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Inside the Black Box of the Corporate Staff:
An Exploratory Analysis Through the Lens of E-Mail Networks

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Abstract

The corporate staff is central in theories of the multi-business firm, but empirical evidence on its function is limited. In this paper, we examine the high-level role of two units of a corporate staff through analysis of electronic communications. We find sharp cross-sectional differences in communication patterns: relative to people in the line organization, staff members are more central in the corporate e-mail network and possess broader networks. However, much of this difference is attributed to who sorts into jobs in the corporate staff, rather than being caused by employment in the corporate staff *per se*. Results suggest that once people receive the "corporate imprimatur" on their network structures, they retain it even when they move back to the line organization.

Introduction

In their chapter setting forth a research agenda for the field of strategy, Rumelt, Schendel and Teece (1994) identify four fundamental questions to animate research in the field. One of the four questions asks, "What are the functions of the headquarters unit in a multibusiness firm?"

For two reasons, we find it remarkable that this question has received limited attention in current, empirical research in the field. First, throughout the past century, the diversified, multi-divisional corporation, or M-form, has become the primary organizational structure across the global economic landscape (Fligstein, 2001). The hallmark of the M-form is the oversight of the dispersed activities of the firm by a central headquarters unit (Chandler, 1962; Williamson, 1975). In today's economy, well over half of all industrial output is produced in such organizations (Collis, Young and Goold, 2007; Villalonga, 2004) and for many years, the vast majority of Fortune 1000 firms have been diversified across multiple industries (Montgomery, 1994). This increasingly appears to be true in developing economies as well (Khanna and Palepu, 2000), and there is every reason to believe that globalization will only accelerate this trend. Simply put, the limited empirical work on this subject belies its fundamental importance to the strategic management of the modern enterprise.

The second reason we consider this subject to be under-studied is that although the *empirical* literature on the corporate headquarters unit is sparse, it is appropriately central in current *theories* of the firm. In scholarship on the potential for value creation in the diversified firm, headquarters is regarded as the one organizational unit with the formal authority to coordinate symbiotic interactions among otherwise independent operating units (Chandler, 1962; Goold and Campbell, 1987; Penrose, 1959). Moreover, headquarters also possesses the power to determine the grouping of activities into formal organizational units; it houses the office of the chief executive; it exercises the major voice in the determination of overall corporate strategy; and it controls decision rights regarding the scope of the firm. Together with associated corporate staff functions, the headquarters coordinates the activities of the various business units (Collis *et al.*, 2007; Goold, Campbell and Alexander, 1994). In other words, our

theories of the multiunit firm ascribe a vital set of tasks to the corporate-level staff, which fundamentally influence the conduct and outcomes of the primary organizational actors in the contemporary economy (Foss, 1997).

In this paper, we conduct a quantitative case study of the corporate headquarters unit and a corporate-level function (specifically, a corporate sales force) in a large, multidivisional company. Rather than survey members of the corporate staff as a few other studies have done (Collis *et al.*, 2007; Goold and Campbell, 1987), we follow a different approach: we analyze two temporally spaced cross-sections from an electronic mail dataset comprising the correspondences of over twenty thousand employees distributed across the organizational units of the company. These data allow us to compare the communication networks of members of corporate headquarters (CHQ) and of the corporate sales force (CSF) to those of individuals in the line organization and to map the social organization of the M-form.[1] To the extent that coordination is central to the role of the corporate center, members of the corporate staff units should, on average, have broader networks that are richer in structural holes than members of the line organization. The paper specifically analyzes whether and why members of the corporate center have networks that appear to be better optimized for coordinating across disparate organizational and social structures than do members of the line organization.

