The focused organization of advice relations: A study in boundary-crossing ❖

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ABSTRACT
Organizations contain multiple social foci – settings for interaction providing organizational members with occasions for structuring their social relations. In this paper we examine how identification with particular social foci within organizations influences the propensity of advice-seeking ties to cross-cut the boundaries of organizational sub-units. We propose and test a theory of relationship formation based on the strength of identification of organizational members with social foci. We expect that advice relations of organizational members identifying more strongly with local foci (organizational sub-units) will be more likely to be contained within their boundaries. By contrast, we expect that advice relations of organizational members identifying more strongly with a global focus (the organization as a whole) will be more likely to cross-cut the boundaries defined around local foci. We test these hypotheses on data that we have collected on advice-seeking relations among members of the top management team in an industrial multi-unit group which comprises five distinct subsidiary companies. Results show that identification with social foci affects the formation of cross-cutting network ties over and above the effect of the formal organizational boundaries that encircle the foci. More specifically, we find that organizational members who identify strongly with local foci (subsidiaries, in our case) tend to seek advice within such local foci, while organizational members who identify strongly with a global focus (corporate, in our case) tend to be sources of advice across the boundaries of the local foci in which they participate. Cross-boundary advice ties are less likely to occur among managers who identify strongly with their subsidiaries, but only weakly with the corporate group. As a consequence, identification with local foci constrains knowledge transfer relations within the boundaries of such foci. On the contrary, cross-boundary advice ties are more likely to occur among managers who identify strongly with the corporate group, but only weakly with their subsidiary. As a consequence, identification with a global focus activates knowledge transfer across the boundaries of local foci.

1. INTRODUCTION

Organizational structures are typically designed to group homogeneous activities into discrete units to promote local efficiency gains, accelerate learning, facilitate control, and reduce interdependence (Thompson, 1967). Yet, specialization at the unit level also makes coordination, communication and knowledge transfer more difficult between units resulting in increased coordination costs at the organizational level (Argote, 1999; Hansen, Mors, and Lovas, 2005; Tushman, 1977). In order to reconcile these mutually offsetting consequences of organizational design, over the last decade considerable attention has been dedicated to the role played by interpersonal networks in the coordination and integration of differentiated organizational activities (Argote, McEvily, and Reagans, 2003; 1999; Baron and Podolny, 1997; Mehra, Kilduff and Brass, 1998; Reagans and McEvily, 2003; Tortoriello and Krackhardt, 2010).

Networks of advice, communication and friendship relations - and the intraorganizational structure of roles and positions they induce (Barley, 1990) - have frequently been considered as powerful coordination mechanisms capable of cross-cutting the formal boundaries of organizational units (Argote, Beckman, and Epple, 1990; Kilduff and Krackhardt; 2008; Reagans and McEvily, 2003; Zander and Kogut, 1995). Extensive research has emphasized the association between the presence of network ties across organizational sub-units and a variety of consequences unfolding across multiple organizational levels including, for example, knowledge sharing between sub-units (Tsai, 2002), productivity of teams (Reagans and Zuckerman, 2001), sub-unit performance (Tsai, 2001), individual creativity (Burt, 2004), and overall organizational competitiveness (Argote 1999). More or less explicitly, these desirable outcomes have all been linked to the extent to which relations within organizations are able to span multiple knowledge pools - or network range (Reagans and McEvily, 2003). Reagans and Zuckerman (2001), for example, argue and show that network ties providing access to diverse sources of information and facilitating the development of contact with different others within organizations – i.e., ties which increase network range - are systematically associated with higher productivity and performance of the relevant organizational units. The accumulation of these empirical experiences has amplified the interest in the network-based mechanisms behind boundary-crossing ties in organization (Tortoriello, Reagans, and McEvily, 2012).

The main objective of this paper is to advance our understanding of the conditions under which advice relations are more likely to occur within and across inter-organizational boundaries. More precisely, we examine the permeability of intra-organizational boundaries to advice relations by

considering each organizational sub-unit as a *focus* of activity, i.e., as a "social, psychological, legal or physical entity around which joint activities are organized" (Feld, 1981: 1016). Organizational sub-units represent social foci whose boundaries are established by design, and maintained by official administrative rules, explicit systems of incentives and formal resource allocation policies. Treating organizational sub-units as social foci is useful for the purpose of this study because: "Most associates are drawn from focused sets" (Feld, 1982: 798)." Given the tendency of organizational sub-units to retain network ties within their boundaries what might drive the formation of advice relations between organizational members across organizational sub-units? To address this question we treat advice ties as the dependent variable of interest and assess the circumstances under which advice ties are directed within and across multiple social foci represented by organizational sub-units.

We adapt Feld's (1981; 1982) social foci thesis to explain intra-organizational networks, and extend it in two ways. First, we suggest that social foci provide not only opportunities for establishing network ties, but also targets for identification – an aspect that the original thesis leaves underdeveloped (Cooper and Thatcher, 2010). Identification consolidates the boundaries around foci thus decreasing the likelihood of observing network ties across foci. We predict that organizational members who identify more strongly with the local foci of activity represented by their organizational sub-units (subsidiaries in the specific case we examine) will be less likely to participate in advice relations that traverse sub-unit boundaries. We expect the effect of organizational identification coming from sharing a common focus to operate over and above the direct effect of joint subunit membership. Second, we draw attention to the fact that social foci may be ordered and indeed contained within one another. This is particularly the case with organizations where sub-units are contained within super-ordinate units. We suggest that the level at which social foci effectively operate as identification targets affects the propensity of organizational members to establish advice ties across the boundaries of sub-units. Building on Kane (2010) and Argote and Kane (2009), we predict that advice relations involving individuals with stronger identification with a global focus (the corporate group in the case we examine) will be more likely to cross-cut the boundaries of local foci (subsidiaries). We expect the effect of corporate identification to operate regardless of the specific subsidiaries in which organizational members belong.

We emphasize advice relations because extant research demonstrates that advice networks constitute the social plumbing system which allows knowledge and experiences to be shared, interpreted, transferred and developed within organizations (Cross, Borgatti and Parker, 2001; Lazega, 2001; Lazega, Mounier, Snijders, and Tubaro, 2012; Nebus, 2006). Understanding the

conditions under which advice relations cross-cut the boundaries of organizational sub-units is both theoretically interesting, as well as managerially valuable, because of the potential of advice relations to connect and mobilize different knowledge stocks available within organizations (Hansen, 2002; Kleinbaum and Tushman, 2007; Reagans and McEvily, 2003; Tortoriello, and Krackhardt, 2010).

We seek empirical evidence in support of our predictions in an analysis of advice-seeking relations among members of the top management team of a multinational industrial group which includes five distinct subsidiary companies representing the relevant social foci. The analysis emphasizes the association between the strength of company and corporate identification and the occurrence of advice ties within and across subsidiary companies in the group. Similar to prior studies that have examined the arrangement of network ties within organizations we estimate the likelihood of observing the presence of network ties between managers within and between relevant organizational sub-units. Our approach, however, departs from most available studies in that we specify and estimate exponential random graph models (ERGM) for social networks (Robins, Robins, Pattison & Wang, 2009; Snijders, Pattison, Robins & Handcock, 2006; see also Lusher, Koskinen and Robins, 2013) that allow us to account explicitly for a variety of endogenous dependencies that are known to characterize networks of advice relations within organizations (Tortoriello and Krackhardt, 2010) and to confound the interpretation of empirical results (Krackhardt, 1987; 1988). When correctly specified, these models support the estimation of parameters associated with variables of theoretical interest, while at the same time providing an accurate characterization of the network structure in which individual relations are embedded.

2. THEORETICAL BACKGROUND

2.1. Advice networks in organizations

Boundaries placed around organizational sub-units identify and encircle distinct pools of knowledge and expertise. To the extent that diversity fosters innovation, interaction and knowledge exchange across the boundaries of organizational sub-units facilitate the recombination of diverse pieces of information that may be crucial for the generation of new ideas (Burt, 2004; Reagans and McEvily, 2003; Tortoriello, and Krackhardt, 2010). Because boundaries around organizational sub-units also make them powerful targets for social identification (March and Simon, 1958), our ability to understand knowledge exchange across internal boundaries depends crucially on the effect of identification on the permeability of boundaries to knowledge transfer relations among organizational participants.

Interpersonal networks of advice relations are routinely considered as the main social conduits through which resource, knowledge and information flow within organizations (Borgatti and Cross, 2003; Kilduff and Krackhardt, 2008). Building on in-depth fieldwork, Cross, Borgatti and Parker (2001) suggest that inter-organizational networks of advice relations are important because they are vital to activities of knowledge transfer and exchange across organizational boundaries. Advice relations relate to knowledge transfer within organizations in at least three ways. First, advice relations provide essential information to resolve problems that require integration of different kinds of expertise and sources of knowledge. Advice ties are common because they are routinely activated during the course of regular organizational problem solving activities (Hansen, 2002). Second, advice relations provide meta-information about the location of relevant knowledge in organizations (Cross, Nohria and Parker, 2002). Advice ties, therefore, produce richer and more complex information than the resolution of the problem at hand may require (Cross and Sproull, 2004). Third, advice ties encourage exchange of opinions among individuals who may be working in different organizational units, divisions or functions. As such, advice networks are essential as aids to intraorganizational processes of vicarious learning (Argote, Beckman, and Epple, 1990). Problem solving, information search, and learning, are particularly critical organizational activities when they link individuals separated by boundaries defined around organizational units, teams or jobs (Hargadon and Sutton. 1997; Tsai, 2001).

