no significant difference between treatment and control groups. Table 1 shows that our treatment and control groups are well balanced, in that there are no statistically significant differences between treated and control observations in the quantitative variables.

\textsuperscript{10} Exactly matching on election cycle and incumbent party controls for a litany of partisan and economic contextual factors (e.g., party of the president) that have been found to effect election outcomes.
Figure 8 gives our estimates of treatment effects. We estimate the overall average treatment effect (ATE), the ATE among control units (ATC) and the ATE among the treated units (ATT) (Morgan and Winship 2007). The ATT and ATC constitute estimates of how much the party network integration increased the probability of victory among the treated units and how much it would have increased the probability of victory among the control units, respectively. The ATE constitutes an estimate of the difference in the rate of victory between treated and control units, discarding units that are not comparable along the control measures. The ATC is noticeably larger than ATE and ATT, which indicates the need for our matching approach in estimating ATE – the main effect of interest. If treatment were truly randomized, then in expectation ATE = ATT = ATC (Konisky and Reenock 2012). Focusing on ATE, we find that party network integration increases the

11 The R package Matching (Sekhon 2011) is used to estimate the effects and their standard errors.
chance of challenger success by approximately twelve percentage points – an effect that is statistically significant at the 0.05 level (two-tailed). This effect is substantively significant considering that a challenger’s naïve chance of success is, in nearly every election cycle, below 10% (Friedman and Holden 2009). In this analysis we leveraged a large initial dataset to prune down to treatment and control cases that were statistically indistinguishable based on several variables that effect congressional elections outcomes. These treatment effect estimates align with conventional regression-based estimation of the effect of party network integration, which we present in the appendix.

5. Discussion

This study demonstrates that the extended party network is active and appears influential in congressional elections. In support of previous work our analysis provides evidence of coordinated efforts by contingents of the extended party network to support and elect candidates of their choice. The highly synchronized effort among a subset of political committees suggests strongly that the party is more than just the formal party organization. In contrast to previous analyses that focused on relationships among PACs (Grossman and Dominguez 2009; Dreiling and Darves 2011), our community detection algorithm was able to isolate unique subsets of PACs that converged on distinctive subsets of challengers to finance their elections with contributions and independent expenditures. Uniquely, we also provide evidence that such backing elevates the electoral success of selected challengers, above and beyond what conventional measures of campaign spending, candidate quality and macro-political factors would predict.

It is instructive to unpack the groups backing these communities of candidates as a way of illustrating the kinds of interests that behave collectively like a political party.
Table 2 lists the top five donors to communities broken down by the incumbency status and partisanship of candidates in the communities for election years 2004 through 2010. On the Democratic side, we observe that the formal party organization, the Democratic Congressional Campaign Committee (DCCC), sits atop the list each year. Right below the DCCC are interest groups that are often associated strongly with the Democratic Party coalition (Grossman 2012), including labor unions, trial lawyers, environmental and women organizations. On the Republican side, we observe anti-tax organizations, the National Rifle Association, pro-life groups and small business associations. Such organizations are consistently cited in news articles during elections as highly active and powerful interest groups (see, e.g., Eggen 2010). In support of the conventional wisdom, our study shows that these partisan and ideological groups coordinate their efforts to support targeted candidates in ways that potentially shape the outcome of the race.

Previous descriptive studies and news accounts document ways that partisan groups coordinate efforts. First, the formal party organizations (DCCC, NRCC) sponsor informational meetings on Capitol Hill to discuss various political campaigns and release materials that highlight themes the parties and candidates will focus on (O’Connor 2012). In this way, party committees like the DCCC and NRCC “orchestrate” partisan strategy with PACs, some of which have leaders sitting on advisory boards of the party committee (Kolodny and Dwyre 1998). On the Republican side, party leaders with strong policy preferences like Newt Gingrich have created new organizations dedicated to recruiting like-minded challengers, providing them with seed money, and encouraging interest groups to support them (Wood and Adams 1997). A recent example is the “Young Guns” PAC started in 2007 by Republican party leaders Eric Cantor, Paul Ryan, and Kevin
McCarthy to recruit and support conservative candidates for Congress (Burns 2010). Many candidates recruited by Young Guns come from business backgrounds rather than elective office (Chaddock 2010), meaning that traditional measures of candidate quality would not classify these candidates as serious. By grooming candidates early in the electoral season the Young Guns PAC signals to friendly PACs the desirability of these candidates.