To be clear about the paper's objectives, analyzing the social networks of organizational members will *not* enable us to adjudicate among alternative theories of the role of corporate staff. Our ambition in this paper therefore is more modest: we view this as an early step to further open the black box of the still-opaque organizational units that sit at the corporate level in the M-form. We do, though, believe that virtually all theories of the M-form that emphasize the corporate staff's role in value creation ultimately rest on some form of coordination. Insofar as the corporate staff actually does coordinate across the structurally discrete components of the overall organization, the informal communication networks of its

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[1] Although our analysis will separately examine the corporate headquarters unit and the corporate-level sales force, throughout the paper we will, for rhetorical convenience, refer to these two units as the "corporate staff", and we will frequently draw a contrast between "staff" (i.e., employees of the CHQ and the CSF) and employees who are members of the "line" organization (i.e., any of the 29 discrete business units of the company).

members should, relative to individuals in the operating units, exhibit the tangible residue of this interstitial activity. To put it in plain terms, the communication networks of organizational members are, we believe, the place to search for the concrete manifestations of coordination. The primary question that orients our work therefore asks: do the members of the corporate staff indeed have networks that are broader than those of their counterparts in the line organization, such that we see evidence of the coordinating role in the communication networks of staff members?

There is a second, related question that we also consider. In administrative science, there is a classic distinction between person and job. For instance, Reiley and Mooney (1939) wrote that formal structures in organizations coordinate collections of jobs that are logically antecedent to the individuals who occupy them. The classical organization theorists viewed formal structures as interconnections of jobs rather than people (cf. Scott, 1992). In a parallel manner, relational theories of social structure (Simmel, 1902) emphasize a duality between person and position; actors occupy positions in social structures that are consequential independent of any specific occupant. The relevance of the person-job distinction to our research revolves around the question of how any observed differences in network structures come to be. Specifically, if there is a difference in the composition of the networks of the individuals in corporate headquarters versus line jobs, can we attribute this difference more to the person, or to the job? Given the importance of coordination to the multi-divisional firm, this question has important implications for how best to achieve coordination: through an emphasis on structure or an emphasis on selecting the right people to occupy those structures.

This is a difficult question to answer definitively but we are able to gain some purchase on the question because we can measure communication networks both before and after episodes of employee mobility in both directions across the staff ↔ line divide (i.e., transitions from CHQ or CSF to a line role, and from the line organization to a position in CHQ or CSF). When we couple mobility and communication networks with human resource data from the company, we can attempt to isolate the person effects from the role effects. We do this by estimating regressions of the probability of staff-to-line

and line-to-staff transitions. These estimated probabilities of the conditional likelihood of mobility are equivalent to propensity scores that can be used to construct matching estimators.

The findings offer evidence for a strong selection process that results in the recruitment of central individuals with broad networks to roles in the corporate staff. This is true for transitions from the line organization to both the CHQ and the CSF. Even after accounting for the selection process, however, we find evidence of an incremental effect of the transition into CHQ and CSF on broadening individuals' networks. Therefore, we find that both person effects and role effects result in less constrained, more central networks among people who switch into staff roles. We find limited evidence, however, that exiting from jobs in the corporate staff is associated with a *narrowing* of social networks. Our results suggest that once people receive the "corporate imprimatur," they may carry it with them, even when they move back to the line organization.

This research offers several contributions to the field of strategy. Foremost among them, we begin to open the black box of the corporate center to reveal its internal wiring. This contributes to a long literature that considers the important role of the corporate staff in achieving coordination, by measuring the informal networks of communication through which coordination is effected. Relative to members of the line organization, members of the corporate staff have larger networks that are richer in structural holes. Second, we contribute to the literature on integration and coordination by showing evidence that the broader networks of the corporate staff result both as a consequence of formal organizational structure and as a result of non-random selection of people into roles. For organization designers, this implies that not only is it important to put the right structures in place, but those structures must also be populated with the right "types" of people.

Theory and Hypotheses

The corporate staff is central in classical and contemporary theories of the corporation. Indeed, the *raison d'etre* for the diversified corporation is the creation of value through the coordination of activities (broadly defined) across multiple business units. Although the literature identifies multiple

avenues through which the corporate center may create value, virtually all entail some aspect of coordination within the firm. In turn, we believe that these forms of coordination have similar implications for the social organization of the M-form: in performing these functions, members of the corporate staff necessarily will engage in interactions across the many organizational and social boundaries within the company. Doing so effectively requires them to have larger, broader networks of informal interactions.