Knowledge across intra-organizational boundaries is difficult to find and, when found, it is difficult to mobilize (Brown and Duguid, 2000). This is due to three main reasons. The first is that information and ideas are more difficult to exchange and integrate when the parties involved do not share a common knowledge base, concepts or language (Reagans and McEvily, 2003). The second reason is that the explicit objectives of organizational design are to endow organizational sub-units with common resources, objectives *and* identities, and to subject members within sub-units to common incentive, control and evaluation schemes (March and Simon, 1958). Yet, evidence is mounting that individual and sub-unit performance increasingly depend on the existence of ties reaching across formal sub-unit boundaries (Cross and Cummings, 2003; Kleinbaum and Tushman, 2007). The third reason making ties across organizational sub-units at once valuable and fragile is firmly grounded in generally accepted – and in fact efficient - organizational practices. Dokko, Kane and Tortoriello (2011) aptly observe that organizations specialize and recruit staff according to expertise and function as a consequence of internal resource allocation practices. Such organizational staffing practices encourage processes of socialization that are typically local and whose outcomes

are highly contingent on membership in specific sub-units or professional groups. Social networks play an important role in socialization (Morrison, 2002). Once established, however, the behavioral consequences of socialization become exceptionally resistant to change (Weick, 1993). Organizational sub-units tend to develop idiosyncratic local cultures, interpretive strategies and language that may make it difficult for organizations to benefit from attempts to integrate heterogeneous resources (Tortoriello and Krackhardt, 2010). In other words, while organizations recognize the value of integrating diverging views and heterogeneous resources across organizational sub-units (Argote, McEvily, and Reagans, 2003), they also purposefully create and actively enforce internal divisions that make integration across sub-unit both necessary as well as problematic (Szulanski 1996).

Considered together, these various sources of tension between organizational goals and formal organizational structures give prominence to the role that informal social structures play in the integration of knowledge across the boundaries of organizational sub-unit (Agneessens and Wittek, 2012; Kleinbaum and Tushman, 2007). But given that boundary crossing is difficult and its benefits uncertain, what makes individuals more or less likely to be involved in cross-cutting ties? In the section that follows we argue that at least part of the answer may lie in how individuals identify with the organizational foci in which they participate.

2.2. The focused organization of advice ties

Organizational identities are resonant to the extent that they capture or activate powerful distinctions among organizational members (Baron, 2004). Membership in organizational sub-units shape relations among their members not just because of the increased opportunities for tie formation that they provide, but also because sub-units represent resonant social foci – or settings "around which individuals organize their social relations" (Feld, 1981: 1016). Consistent with this broader sociological view, organizational research has shown that membership in distinctive categories affects both identification *and* network formation within organizations (Mehra, Kilduff and Brass, 1998). Network ties are more likely to be established between individuals sharing social foci because social foci "systematically constrain choices to form and maintain relationships" (Feld, 1982: 797). This view is particularly relevant for organizations because membership of individuals in meaningful sub-units and categories is typically exogenous to the formation of network ties between individuals. This is a core element that makes studying social networks in organizations different from studying social networks in less structured social settings. But what are the mechanisms

through which social foci constrain social selection and give rise to the tendency for network ties within organizations to be bounded within foci?

While it is difficult to provide a context-independent answer to this question, a general mechanism through which social foci operate to constrain the network of advice relations within organizations is identification. Organizational sub-units are well-recognized identification targets (March and Simon, 1958). The common interests, values and world views promoted by joint sub-unit membership make organizational sub-units particularly salient social foci – or sites for the development of social relations (Lincoln and Miller, 1979; Seibert, Kraimer, and Liden, 2001; Riketta and van Dick, 2005). The allocation of individuals to intra-organizational units is often - although not exclusively - exogenous with respect to the formation of interpersonal advice ties among members: sub-units pre-exist the arrival of specific members, and decisions to allocate individuals to sub-units are typically not affected by interpersonal relations. As a consequence it is useful to ask questions about how membership in intra-organizational units affects the formation of advice ties within and across their boundaries.

A major insight of Self-Categorization Theory is that the imposition of an exogenous social boundary of this nature leads to identification with those others and with the "group" - even when individuals do not know others personally within this boundary (Hogg and Terry, 2000). Results produced by more than forty years of experimental research inspired by Social Identity Theory are now available to support the claim that that identification with group causes preferential choices of others (Tajfel, Billig, Bundy and Flament, 1971). According to this argument, even members of organizational sub-units between whom there is no personal direct connection may still develop social identities that overlap with that of the social focus which bounds their activities. As much of this research is experimentally-based, it provides evidence for a causal direction: boundaries induce identities which then shape preferences and behavior.

Research on social identity has established that it is the actual strength of identification with socially bounded categories that facilitates or impairs communication, coordination, and cooperation within and across boundaries (Ashforth and Mael, 1989; Kramer, 1993). According to this view, social foci bound interaction among participants by triggering processes of identification which eventually affect their self-distinctiveness – their tendency to distinguish themselves from others in the relevant "outgroups" (Ashforth, Roger and Corley, 2011). Identification with a social focus provides a basis for self-definition and social comparison that controls attitudes, cognitions and behaviors (Ashforth, Harrison, and Corley, 2008). This core theoretical insight offered by

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contemporary theories of social identity builds on a longstanding tradition of research in social psychology on the effect of group membership on identity, collaboration and conflict (Sherif, 1954). We would expect, therefore, that:

Hypothesis 1: Advice relations that crosscut sub-unit boundaries are less likely to be observed for organizational members who identify more strongly with their sub-unit.

Our first hypothesis predicts that sub-unit identification is associated with a contraction of network range (Reagans and McEvily, 2003). We argue that the effect of identification with local foci operates over and above the simple main effect of sub-unit boundaries. Because advice ties are inherently asymmetrical, the restriction on network range induced by identification with organizational sub-units may operate through different relational micro-mechanisms. For example, identification with organizational sub-units may increase the sub-unit members' propensity *to ask advice to* members of the same sub-unit, or their propensity *to be asked for advice from* members of the same sub-unit. We do not offer specific directional hypotheses of this kind because extant research demonstrates that advice ties, even if directional, invariably imply a two-way exchange of information between the parties involved (Cross and Sproull, 2004). In the empirical part of the paper, however, we estimate models that allow analytical discrimination between these directional relational micro-mechanisms.

Joint membership in an organizational sub-unit provides opportunities for structuring social relations because individuals sharing the same focus "tend to become interpersonally connected to form a cluster" (Feld, 1981: 1016). Once these "clusters" are formed, they tend to induce social boundaries that consolidate and reinforce the effects of formal intraorganizational boundaries. Thus far we have argued that knowledge transfer, information sharing and coordination across social foci become more difficult as opinions and behavioral orientations become more homogeneous within foci (Festinger, Schachter, and Back, 1950). Theory and empirical evidence in support of this prediction is extensive (Nelson, 1989; March and Simon, 1958).

According to theories of social identity: "Organizational contexts provide a near-perfect arena for the operation of social identity processes. Organizations are internally structured groups, which are located in complex networks of intergroup relations. To varying degrees people derive their identity and sense of self from the organization or work groups to which they belong" (Hogg and Terry, 2002:1). For example, organizational members may identify with their work team,

business unit, function, division, brand - or with the superordinate corporate entity which encompasses all these local identification targets. This is particularly the case in multi-unit groups like the one we examine in the empirical part of this paper. In multi-unit groups organizational sub-units are partially independent companies that may be linked to a superordinate corporate entity in a variety of ways (Nohria and Ghoshal, 1997). Managers in multiunit groups typically have to cope with simultaneous membership in a variety of foci such as for – example – those represented by their unit (or company), and by the corporate (or the overall group). In multi-unit organizations, the "simply focused" solution (Feld, 1981: 1020) – whereby participation in a social focus is exclusive – is rarely available

Building on this view, contemporary research emphasizes that the propensity of information to travel across organizational boundaries is contingent on the extent to which individuals identify with superordinate foci – or an overarching collective identity (Kane, 2010). Identification with superordinate foci facilitates relations across sub-unit boundaries by making practices, knowledge and solutions adopted in different units easier to consider, appreciate and absorb (Kane, 2010). For example, in a study of knowledge transfer through team member rotation, Kane, Argote and Levine (2005) found that knowledge is more likely to be transferred from a source (a member coming from a different group) to a recipient group when both shared identification with a superordinate social target deriving from recognition of joint membership in a larger group. Ingram and Simons (2002) showed that relations of knowledge transfer were more likely to be observed when the sender and receiver were part of the same superordinate entity (in this case, a kibbutzim federation). Argote and Kane (2009) argue that identification with superordinate identity targets increases the permeability of organizational boundaries to relations of knowledge transfer and sharing. Finally, Dokko, Kane, and Tortoriello (2009) showed that identification with superordinate targets motivates individuals to rely more frequently on boundary-spanning relations. These recent studies specify and extend classic results in social psychology on the positive effect of sharing a superordinate target on the propensity of individuals in different groups to reduce their differences and collaborate (Sherif, 1958).

To the extent that advice networks may be considered a form of collaborative knowledge sharing, research suggests that identification with a superordinate entity encourages the presence of advice ties across the boundaries of organizational sub-units. Therefore we would expect that:

Hypothesis 2: Advice relations that crosscut sub-unit boundaries are more likely to be observed for organizational members who identify more strongly with the superordinate corporate level.