A second coordinating strategy involves meetings among interest groups to devise common campaign strategies. Campaign finance law prevents the party committees from coordinating with interest groups that use “soft money” (i.e., funds raised outside the limits of federal law). For this reason, partisans form umbrella organizations that help coordinate in the absence of a formal party organization. In 2004, Democratic partisans used “America Coming Together” to convene meetings of labor, environmental and women’s groups to coordinate voter mobilization efforts (Skinner 2005). In the 2012 elections, a diverse collection of conservative organizations took its lead from a prominent group called American Crossroads (managed by president Bush’s former political advisor Karl Rove) with the broad electoral goal of taking full control of Congress (Confessore 2011). Scholarly field studies have documented these coordination efforts in previous elections (Magleby et al. 2007).
<table>
<thead>
<tr>
<th>Non-Incumbent Democrats</th>
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<tbody>
<tr>
<td>2004</td>
<td>2006</td>
<td>2008</td>
<td>2010</td>
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<tr>
<td>DCCC</td>
<td>DCCC</td>
<td>DCCC</td>
<td>DCCC</td>
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<tr>
<td>Machinist/Aero. Workers Union</td>
<td>AFSCME</td>
<td>AFSCME</td>
<td>American Fed of Teachers</td>
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<tr>
<td>Laborers Union</td>
<td>Moveon.org</td>
<td>SEIU</td>
<td>SEIU</td>
</tr>
<tr>
<td>AFSCME</td>
<td>EMILY’s List</td>
<td>Defenders of Wildlife</td>
<td>Credit Union Nat. Assn</td>
</tr>
<tr>
<td>Assn of Trial Lawyers</td>
<td>National Education Assn</td>
<td>Nat. Assn of Realtors</td>
<td>Women Vote!</td>
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<tr>
<td>Non-Incumbent Republicans</td>
<td></td>
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<tr>
<td>NRCC</td>
<td>NRCC</td>
<td>NRCC</td>
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<tr>
<td>Nat. Assn of Realtors</td>
<td>Club for Growth</td>
<td>Rep. National Cmte</td>
<td>NRA</td>
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<td>NRA</td>
<td>RNC</td>
<td>NRA</td>
<td>Americans for Tax Reform</td>
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<td>Incumbent Democrats</td>
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<td>Nat. Assn of Realtors</td>
<td>AFSCME</td>
<td>Amer. Hospital Assn.</td>
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<td>AmeriPAC</td>
<td>IBEW</td>
<td>Nat. Assn of Realtors</td>
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<td>AFSCME</td>
<td>Amer. Fed of Teachers</td>
<td>Int. Assn. of Fire Fighters</td>
<td>NEA</td>
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<tr>
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<td>AmeriPAC</td>
<td>Oper. Eng. Union</td>
<td>SEIU Local 1199</td>
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<td>Incumbent Republicans</td>
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<tr>
<td>Nat. Assn. of Realtors</td>
<td>NRCC</td>
<td>NRCC</td>
<td>AT&amp;T</td>
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<tr>
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<td>RNC</td>
<td>Club for Growth</td>
<td>Honeywell Int.</td>
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<td>Nat. Assn. of Realtors</td>
<td>NRA</td>
<td>Nat. Beer Wholesalers</td>
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<tr>
<td>AMA</td>
<td>Nat. Right to Life</td>
<td>RNC</td>
<td>Nat. Assn. of Realtors</td>
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Table 2: Top Five Donors to the best funded cluster in each election cycle. For non-incumbent clusters, the cluster with the highest median donation with a majority of the named part and a minority of incumbents was chosen. For incumbents, the cluster with the highest median donation amount with a majority of the named party and a majority of incumbents was chosen. If no cluster contained a majority of non-incumbents, the best funded cluster with the highest percentage of non-incumbents was chosen.
These developments in congressional campaign activity provide evidence that the kind of coordination and signaling among partisan elites in selecting presidential candidates, as described by Cohen et al. (2008), also takes place in legislative elections. Theories of extended party networks portray the party as a conglomerate of non-conflicting and cooperating interests who select and support candidates they can trust to pursue the policy objectives of the party. This implies that the integration of a candidate into the extended party network is a signal that they are credible on partisan policies. And such signaling should pay electoral dividends with a broader constituency of partisans. Similar to presidential elections, participants in the extended party network have discovered ways to coordinate, but across the many candidates and campaigns that constitute congressional elections.