Our second hypothesis (H2) predicts that identification with a superordinate corporate identity stimulates the expansion of network range (Reagans and McEvily, 2003). According to H2, members who identify strongly with the corporate level are expected to have networks of advice relations with greater range, connecting to colleagues located in different units. As it was the case for H1, the asymmetry of advice ties creates different possibilities for the expansion of network range driven by corporate identification. For example, identification with a superordinate entity may increase the members' propensity to *ask* for advice from other organizational members across sub-units (for example, because superordinate identification increases the appreciation of apparently more distant knowledge), or it may increase the propensity to being *asked for advice* from members located in different sub-units (for example, because managers communicating or signaling a high level of superordinate identification are considered more trustworthy, better informed, or are simply more visible). As already noted, advice relations are directional but imply a two way exchange of information (Cross, Borgatti and Parker 2001; Cross and Sproull, 2004). For this reason we do not offer directional hypotheses, but in the empirical part of the paper we estimate models that allow analytical discrimination between different plausible relational micro-mechanisms.

3. RESEARCH DESIGN AND METHODS

3.1. Setting

The opportunity to establish the empirical value of our argument is provided by original fieldwork and data that we have collected on relations among all the members of the top management team in an international multi-unit industrial group. Multi-unit organizations provide an ideal setting for examining the role that organizational identification and boundaries jointly play in the formation and maintenance of social networks. The effectiveness of multi-unit organizations depends delicately on their ability to facilitate coordination and mobilization of dispersed knowledge resources across units separated by organizational and geographical boundaries (Hansen, 2002; Tsai, 2002). For this reason understanding advice networks is of crucial importance for understanding how multi-unit organizations may be managed effectively (Kleinbaum and Tushman, 2007).

The corporate group selected for study includes five separate, quasi-independent subsidiary companies involved in the design, manufacturing and sale of high quality products in the market for leisure motor yachts. The central company in the group plays the double role of independent company and corporate headquarters for the whole group. During its early years the company only distributed in Europe boats produced by a US manufacturer which is still an active player in the

industry. In 1971 the first boat was built: a 10-meter wooden motorsailer. In 1982 the company built its first motor yacht. During the 80's the original production of sailboats and motorsailers was progressively abandoned and the company concentrated on the market for recreational motor yachts. Presence in the luxury segment of the motor yacht industry progressively increased. Success in off-shore racing created a reputation for innovation based on the transfer of high-technology developed for racing to recreational motor yachts – a strategy that Ferrari pioneered in the automobile industry.

The group grew rapidly through a series of national and international acquisitions of prominent brands. After the year 2000, the company turned into a small group of quasi-independent firms. At the time in which data were collected the group comprised five distinct companies. As of August 2006, the production value of the group was estimated at 770.4 million Euros. The group was ranked by *Business Week* (2006) among the top 30 fastest growing industrial groups in Europe. In external corporate communications, membership of the companies in the group is not hidden, but the companies are presented as independent, each with its distinct product lines, target market segment, customer base, dealer network, management and – most importantly for the purpose of our study – organizational and brand identities.

To reduce terminological ambiguity, from now on we use the term "subsidiary" when referring to each individual *company* within the overall industrial group. The term "organizational boundaries," therefore, refers to the boundaries defined around each subsidiary company within the group. We use the term "subsidiary company identifiers" to describe managers whose identification with their subsidiary company is high. We use the term "corporate group" when referring to the corporate level. We use "corporate boundaries" as a synonym of "corporate group boundaries" to indicate the boundary encircling the set of five subsidiary companies. We use the term "corporate identifiers" to describe managers whose identification with the corporate group is high. As we explain below the categories "company" and "corporate" identifiers are not mutually exclusive as it is possible for individuals to be both - or neither - company and corporate identifiers.

3.2. Fieldwork and Data

We started by asking the President and the CEO of the group to examine the corporate organizational chart and identify the individuals they considered members of the "top management" team or – in the words of the CEO – managers who "[C]an take important decisions and whose presence in our companies makes a real difference for who we are and for what we do. Together

these people represent the brain of our group." We arrived at a list of 47 people distributed across the five different companies. Five individuals in the list were consultants working in internationally prominent nautical design firms. They were originally included because of their very personal and direct relationship with the president-founder of the group and for their involvement in important product development decisions. With the agreement of the CEO their names were eventually dropped from the list because the consultants were not uniquely linked to any of the companies in the group but professional designers and engineers in international consulting firms. Perhaps more importantly for our analytical purposes, issues of organizational identity are not well defined for professional consultants who, by definition, are not organizational members but hired external professionals. The results we report are based on the analysis of a network with 42 nodes.[1]

We collected relational and demographic information by means of a questionnaire administered personally and individually to all the remaining 42 top managers in the group. The response rate was 100 percent (no missing responses). Demographic information included individual educational experience, age (mean = 43.63; range 25-65), professional experience (mean 7.17; range 1-33), formal status, and membership in organizational functions and in professional families. The research team visited each company of the group in Europe and in the U.S. During the data collection the research team spent between two and three weeks with the management in each of the five companies in the group.

In our analysis we focus on advice relations because extant research has demonstrated that advice ties provide a meaningful basis for understanding important aspects of knowledge sharing and knowledge transfer within organizations (Cross, Borgatti, and Parker, 2001). As the CEO explained: "We sell luxury products, high-technology products, entertainment products, and products that allow our clients to develop a special relation with nature and the sea. It is obvious that our products may credibly be all these different things at once only if different kinds of knowledge, competencies, and visions are coordinated across different boundaries to form a coherent whole. Our job (Note: the job of the corporate) is to create the conditions for this to happen naturally and with little effort. When we see people exchanging information and working as consultants for each other we have the feeling that we are doing something right."

As it is common in research on interpersonal relations within organizations, we collected information on social networks among managers using the roster method (Kilduff and Krackhardt,

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[1] We also conducted the analyses including the five consultants (N=47) and the results were virtually identical to the results reported in the paper.

2008). Each respondent was presented with a list containing the names of the other 41 individuals in the sample arranged in alphabetical order, and asked to indicate the existence of an advice relation with each of them. The following narrative was shown to participants to assist them in reconstructing their advice relations:

> *"It is not unusual to rely on colleagues for help and advice on work-related matters. In this section of the questionnaire we are interested in obtaining information about whom you might go to for help and advice on problems that you may encounter in your work. Please indicate your answer by placing a check next to the name of people you generally go to for help and advice. If there is only one person you might go to, then just check that one person's name. If there are several people you might go to, then check these several names. If there is no one you would go to for help and advice work related matters, then do not check any name. If you have a question or problem at work, to whom would you go for help and advice?"*

Based on field experience the research team also prepared a list of concrete "questions and problems" that would help rooting "advice relations" more firmly in the specific business and organizational context and in the understanding that managers have of their own business. Examples of issues included the evaluation of potential clients, pricing issues, transportation problems, flexibility with terms of payment, management of production and delivery delays, communication of cost over-runs, and management of the relation between production costs and customization. The advice-seeking network may be represented as a 42×42 binary adjacency matrix recording the presence or absence of advice relations for each possible pairs of individuals in the sample. **Figure 1** reports the network of advice relations.

Insert **Figure 1** about here

Table 1 reports the main descriptive statistics for the advice network.

Insert **Table 1** about here

Finally, we collected information on formal hierarchical relations existing among individuals defined at the overall corporate level *(Corporate hierarchy)*. This information takes the form of dyadic covariate defined in terms of the relation "reports to." For example, the managers responsible for Marketing and Sales working in individual subsidiaries within the group all reported to the Corporate Vice-

President for Marketing and Sales. This final piece of information was provided directly by the CEO of the group during a series of interviews. As he explained: "While the companies can work almost independently, coordination within the group is achieved also by having people working in the same functional areas but working in different companies talk to each other. For obvious reasons this is particularly important in accounting where there must be some degree of standardization. But it is similarly important in engineering – where technical solutions discovered in one company may be applicable in another – and in marketing – where people working in different areas of the world may exchange information about dealers, competitors, and potential customers. This kind of information would normally be difficult to get from people outside the group, and would be likely to be both costly as well as unreliable. This is why the organization chart will never tell you the whole story about how we work."

3.3. Variables and measures

In the empirical part of the paper we estimate models for the probability of advice ties as a function of (i) measures of organizational identification; (ii) actor-specific covariates, and (iii) endogenous network effects. Our analysis focuses on the effect of organizational identification on the presence of advice ties. Actor-specific covariates (which may be monadic or dyadic) are included to capture the effect of attributes of respondents on their propensity to activate advice relations. As we explain in the next section, endogenous network effects need to be included to account for known tendencies of networks of advice ties in organizations to self-organize into - and give rise to - a variety of meaningful structural patterns (Pattison and Robins, 2002). In a directed network, for example, the simplest such pattern is the tendency for reciprocation where the presence of one tie in one direction may elicit the formation of another in the opposite direction. In the next section we provide more detail about the endogenous network processes that we incorporate in our models. Including these parameters enables us to capture the network dependencies in the data and to make principled inferences about the effects of actor-level variables such as identification. Failure to incorporate these well-established network effects may result in seriously misspecified models leading to invalid inferences.