6. Conclusion

In this study, we addressed two basic questions. First, who – in terms of both supporters and candidates -- constitutes the political party and second, how are electoral outcomes shaped by the dynamics of extended party network support? We built upon emerging theories about the organizational form of political parties and exploited a new algorithm of community detection to reveal unique patterns of behavior among different groups that embody the concept of an ‘extended party network’. Our study confirms prior accounts about the existence of partisan networks, but it moves beyond prior work in two ways. First, building upon previous unipartite network analyses, we integrate both interest groups and candidates into communities using a bipartite network representation. This method enables us to identify the core of the party network and illustrate the tight links between party resources and selected candidates in advancing electoral goals.
Second, we demonstrate the stark difference in electoral prospects for challengers within and outside the extended party network. Challengers who incorporated into densely interconnected partisan communities have a greater likelihood of winning compared to those with similar campaign resources and political backgrounds, but without party network backing.

We also make a contribution to understanding the concept of challenger quality, which appears to be an important explanation of the incumbent electoral advantage (Carson et al. 2007). We theorize that members of the party coalition converge on highly viable candidates who satisfy the policy agenda of those in the extended party network. Offering appealing party stances to the extended party network is an important dimension of challenger quality since broad endorsement by the party network sends a powerful signal to voters who look to the party for cues. Parties are able to recruit high quality candidates by lowering the opportunity cost of running for office by organizing substantial electoral resources on their behalf. Thus, the presence of strong political parties can entice better quality candidates to run against incumbents when such candidate might strategically decide against it if they were making the decision on their own. The intervention of parties to enhance entry of quality candidates should make elections more competitive, as indeed our findings suggest.\textsuperscript{12} Our measure overlaps with conventional measures of candidate quality that simply look at elective office experience. But the positive impact of our measure, above and beyond the conventional measure,

\textsuperscript{12} We surmise that parties (as conceived through the extended party network) have become stronger since the heyday of ‘candidate-centered’ elections in the 1970s and 1980s, a period in which incumbents appeared fairly invulnerable (Herrnson 1995).
suggests that candidate quality means something more to the political party than simply elective office experience.

The empirical findings from this analysis have important implications for theories about contemporary parties. By observing a unique set of groups that coordinate actions to help targeted challengers, we have revealed exactly the kind of electoral activity that scholars attribute to strong political parties (see, for example, Schattschneider 1942). The patterns we find suggest that political parties comprise contending policy-demanders in the electoral process (Bawn et al. 2012). It also presents a challenge to theories positing that officeholders in the legislature shape the party to advance their electoral and policy goals (Aldrich 1995; Cox and McCubbins 1993). If interest groups with strong policy agendas shape who wins office then it seems officeholders might have far less discretion about the direction of party policy than previously theorized (Masket 2009). It could help explain why members often fail to move toward the median voter and instead take greater policy risks by adopting more extreme positions (Fiorina et al. 2005). An approach that draws on group-centered theories of parties might help explain why party elites are converging on an ideological point that is more extreme than rank-and-file voters (Fiorina et al. 2005), while pushing the rival parties farther apart.

Appendix

In previous studies addressing congressional election outcomes, the primary approach to identifying the factors that influence election results has been the application of regression models in which a measure of electoral success constitutes the dependent variable (see, e.g., Canes-Wrone et al. 2002; Alexander 2005; Abramowitz et al. 2006; Woon and Pope 2008; Jones 2010; Carson et al. 2012). In this appendix, we extend a
regression model from Woon and Pope (2008) in which the dependent variable is the vote share won by the Democratic Party candidate in US House elections, to include an indicator of whether a challenger has networked support. This analysis permits us to assess whether our conclusion about the effect of networked support is dependent upon the use of matching-based inference, as well as to connect our empirical analysis to the prior literature on success in congressional elections.