Identification derives from a "perception of oneness" with specific social targets (Ashforth and Mael, 1989: 21). Building on this view, the construct of core theoretical interest in this study involves measuring the extent to which individual, organizational, and corporate identities overlap. This empirical approach is consistent with the theoretical view that when members identify strongly with

their organization: "the attributes they use to define the organization also define them" (Dutton, Dukerich, and Harquail, 1994; 239). Social identity is typically defined as an individual's sense of self derived from membership in multiple groups (Tajfel and Turner, 1979). Therefore, the extent to which individuals perceive themselves as part of the organizational units to which they belong depends on the overlap of self-perceived identity and the identity of those units – as they perceive it. According to this view, identification results from a "merger of self and group" (Tayler and Blader, 2000: 15).

To measure the degree of overlap between individual and organizational identities, we used a visual scale developed by Bergami and Bagozzi (2000) who established its internal, convergent and predictive validity. Bagozzi and Lee (2002) demonstrated the empirical generality of the scale in a study of social influence and intention to participate in group activities across different national cultures. Bartel (2001) adopted the same scale to examine the effects of role experience on organizational identity and identification. Dukerich, Golden, and Shortell (2002) used the scale to study the impact of organizational identity on the extent to which physicians engage in cooperative behavior. Dokko, Kane, and Tortoriello (2009) measured team identification using a five-item scale that was developed in previous research (Mael and Ashforth 1992; 1995). This different approach to measuring identification was found to produce results consistent with those of the method that we adopt.

Respondents were presented with Venn diagrams indicating the extent of overlap between the self and "own" subsidiary company, and between the self and the corporate group. The scale is "visual" because "personal identity" and "organizational identity" are represented as circles of equal radius. Respondents were asked to select the position of the two circles that best described the distance between their own personal identity and the identity of the two identification targets (subsidiary company, and corporate). The measure ranges from "far apart" (corresponding to disjoint circles) to complete overlap (corresponding to completely overlapping circles) with various degrees of partial overlap defined between these extremes. Respondents received one diagram in which they were asked to indicate the degree of overlap between their own personal identity (as they defined it) and the identity of their subsidiary company (as they understood it). Respondents also received an identical diagram in which they were asked to indicate the degree of overlap between their own personal identity and the identity of the corporate group (corporate identity).

We distinguish between two sets of control covariates: The first set captures the effects of organizational structure, while the second captures the effects of socio-demographic characteristics

of the respondents on the likelihood of observing network ties. We discuss them in turn. In multiunit companies, interpersonal relations are affected by organizational structure in a variety of ways. Perhaps the most important is membership of individuals in distinct organizational units (the "subsidiaries" in our case). We control for this possibility by keeping track of whether potential advice partners share membership in the same company within the corporate group *(Subsidiary (matching))*. We also control for membership in the same broadly defined professional family *(Organizational function (matching))*, appointment at the same formal organizational level - or "grade" (*Organizational level (matching)* (Baron and Podolny, 1997), and working in a similar location (*Location (Matching)*).

Information on formal corporate hierarchy enters our empirical model specification in three ways. First, we define an indicator variable which takes the value of 1 if the individual manager seeking advice works in the central company (the company originally founded by the president which also gives the name to the group) to control for possible deference effects inherent in being a member of the corporate center (*Corporate hierarchy (Sender)*). Second, we define a similar indicator variable taking the value 1 if the individual manager who is the target of an advice tie works in the central company *(Corporate hierarchy (Receiver))*. Third, we transform information on the formal hierarchy into two dyadic covariates that we use to control for the obvious potential effect that the presence of a formal reporting relation has on less formal advice relations. We focus on the extent to which (i) formal reporting relations and informal advice relations tend to co-occur (*Entrainment with formal hierarchy*), i.e., the extent to which superiors also seek advice from their direct subordinates, and (ii) individuals tend to exchange formal reporting relations and informal advice relations (*Exchange with formal hierarchy*), i.e., the extent to which subordinates also seek advice from their superiors.

Research on organizational and work group demography instructs us that sharing demographic traits strengthens social relationships between individuals (Hinds, Carley, Krackhardt and Wholey, 2000; O'Reilly, Caldwell, and Barnett, 1989; Reagans, Zuckerman, and McEvily, 2004). The space spanned by demographic characteristics is typically multidimensional (McPherson and Ranger-Moore, 1991). For this reason our empirical model specifications control for a number of potential sources of individual differences on individual propensities to create network ties. More specifically we control for differences between respondents in terms of: (i) *Age (difference)*; (ii) *Tenure in group (difference)*, and (iii) *Education (difference)*. Age and tenure in the group are measured in years, whereas education is measured in terms of the last academic title obtained. We also controlled for similarity

of potential tie partners in gender and nationality, yielding two covariates: (iv) *Gender (matching)*, and (v) *Nationality (matching)*. Controlling for the effects of individual attributes on the formation of network ties is important because common attributes form the bases for identification and social ties within organizations (Ibarra, 1999).

3.4. Representing network dependencies

Modern studies of social networks in organizations increasingly recognize that endogenous network effects are central to well specified empirical models (Lusher, Koskinen and Robins, 2013). For example, Krackhardt (1987, 1988) showed that ignoring even relatively minor network effects can lead to a dramatic increase in risks of spurious inference. Accordingly, it is now well established in the statistical modeling of social networks that including endogenous network parameters is of central importance (Robins et al., 2007; Snijders, 2011). It is worth noting that the endogenous network parameters representing specific network dependencies are not just statistical ameliorations, but represent theoretical claims about important social processes through which network structures are built (Contractor et al, 2006).

Like other forms of knowledge transfer and information exchange within organizations, advice relations are unlikely to occur independently of each other and have in fact been found to be linked by complex dependencies (Tortoriello and Krackhardt, 2010). As Rank, Robins, and Pattison (2010) demonstrate, advice networks in organizations cannot be fully understood if such interdependencies among ties are ignored. In building network ties organizational members may be influenced both by their own pattern of interaction, as well as by the association of their potential partners with others (Granovetter, 1973; Kilduff and Krackhardt, 1994; Lazega and Pattison 1999). For example, individuals may be more likely to seek advice from popular others (i.e., others to whom many go for advice) or to select advisors on the basis of referrals from others with whom they already have advice relations.

The simplest form of dependence is defined at the dyadic level. In the models that we estimate in the empirical part of the paper this form of dependence is represented by tendencies of individuals to initiate advice relations (*Arc*) and to reciprocate them (*Reciprocity*). But social network in organizations are unlikely to be satisfactorily represented in terms of dyadic dependencies only (Snijders, Pattison, Robins and Handcock, 2006). While the particular forms of dependence present within an organizational system is typically an empirical question, structural dependencies generated by (i) individual propensities to send and receive ties, and by (ii) tendencies toward closure in small

groups are generally considered defining features of social networks (Robins, Pattison, and Wang, 2009). Individual propensities to send or receive ties shape the network degree distribution. Tendencies toward closure lead to variations in network clustering.

Structural regularities associated with differential propensities to be the source, or target, of particular types of ties lead to star-like configurations, where a single actor is at the center of several ties. Because the number of "stars" is a function of the degrees, including parameters corresponding to star-like network configurations is equivalent to modeling the degree distribution (Snjiders, Pattison, Robins, and Handcock, 2006). Building on Robins, Pattison, and Wang (2009), we capture core features of the (in and out) degree distributions by controlling for heterogeneity in relational activities revealed by differences in the propensity of individuals to be selected as partner by many others (In-stars or *Popularity*) and in the propensity of individuals to select multiple others as partners (Out-stars or *Activity*). These two types of star-like configurations can be related to notions of in- and out-degree centrality in social network theory (Freeman, 1979). In a statistical sense they can be used to control for dispersion in the in- and out-degree distributions of the network (Pattison and Robins, 2002).

We call these effects *popularity spread* and *activity spread*, respectively, because their consequence is to increase the variance (or the "spread") in the (in and out) degree distributions (Robins, Pattison, and Wang, 2009). High positive values of these parameters indicate network centralization. For instance, a significant popularity spread parameter would indicate that indegrees are centralized on a few key actors. A negative parameter on the other hand would suggest a relatively equal spread of popularity (indegrees) across actors.

The second source of structural regularities that we incorporate in our models is closure – the tendency of network ties to occur more frequently between individuals sharing common contacts (Davis, 1970; Rank, Robins, and Pattison, 2010). We control for closure because the theory of social foci that inspires our empirical analysis predicts that closure will emerge as a direct consequence of the presence of multiple social foci (Feld, 1981). Closure will occur in a social structure where the individuals tend to collaborate in small informal groups with team-like structures. Tendencies toward closure that may be present in the data are captured by: (i) *(generalized) cyclic closure* where cycles of three arcs tend to be present in the network; and (ii) a generalized effect for *transitive closure*, where different types of transitive triads tend to be present in the network. The rationale behind various forms of triadic closure is discussed in Robins, Pattison, and Wang (2009).

We note, in passing, that the analytical purpose of estimating parameters for the generalized versions of cyclic and triadic closure is to capture the effects of triadic and extra-triadic dependencies that may be present in the data (Snijders et al., 2006). As a counterpart to the various mechanisms of triadic closure, we also include a parameter for non-closure, where two actors are connected by (possibly multiple) longer open paths, an effect we call *multiple connectivity* (Pallotti, Lomi and Mascia, 2013). Multiple connectivity effects may indicate the presence of many structural holes in the network. As explained in Robins, Pattison and Wang (2009), inclusion of a multiple connectivity parameter sharpens inferences about the presence of closure in the network. Again, it may be worth noting that *multiple connectivity* implies the presence of extra-triadic dependencies in the data. **Table 2** summarizes our discussion on the forms of network dependence represented in the empirical model specifications that we discuss below.

Insert **Table 2** about here

3.5. Empirical model specification and estimation

To link our arguments to appropriate statistical models, we consider each potential network tie between organizational members as a random variable. More precisely, for each pair of individuals i and j we define a random variable Y_{ij} so that $Y_{ij} = 1$ if a given relation exists between i and j, and $Y_{ij} = 0$ otherwise. Because relations of advice give rise to directed ties, Y_{ij} may be different – in general – from Y_{ji}. We define y_{ij} as a given value of the variable Y_{ij} and we let y be an instantiation of the set of all variables Y. The observed network is one such y and can be represented as an adjacency matrix containing the observed y_{ij} for all i and j. By considering each individual network tie as a random variable, we link our data structure directly to a class of Exponential Random Graphs Models (ERGM), also known as p^* (read p-star) models (Snijders, Pattison, Robins, and Handcock, 2006; Wasserman and Pattison, 1996; Robins, Pattison and Wang, 2009).

ERGMs are statistical models for social network structure (Lusher, Koskinen and Robins, 2013). They have their origin in spatial statistics (Besag, 1974; Frank and Strauss, 1986) with some similarity to certain models in statistical mechanics (Koskinen and Lomi, 2013; Park and Newman, 2004). Intuitively, ERGMs model both structure and randomness in networks. The structural part of the model is represented by a set of parameters that reflect positive or negative tendencies for certain network patterns to occur. Unlike the more conventional logit model used to represent network data, not only do ERGMs not assume independence between the dyads, but they also allow

the specification and estimation of specific sources of dependence (as explained in the previous section). Because ERGMs are based on dyadic observation schemes, the effective number of (non-independent) observations is N*(N-1), where N is the number of nodes in the network. In our case the number of observations is 1722. Different network configurations represent different assertions about why social ties form. There is a parameter for each configuration and positive (negative) parameter estimate indicates that there are more (fewer) of that configuration in the network than expected by chance, conditional on the other effects in the model. In this way, we can test different theoretical assertions regarding the formation of social ties altogether, one against the other.

More formally, an ERGM is a probability model for the structure of network ties with actor attributes and dyadic covariates as exogenous predictors and has the general form:

$$\Pr(Y{=}y \,|\, X{=}x) = (1/\kappa)\exp(\textstyle\sum_k \theta_k Z_k(y,x)) \tag{1}$$

where (i) Y is the $n{\times}n$ array of network tie variables, with realizations y; (ii) X is an $n{\times}p$ array of individual attribute variables with realizations x; (iii) $Z_k(y,x)$ is a network statistic that can be computed for a particular network realization y that may also depend on the vector x of attributes, (iv) θ_k is the parameter corresponding to the statistic $Z_k(y,x)$; and (v) κ is a normalizing quantity included to ensure that (1) is a proper probability distribution. The summation is taken over all network effects included in a given model.

Equation (1) describes a probability distribution of graphs on n nodes. The probability of observing any particular graph y in this distribution (including the one actually observed) is dependent both on the statistics $Z_k(y,x)$ for the network y and attribute vector x and on the corresponding parameters θ_k for all effects in the model. These configurations can be interpreted as the outcomes of potentially attribute-dependent endogenous network processes whereby ties come to be patterned in various ways. Certain endogenous processes are well documented in most human social systems – for example, tendencies to reciprocation, triangulation, and differential activity and popularity (Snjiders, Pattison, Robins, and Handcock, 2006). While it is always an empirical question whether a particular endogenous process is present in a social system, these forms of endogenous network self-organization are implicit within a network approach.

A model in the form of (1) can also be used to examine the specific effects of individual attributes on network ties in a way that controls for endogenous network processes. Attributes, in the form of actor-relation covariates may enter the model specification in (at least) three ways. The first is as a *sender (or activity) effect*: Individuals with a higher level of a specific attribute (x) may tend

to express more network relations. In this case the statistic for the corresponding sender effect is defined as: $\sum_{i} x_i y_{i+}$ where x_i is the attribute value and y_{i+} is the outdegree of actor *i*. The second way is as a *receiver (or popularity) effect*: Individuals with a higher level of a specific attribute may be the target of more network relations. In this case the corresponding receiver effect statistic $\sum_{i} x_i y_{+i}$, where y_{+i} is the indegree of actor *i*. In our data, it should be noted that *sender* refers to an actor who directs an advice tie towards a *receiver*, so that the sender seeks advice from the receiver.

Finally, an actor-specific variable may enter the model as an homophily or difference effect: network ties are predicted to be more or less likely between individuals who are different with respect to the level - or the presence of a specific attribute. The difference statistic is defined as $\sum_{i,j} y_{ij} |x_i - x_i|$, where   is the (absolute) difference in the level of attribute between actor *i* and actor *j*. A negative (positive) parameter associated with the difference statistic implies a tendency toward homophily (heterophily) in the formation of advice ties. When the variable *x* is binary or categorical a *matching* statistic, defined as the count of the number of ties for which the sender and receiver have matching values of the attribute, is used. In this case a positive (negative) parameter implies that ties are more (less) likely between actors sharing membership in the same category or possessing the same binary attribute.

Reliable parameter estimation for these models requires Markov Chain Monte Carlo Maximum Likelihood (MCMCML) Estimation (Hunter and Handcock, 2006; Snijders, 2002; see also Wasserman and Robins, 2005, for a review).

4. ANALYSIS

4.1 Results

The results of our analysis are summarized in **Table 3**. Model 1 provides a baseline specification only controlling for the average tendency of managers to ask advice *(Arc)*, the simplest form of dyadic dependence that may be present in the data *(Reciprocity)*, and the tendency of subsidiary companies as social foci to bound advice relations *(Subsidiary company matching)*. The negative *Arc* effect simply indicates that advice seeking behavior occurs infrequently outside more complex local configurations of advice relations. The positive *Reciprocity* effect indicates that advice relations rarely occur in isolation and tend to be reciprocated. Conditional on the presence of an advice relation

from manager *i* to manager *j,* the odds of reciprocation are more than four times (exp[1.4336=4.19]) the odds of no reciprocation . Finally, the significantly positive effect of membership in the same subsidiary reveals the tendency of subsidiaries to bound advice relations. Other conditions being equal, the odds of observing advice ties between managers in the same subsidiary are almost four times (exp[1.3121]=3.71) the odds of observing a tie between managers in different subsidiaries. Obviously, these results should be considered only as preliminary because they do not take into account the dependencies between network ties that will be introduced in the full model (Model 4). Given network dependencies, statistical inferences based on models 1-3 will be incomplete, as these preliminary models assume that dyads are independent of each other. For instance, he presence of closure effects in model 4 demonstrates that this independence assumption is incorrect.

Model 2 adds all the control variables and the sender and receiver effects of identification with subsidiary companies and with the corporate group. Model 3 adds selected interaction effects with the purpose of revealing the relation between company and corporate identification and the tendency of advice ties to crosscut or - as the case may be - to be constrained within the boundaries of the subsidiaries. Finally, Model 4 incorporates controls for network dependencies that are likely to affect endogenously the presence of advice relations among managers and that allow us to capture salient structural features of the network of advice relations. We focus our discussion on the full model (Model 4) and refer to intermediate models only to highlight interesting changes.

Insert **Table 3** about here

The effects of individual attributes reveal selected aspects of the mechanisms that may affect the presence of advice ties. The presence of network ties is related to homophily on gender and nationality. Similarity in age, tenure and education are not related significantly to the presence of advice relations. Organizational factors tend to have a stronger effect. As already observed in the baseline model, advice relations are significantly more likely to be observed between managers in the same subsidiary *(Subsidiary)* and working in the same functional area *(Organizational function)*. In the full model the (conditional) odds of observing advice relations between managers working in the same subsidiary is approximately 7 times the odds of observing advice relations between managers working in different subsidiaries. The effects of location disappear when network dependencies are appropriately specified. This result reveals the presence of interdependence between physical and social distance, and indicates that it is social distance, rather than physical location *per se*, that matters

for understanding advice relations within organizations. Managers in the corporate centre are significantly less likely to ask for advice *(Corporate - sender)* but more likely to be asked to provide advice *(Corporate - receiver)*. Subordinates tend to ask their superiors for advice *(Exchange with formal hierarchy)*. Superiors are neither more nor less likely to seek advice from their subordinates *(Entrainment with formal hierarchy)*.

Organizational research has established that advice relations within organizations are shaped by complex network dependencies taking the form of local relational structures (Lazega, 2001; Tortoriello and Krakhardt, 2010; Rank, Robins and Pattison, 2010). The endogenous network effects included in Model 4 reveal that the advice network is characterized by clear tendencies toward *Reciprocity* and closure *(Generalized closure)*, and against multiple connectivity in the absence of closure *(Multi-connectivity)*. In general, managers tend to establish advice ties with reciprocating others, and with others connected to the same multiple alters. There is no significant tendency toward centralization in the outdegree *(Activity spread)* or indegree *(Popularity spread)* distributions. Conditional on the other effects included in the model, this result suggests that managers in our sample tend to be relatively homogeneous with regard to activities of asking and receiving advice. Considered together, these results support the conclusions that the network structure of advice relations is best explained in terms of closure-based mechanisms rather than preferential attachment mechanisms affecting the degree distribution of the network of advice relations. The corresponding lack of centralization in the advice network may be consistent with the relatively homogeneous level of seniority and prominence of the managers in the sample. The significantly negative parameter associated with cyclic closure reveals tendencies toward local hierarchization of advice relations and against generalized exchange (Lazega and Pattison, 1999). When network dependencies are properly accounted for, the propensity of high corporate identifiers to be more active advice seekers disappears – a result suggesting that individual advice-seeking behavior is influenced by structural characteristics of the advice network, and in particularly by strong tendencies of advice relation toward transitive closure.