Woon and Pope (2008) (WP) examine the relationship between the aggregate ideological characteristics of political parties regarding the behavior of partisans in Congress and the results of individual House elections. Broadly speaking, they argue that party labels serve a branding function for candidates in congressional elections, and that the behavior of party members in Congress determines ideological information communicated by the party brands. In order to evaluate the empirical accuracy of their theory, WP study US House election outcomes between 1952 and 2000. They estimate a series of hierarchical regression models in which the dependent variable is the vote share of the Democratic candidate in a district. They draw upon the literature to include several control variables and specify a number of additional independent variables that operationalize concepts derived from their theory of party branding. The variables included in their models are described in table A.1. Please see the original article for in-depth discussion regarding hypotheses related to these variables.
Our data on campaign finance networks overlaps with WP’s data in the election years between 1990 and 2000. We utilize the subset of WP’s data that falls within this range, which includes 1,939 races in total.\textsuperscript{13} The model includes election level random effects, and are estimated by feasible generalized least squares.\textsuperscript{14} To test the effect of networked support we include two additional independent variables – \textit{Networked Rep. Challenger} and \textit{Networked Dem. Challenger} – which are indicators of whether there is a Republican challenger in the race with networked support and whether there is a Democratic challenger in the race with networked support, respectively. We expect that having a networked Republican challenger in the race will reduce Democratic vote share and that having a networked Democratic challenger in the race will increase Democratic vote share. The results are given in Table A.2.

\begin{table}[h]
\centering
\caption{Independent variables from Woon and Pope (2008)}
\begin{tabular}{ll}
\hline
\textbf{Variable} & \textbf{Description} \\
\hline
\textit{incMID} & Midpoint between incumbent Ideology and challenger’s party mean \\
\textit{incDHA} & Heterogeneity of the party ideological signal \\
\textit{incGAP} & Ideological gap between incumbent and challenger’s party \\
\textit{Presidential Vote} & Proportion in the district voting for Democratic president \\
\textit{Democratic Incumbent} & Indicator of Democratic incumbent \\
\textit{Dem. Quality Challenger} & Indicator of Democratic challenger who has held elective office \\
\textit{Rep. Quality Challenger} & Indicator of Republican challenger who has held elective office \\
\textit{South} & South region indicator \\
\textit{Midterm} & Midterm election \\
\textit{Dem. Pres} & Indicator of Democratic president \\
\hline
\end{tabular}
\end{table}

Independent variable descriptions. Please refer to Woon and Pope (2008) for discussion regarding the rationale for including these variables in the model.

\textsuperscript{13} Uncontested seats are excluded from the sample.
\textsuperscript{14} WP present several similar models of Democratic vote share. We present just one replication. We replicate the model from Table Two, since this one fits the data better than the other two models. However, our conclusions regarding the effect of networked challenger do not change if we use one of the other specifications presented by WP.
The results provide strong support for our hypothesis that extended party network integration improves the electoral prospects of challengers. The presence of a challenger in the race with networked support statistically significantly reduces the expected incumbent vote share by approximately eight percentage points, an effect that is nearly identical for Republican and Democratic challengers. To put the magnitude of this effect in perspective, the conventional measure of challenger quality – the indicator of whether a challenger has held elective office – results in a two to four percentage point reduction in the expected incumbent vote share. Moreover, we illustrate in table A.3 that there are many instances in which a challenger with electoral experience does not have
networked support and vice versa, which underscores the fact that our networked challenger measure is picking up a different dimension of challenger quality than is the traditional electoral experience measure. This illustrates that our result is robust to the choice between matching and regression to draw inferences. Despite the fact that the sample size is only 20% of that appearing in the original study, except for the *South* regional indicator, the effects of all of the variables are statistically significant and in the same direction as in the original study.

<table>
<thead>
<tr>
<th>Table A.3: Network Integration and Challenger Quality</th>
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<tr>
<td>Non-Quality Challenger</td>
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<tr>
<td>Non-Networked Challenger</td>
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**References**