Our analysis of the effects of theoretical interest starts with a discussion of the effects of identification with the subsidiaries on the presence of advice ties. We decompose the overall effect of company identification on advice ties into two main components: (i) an effect reflecting the tendency of managers identifying with their own organizational unit (subsidiary company identifiers) to *ask for* advice *(sender effect)*, and (ii) an effect reflecting the tendency of managers to *be asked* for advice by others *(receiver effect)*. We follow the same strategy for the effect corporate identification on

advice and specify (i) an effect reflecting the tendency of managers identifying with the corporate (corporate identifiers) to ask for advice *(sender effect)*, and (ii) tendency of managers identifying with the corporate to be asked for advice *(receiver effect)*.

We include two interaction terms between the individual strength of identification with subsidiary and the dyadic indicator variable that records membership in the same subsidiary. We distinguish between the tendency to ask for advice within the subsidiary (*Identification with company (sender–W/I))* and the tendency to being asked for advice from within the subsidiary (*Identification with company (receiver–W/I))*. We do so because we are interested in learning whether ties between high subsidiary company identifiers are likely to be contained within the boundaries of their unit. This provides eight separate identification effects by which we can delineate these issues.

High company identifiers – individuals with a high level of identification with their subsidiary company - are neither more nor less likely to ask – or to be asked for advice ties (Model 4). The significantly positive effect of the parameter associated with the sender effect (*Identification with company (sender–W/I))* suggests that when high subsidiary company identifiers seek advice, they do so within - rather than across - the boundaries of their subsidiary. This conclusion provides partial support for H1.

The effect of *Identification with corporate* reveals a significant tendency of high corporate identifiers to be popular sources of advice *(receiver effect)*. Thus corporate identifiers are more often the targets of advice seeking, either within or across subsidiary boundaries. Because we are interested in assessing the extent to which advice ties cross-cut organizational boundaries we define an interaction effect between the strength of corporate identification and membership in the same subsidiary. As before, we distinguish between the tendency of high corporate identifiers to ask for advice within their subsidiary (*Identification with corporate (sender–W/I))* and the tendency to being asked for advice from within their subsidiary (*Identification with corporate (receiver–W/I))*.

The parameter corresponding to the interaction effect between strength of corporate identification, outdegrees and subsidiary boundaries (*Identification with corporate (sender–Within))* is negative, indicating that high corporate identifiers are less likely to look for advice within their subsidiary companies. Considered together, the estimates provide support for H2: high corporate identifiers not only are more popular sources of advice within the organization as a whole, but they are also more active in seeking advice across the boundaries of their subsidiaries. We note that the effects of identification with corporate and with subsidiary companies operate over and above the direct effects of intra-organizational boundaries already revealed by Model 1.

4.2. Qualitative implications

Because identification enters the model in different ways, it may be instructive to derive some of the qualitative implications of its combined effect on the presence of advice ties within and between intra-organizational boundaries. Identification scores with subsidiaries and corporate are measured independently and hence it is possible for the same manager to be high in both, low in both, or high in one while low in the other. Our post-estimation analysis addresses this possibility. The results are contained in **Tables 4a and 4b** which report the conditional odds for different types of advice ties as implied by the estimates of model 4 in Table 3[2].

Insert **Tables 4a and 4b** about here

The conditional odds tables are constructed analogously to the odds ratios of a logistic regression, although the analysis reported here is dyadic, i.e., the odds are applied to the presence or absence of a network tie. Each entry in the table is the odds of a tie from a sender with a particular identity profile to a receiver with a particular identity profile, compared to a tie from a baseline sender to a baseline receiver. In this case, the baseline profile for both sender and receiver is a low identification with subsidiary and a low identification with corporate. The identity profile always takes the form of high or low subsidiary identification with high or low group identification. So, there are four types of senders and receivers, hence 16 possible dyadic combinations (corresponding to the 16 cells in each table). Here "high" and "low" identification scores, for both subsidiary and corporate, are defined in terms of the corresponding ranges observed in the data. As it is the case in a logistic regression, the odds analysis assumes that everything else about the dyad is the same (i.e., all other structural and attribute variables). The odds for the baseline dyad are set equal to 1. So if a cell has an odds ratio of 2, then the odds of a tie from that type of sender to that type of receiver is twice that of the baseline case. Similarly, an odds ratio of 0.2 indicates that the odds of a tie in that type of dyad is one-fifth that of baseline. The odds ratios are calculated from the parameter estimates of Model 4 in Table 3, as explained in Robins and Daraganova (2013).

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[2] The results of extensive simulation-based goodness of fit diagnostic tests based on the procedure suggested by Hunter, Goodreau and Handcock (2008) support the conclusion that model 4 in Table 3 which controls for network structure is better able to reproduce the observed network than models assuming dyadic independence between network ties (Models 1, 2 and 3). The simulation results were contained in earlier version of the manuscript and are available upon requests.

Two tables are presented: one for ties within subsidiary (**Table 4a**) and one for ties between subsidiaries (**Table 4b**). The patterns of values in the two tables indicate where ties are most likely to occur, given a within or between subsidiary tie. As Table 4a clearly shows, managers who identify strongly with their subsidiary display the highest propensity to look for advice within the subsidiary. Section (ii) of Table 4a *(Sender high identification with company, low identification with corporate)* reveals that the odds of an advice relation of this kind is three (2.63) to four (4.26) times larger than the odds associated with the baseline profile. Section (iii) of Table 4a *(Sender low identification with subsidiary company, high identification with corporate)* reveals that managers who identify weakly with their subsidiary, but highly with corporate, are the least likely to ask for advice to colleagues within their subsidiary: the propensity for this kind of tie is 1/3 (0.35) to 1/5 (0.22) of the propensity associated with baseline profile. Table 4b shows that corporate identification is what drives advice ties across subsidiaries (2nd row of each of sub-tables 4b, i-iv). The odds of observing boundary-crossing ties involving managers who identify strongly with corporate are two (2.43) to five (5.65) larger than the odds corresponding to the baseline profile. Overall, the figures reported in the tables provide interpretable evidence in support of the hypotheses of the study.

5. DISCUSSION AND CONCLUSIONS

Understanding advice seeking behavior is important because advice relations affect the way in which knowledge is shared, transferred and mobilized across various boundaries existing within organizations (Cross, Borgatti and Parker, A. 2001; Lazega, Mounier, Snijders, and Tubaro, 2012). In this study we found that managers who identify strongly with their subsidiaries are less likely to seek advice across their boundaries. This finding cannot be explained exclusively in terms of shared membership, in terms of homophily-based sorting due to gender, organizational grade, education, seniority and functional area, or in terms of endogenous network-based processes that might constrain network ties within local social neighborhoods. To the extent that networks of advice relations facilitate knowledge sharing, transfer, and development within organizations, this result suggests that identification with local foci tends to consolidate the boundaries around them and make organizational units more resistant to cross-cutting ties. In line with our predictions, we also found that managers identifying more strongly with the superordinate corporate group were less likely to seek advice within the boundaries of their subsidiaries. This result suggests that identification with global social foci increases the permeability of organizational units to boundary-

crossing ties. This finding cannot be explained exclusively in terms of formal position or status occupied by individuals in the corporate hierarchy.

Recalling Breiger's (1974) classic insight, Brass, Galaskiewicz, Greve, and Tsai (2004 : 801) observed that: "Ties between people in different units are especially intriguing, because they create ties between organizational units, illustrating the "duality" of groups" and of individuals. When two individuals interact, they not only represent an interpersonal tie, but they also represent the groups of which they are members." Our attempt to advance a theory of social foci in organizations produced empirical results that speak directly to these theoretical concerns. First, we have shown that identification with local foci affects advice relations over and above the effect of nominal boundaries. Because advice relations involve forms of knowledge transfer (Cross, Borgatti, and Parker, 2001), this result clearly suggests a novel link between intraorganizational processes of identification and network range (Reagans and McEvily, 2003). According to Tortoriello, Reagans and McEvily (2012) personal networks have range to the extent that they connect organizational members to non-equivalent others – i.e., to others in different knowledge domains within the organization. We have shown that the extent to which individual managers possess relations across their subsidiaries – and hence enjoy an increased network range - is related to the strength of identification with their local foci. Because network range is associated with greater capacity of successful knowledge transfer (Tortoriello, Reagans, and McEvily, 2012) this result suggests new possibilities for research about how social and psychological mechanisms of organizational identification might affect the emergence of range positions. Second, we have shown that identification with a superordinate corporate identity is associated with greater levels of boundary crossing. Again, building on the view that advice relations are forms of knowledge transfer within organizations, this result resonates with current research which has found that sharing superordinate identities facilitates awareness, acceptance, and adoption of solutions developed across organizational boundaries (Argote and Kane, 2009; Kane, 2010). Third, we have shown that a single theoretically defined mechanism might explain both the propensity of knowledge flows to be restrained by the boundaries of organizational sub-units, as well as the propensity of knowledge flows to cross-cut those boundaries.

Considered together, our results suggest new ways in which the theoretical tension behind the co-existence of local and non-local network ties in organizations might be resolved. Our study highlights that in organizations more than in any other settings: "Each identity has its own field of ties which differ from any other identity's in what tie goes to which others" (White, 1992: 116).

More specifically, the results we reported reveal specific mechanisms that may be behind the heterogeneity in knowledge search strategies within organizations that has been recently observed (Singh, Hansen and Podolny, 2010). Managers who identify strongly with their organizational units tend to limit search for information within these units. As a consequence their information "search chains" may be longer than those of managers who identify strongly with the corporate and who have therefore faster access to more global information relayed by boundary-crossing advice relations. This result is surprising – at least in part - because it suggests a paradoxical trade-off between knowledge transfer goals on the one hand, and organizational identification goals on the other. These two rather reasonable organizational goals may prove difficult to reach at the same time.

A number of limitations advise caution in the interpretation of our results, but also indicate clear directions that future research might pursue. Perhaps the most obvious limitation concerns the static nature of our research design. We cannot rule out the possibility that our results could have been different under conditions of changing hierarchical relations, shifting organizational boundaries, and personnel turnover. Furthermore, the cross-sectional nature of the data does not allow us to exclude completely the possibility that identification is at the same time a product and a cause of advice ties. For example, company identifiers may be more likely to establish advice relations within their unit. On the other hand managers with fewer advice ties outside the boundary of their unit may be more likely to *become* company identifiers. This is ultimately an empirical issue. What we have modeled is social selection, but we cannot rule out the presence of concurrent processes of social influence that may confound the relation we have postulated between organizational identification and network ties. Disentangling the relation between selection and influence is likely to require the development of dynamic models for social networks along the lines suggested by Lomi, Snijders, Steglich and Torló (2011). A second limitation concerns the generalizability of our findings. Because the organization we selected for study has some unique features, it is important to be cautious in generalizing the results of our study - although we believe that the relation we found between identification and networks within and across inter-organizational boundaries is important beyond the specific setting we have examined. Because of the logic of its core business, the companies we selected for study emphasized product design and manufacturing processes carried out in a rather decentralized fashion within the individual subsidiaries responsible for managing their own products and brands. One possible implication that our models have clearly registered is that professional boundaries – as defined by membership in

functional areas like finance, engineering, and accounting – were weaker sources of identity than subsidiary boundaries. Results may be different for professional service companies where identities are very much shaped by membership in professional families, rather than manufacturing units. Results may also be different in studies that – unlike the present - are conducted on full organizations that include not only top managers, but also other organizational members distributed across a broader range of employment categories. In such cases it is probably reasonable to expect a stronger effect on interpersonal relations of social identities bounded by employment categories. The ambition of the case study we have presented, however, was not to arrive at conclusions generalizable across diverse organizational settings. Rather, the purpose of our study was to document the relationship between organizational identification and network structure. We think future studies interested in examining this relationship may take our results as a reliable point of departure.

A third limitation is related to the fact that organizations are social systems with nested hierarchical levels. As a consequence, organizations present their members with a variety of identification targets. We selected organizational subsidiaries and the overall corporate group as the appropriate targets for identification. While we controlled for the effects of competing identity targets, our choice was, in part at least, dictated by contextual elements. Therefore, questions remain open on how to identify the relevant element that bound and trigger identities in more general organizational settings. A fourth limitation that deserves notice concerns network delineation. We have argued that advice is a particular important way in which individuals in organizations exchange knowledge, information and experiences. Yet, individuals in organizations are linked in other ways as well. Which relations should be chosen for analysis, and which relations are most useful or revealing of underlying social mechanisms of coordination, knowledge transfer, and knowledge sharing remain issues of general concern that that future research will have to consider more systematically. We suspect that future attempts to model the effects of identification on network ties in organizations will benefit substantially from the development of network models for multiplex relations similar to those proposed by Snijders, Lomi and Torló (2013).

In closing, we note that in addition to the theoretical implications that we have outlined our paper contributes to the growing interests in models for networks designed to account explicitly for dependencies that are known to characterize social networks (Lusher, Koskinen and Robins, 2013) – and that are recognized as crucial to our ability to represent with accuracy boundary-crossing activities within organizations (Tortoriello and Krackhardt, 2010; Tortoriello, Reagans, and McEvily,

2012). Prior studies based, like the present, on dyadic observation schemes have corrected statistically for generic forms of dependence between network ties but, with few exceptions, have not modeled such dependencies explicitly. Accounting for endogenous tendencies of social networks to self-organize into a variety of local configurations has allowed us to account for specific ways in which network ties may generate other network ties. In this way our models explicitly admit that the focused organization of advice relations is characterized by endogenous components whose effects on tie formation co-exist with the effects of individual attributes and with the powerful effects of formal intraorganizational boundaries. We have shown that this analytical strategy produced interpretable evidence on how identification with social foci of activity within organizations influences the propensity of knowledge and information to be transferred across intraorganizational boundaries.

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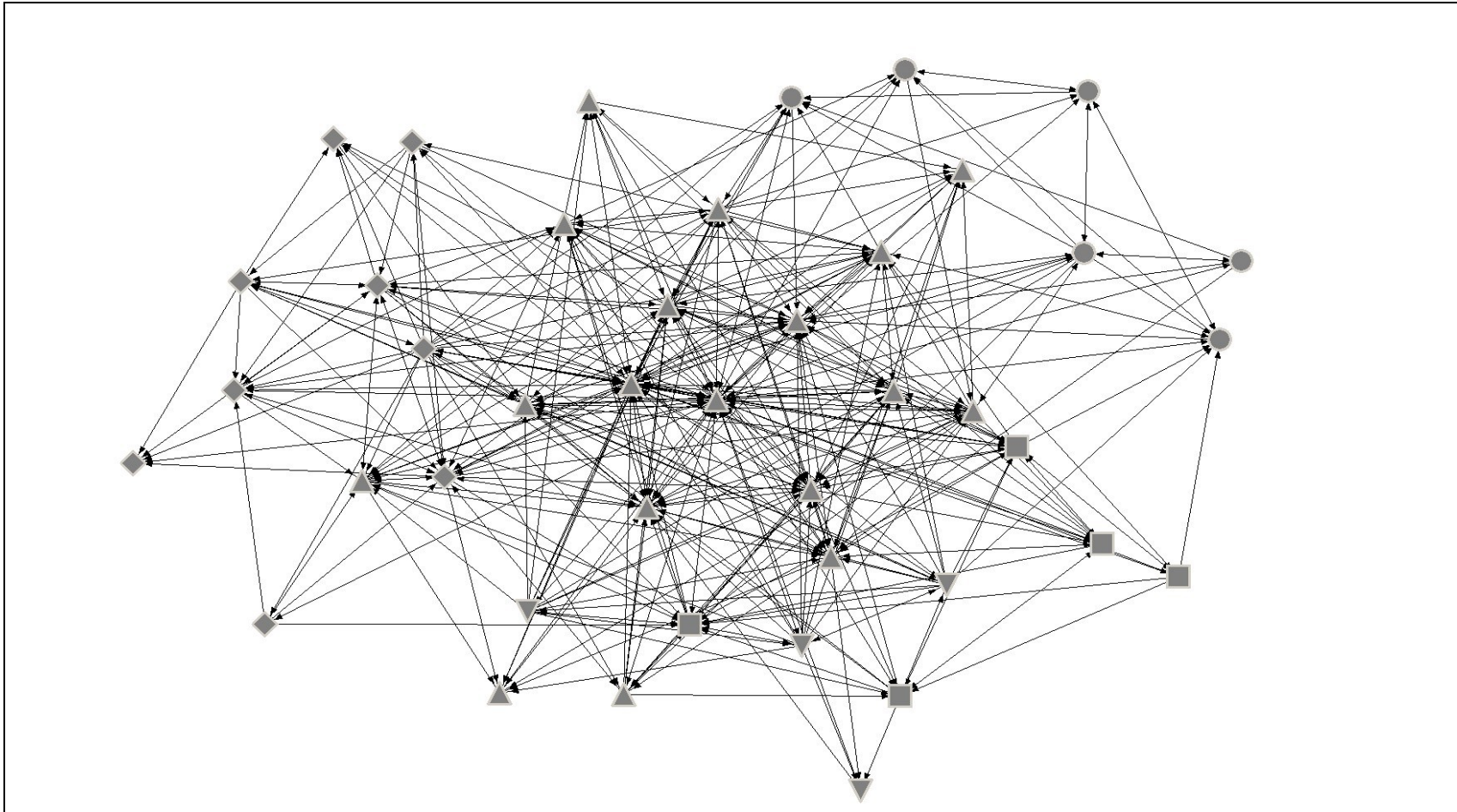
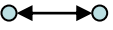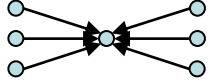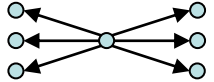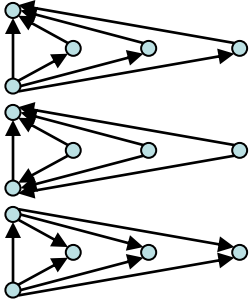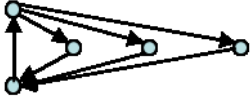**Figure 1.** Network diagram of professional advice relations between members of the top management team. Different shapes of the nodes indicate membership in different organizational units ("subsidiary companies") within the group.
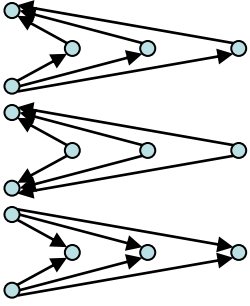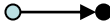
Table 1. Descriptive statistics for the advice network.

Density	0.229
Average degree	9.381
Degree variance	33.093 (in); 47.236 (out)
Reciprocity	0.2834
Average *(Geodesic)* distance	2.092
Number of nodes *(N)*	42
Number of dyads *[N*(N-1)]*	1722

Table 2. Summary table of actor-specific, endogenous, and multivariate network effects included in empirical model specifications.

	Parameter	Qualitative pattern	Included to control for	Network statistics
		Network effects		Notation: x – Network y - Actor attribute v - Dyadic covariate
1	*Density*		*Baseline tendency for an advice tie to occur*	$\sum x_{ij}$
2	*Reciprocity*		*Tendency toward reciprocation in advice*	$\sum x_{ij} x_{ji}$
3	*Popularity spread*		*Tendency for variation in the degree to which an actor receives multiple advice tie nominations*	$\sum_{k=2}^{n-1} (-1)^k \frac{S_{k\_in}}{\lambda^{k-2}}$
4	*Activity spread*		*Tendency for variation in the degree to which an actor expresses multiple advice ties*	$\sum_{k=2}^{n-1} (-1)^k \frac{S_{k\_out}}{\lambda^{k-2}}$
5	*Generalized closure (TDU)*		*Tendency for transitive (T) closure, shared popularity closure (D) and shared activity closure (U) structures to occur.* **NB**: *This is a single parameter which incorporates all three structures.*	$\lambda \sum_{i<j} x_{ij} \left\{ 1 - \left(1 - \frac{1}{\lambda}\right)^{L_{T2ij}} \right\} +$ $\lambda \sum_{i<j} x_{ij} \left\{ 1 - \left(1 - \frac{1}{\lambda}\right)^{L_{D2ij}} \right\} +$ $\lambda \sum_{i<j} x_{ij} \left\{ 1 - \left(1 - \frac{1}{\lambda}\right)^{L_{U2ij}} \right\}$
6	*Cyclic closure*		*Tendency for multiple cyclic structures to occur*	$\lambda \sum_{i<j} x_{ji} \left\{ 1 - \left(1 - \frac{1}{\lambda}\right)^{L_{C2ij}} \right\}$

7	Generalized multiple connectivity (TDU)		Tendency for transitive (T) multiple connectivity, shared popularity (D) and shared activity (U) structures to occur. **NB**: This is a single parameter which incorporates all three structures.	$\lambda \sum_{i<j} \left\{ 1 - \left(1 - \dfrac{1}{\lambda} \right)^{L_{T2ij}} \right\} +$ $\lambda \sum_{i<j} \left\{ 1 - \left(1 - \dfrac{1}{\lambda} \right)^{L_{D2ij}} \right\} +$ $\lambda \sum_{i<j} \left\{ 1 - \left(1 - \dfrac{1}{\lambda} \right)^{L_{U2ij}} \right\}$
			Effects of formal hierarchy	
8	*Entrainment*		*Tendency of hierarchical superiors to ask advice to their subordinates*	$\sum x_{ij} v_{ij}$
9	*Exchange*		*Tendency of hierarchical subordinates to ask advice to their superiors*	$\sum x_{ij} v_{ij}$
			Actor-relation effects	
10	*Homophily*		*Tendency for network ties to occur between actors who are similar with respect to an attribute*	$\sum x_{ij} y_i y_j$
11	*Sender*		*Tendency for actors with a specific attribute (which may be continuous, categorical or binary) to express network ties*	$\sum x_{ij} y_i$
12	*Receiver*		*Tendency for actors with a specific attribute (which may be continuous, categorical or binary) to receive network ties*	$\sum x_{ij} y_j$

Legend: L(*)$_{2ij}$ represents the number of 2-paths between *i* and *j*; λ is a dampening factor (Snijders *et al*, 2006). For S$_k$, S stands for "star", and the subscript *k* indicates the size of the star involved (e.g. 2-star, 3-star……k-star)

Table 3. Maximum likelihood estimates of ERG (p*) models for advice ties. Standard errors in parentheses (N = 1722.

	Model 1	Model 2	Model 3	Model 4
Identification with subsidiary company				
Identification with company (sender)		-0.0099 (0.0509)	-0.0576 (0.0587)	-0.0381 (0.0503)
Identification with company (receiver)		-0.0003 (0.0469)	-0.0244 (0.0559)	-0.0204 (0.0556)
I*dentification with company (sender-W/I)*			0.1524 (0.0971)*****	0.1592 (0.0979)*****
I*dentification with company (receiver-W/I)*			0.0583 (0.0943)	0.0564 (0.0882)
Identification with corporate group				
Identification with corporate (sender)		0.0072 (0.0524)	0.1369 (0.0608)*******	0.0511 (0.0541)
Identification with corporate (receiver)		0.1284 (0.0521)*******	0.1947 (0.0611)*******	0.1694 (0.0647)*******
Identification with corporate *(sender-W/I)*			-0.2710 (0.1053)*******	-0.2411 (0.1065)*******
Identification with corporate *(receiver-W/I)*			-0.1723 (0.1057)	-0.1452 (0.1035)
Control variables: Organizational structure				
Subsidiary company (matching)	1.31209 (0.1135)*******	1.0448 (0.1742)*******	2.5134 (0.7761)*******	2.0330 (0.7624)*******
Organizational function (matching)		0.4058 (0.1473)*******	0.3848 (0.1410)*******	0.4068 (0.1380)*******
Organizational level (matching)		-0.1773 (0.1415)	-0.0957 (0.1303)	-0.1170 (0.1374)
Location (matching)		0.4660 (0.1728)*******	0.4415 (0.1685)*******	0.1769 (0.1295)
Control variables: Formal hierarchy				
Corporate (sender)		-0.7033 (0.1626)*******	-0.3289 (0.1561)*******	-0.5780 (0.1709)*******
Corporate (receiver)		0.8892 (0.1487)*******	0.7637 (0.1387)*******	0.5742 (0.1808)*******
Entrainment with formal hierarchy		-0.0934 (0.4031)	0.0763 (0.3798)	-0.0801 (0.3979)
Exchange with formal hierarchy		1.7007 (0.3940)*******	1.6361 (0.4264)*******	1.7764 (0.4314)*******
Control variables: Individual attributes				
Gender (matching)		0.3636 (0.1365)*******	0.4008 (0.1324)*******	0.1713 (0.1012)******
Nationality (matching)		0.3964 (0.1822)*******	0.3502 (0.1767)*******	0.1807 (0.1049)******
Age (difference)		-0.1553 (0.0981)*****	-0.1050 (0.0930)	-0.1481 (0.0832)
Tenure in group (difference)		0.0087 (0.0093)	0.0120 (0.0092)	0.0054 (0.0081)
Education (difference)		-0.0975 (0.0822)	-0.0955 (0.0783)	-0.0516 (0.0763)
Network effects				
Arc	-1.9760 (0.0860)*******	-3.8691 (0.4578)*******	-4.7138 (0.5749)*******	-4.6084 (2.0007)*******
Reciprocity	1.4336 (0.1888)*******	1.3731 (0.1973)*******	1.3391 (0.1998)*******	1.0290 (0.2561)*******
Popularity spread				-1.1217 (1.0095)
Activity spread				0.1571 (0.3802)
Cyclic closure				-0.1779 (0.1004)******
Generalized closure				1.7280 (0.2648)*******
Multi-connectivity				-0.1383 (0.0443)*******

Legend: *****: p <0.10; ******: p <0.05; *******: p <0.01

Table 4a. Conditional odds ratios for an actor receiving an *advice tie* based on identification profiles (Reference category: sender and receiver both low identification for company and group). *Within companies advice.*

		Receiver subsidiary company identification	
		LOW	HIGH
Receiver corporate identification	*(i) Sender low identification with subsidiary company and corporate*		
	LOW	1.00	1.33
	HIGH	1.21	1.62
	(ii) Sender high identification with subsidiary company, low identification corporate		
	LOW	2.63	3.51
	HIGH	3.20	4.26
	(iii) Sender low identification with subsidiary company, high identification corporate		
	LOW	0.22	0.29
	HIGH	0.27	0.35
	(iv) Sender high identification with subsidiary company and corporate		
	LOW	0.58	0.77
	HIGH	0.70	0.93

Table 4b. Conditional odds ratios for an actor receiving an *advice tie* based on identification profiles (Reference category: sender and receiver both low identification for company and group). *Between companies advice.*

		Receiver subsidiary company identification	
		LOW	HIGH
Receiver corporate identification	*(i) Sender low identification with subsidiary company and corporate*		
	LOW	1.00	0.85
	HIGH	3.88	3.29
	(ii) Sender high identification with subsidiary company, low identification corporate		
	LOW	0.74	0.63
	HIGH	2.86	2.43
	(iii) Sender low identification with subsidiary company, high identification corporate		
	LOW	1.51	1.28
	HIGH	5.84	4.96
	(iv) Sender high with subsidiary identification company and corporate		
	LOW	1.11	0.94
	HIGH	4.30	3.66