In what follows, we briefly review three different activities identified in the literature, and then conclude with their implication for communication network structures. First, in the multidivisional firm, the corporate staff oversees the formulation of corporate-level strategy, strategic planning and resource allocation (Andrews, 1971; Bower, 1970). Second, in normative models of corporate-level advantage (e.g., Campbell, Goold and Alexander, 1995), the corporate center performs a series of value-creating activities, ranging from instituting centralized functions and lateral structures that insure cross-SBU exploitation of economies of scale and scope, to enacting mechanisms that promote the transfer of knowledge across businesses, to the development, implementation, and transference of core competences, to the allocation of capital across the business portfolio. Third, in behaviorally oriented views, the corporate staff is active in the creation and propagation of shared values across the organization (Ouchi, 1980; Parsons, 1956).

The role of the corporate center in planning is most closely associated with Chandler (1962, 1990). Chandler linked the emergence of the multi-business corporation to technological changes that created the opportunity for large, diversified organizations to exploit scale-based production processes. The multi-divisional organization, with the twin features of a separate corporate center and the delegation of decision rights from it to the semi-autonomous operating companies, was the organizational remedy to the coordination problems endemic to large, scale-based, geographically distributed production. Chandler (1962) introduced his book with his description of two central tasks of the headquarters unit. It must, "coordinate, appraise and plan goals …" and "allocate resources" (Chandler, 1962:9). Conversely, the

operating units of the company are granted authority to make operating and strategic decisions related to the conduct of their business.

In Chandler's (1990, 1994) later writings and in subsequent perspectives on the corporate center, especially in normative work such as that on the core competence perspective (Prahalad and Hamel, 1990), the resource-based view of the firm (Barney, 1991; Peteraf, 1993), and in the literature addressing the potential for corporate-level "parenting" advantages (Campbell *et al.*, 1995), the corporate staff almost invariably creates value by implementing cross-business coordination mechanisms (cf. Helfat and Eisenhardt, 2004). It does so by establishing managerial systems and incentive programs, which are often enacted with the participation of corporate staff, to encourage synergistic collaboration across subset(s) of related operating units. In these perspectives, well-structured multi-business firms contain diverse but symbiotic bundles of know-how and competencies, and value creation occurs when the corporate center coordinates the deployment of these resources throughout the enterprise.

Of course, the potential benefit from coordination across organizational units will depend on the relatedness of the activities in the company. A voluminous literature has explored the relationship between diversification and performance (e.g., Ansoff, 1957; Bercovitz and Mitchell, 2007; Berger and Ofek, 1995; Hill, Hitt and Hoskisson, 1992; Hill and Hoskisson, 1987; McGahan and Porter, 1997; Montgomery and Wernerfelt, 1988; Robins and Wiersema, 1995). A meta-analysis concludes that performance tends to peak when a firm engages in diversified, but still related, businesses (Palich, Cardinal and Miller, 2000) and promotes cooperation between those businesses through centralization and integration (Hill *et al.*, 1992).[2] Accompanying this work, there is a substantial design literature on organizational vehicles for achieving such lateral coordination in the M-form. Very broadly, there are (relatively) more formal and more informal approaches. Toward the formal end of the spectrum are reporting structures such as a formal matrix (Galbraith, 1977), liaison roles designed to undertake

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[2] It is important to note that work in financial economics posits many counter arguments that highlight the potential costs of operating a multi-business corporation. This work includes everything from potentially wasteful resource allocation practices (e.g., Rajan, Servaes and Zingales, 2000) to problems associated with rent-seeking behavior within the company (e.g., Scharfstein and Stein, 2000).

coordinated initiatives across interdependent divisions (Lawrence and Lorsch, 1967), and of particular relevance to the organization we study, centralized, corporate-level function that is intended to span – and coordinate across –autonomous product divisions.[3] Each organization structure facilitates certain types of information flows, but inevitably inhibits others (Kleinbaum and Tushman, 2007).

In addition to hierarchical and formal structural approaches to coordination, there is a classic literature on informal mechanisms to achieve coordination. For the most part, these rely on the socialization of the members of the organization into a set of common values (Parsons, 1956). Simplifying matters, in these theories, the internalization of shared values serves as a form of social control that may unite the interests of the overall organization with the values of its members, and therefore create a compatibility of interests that promotes coordination across intraorganizational boundaries even when it is not in the narrow self interest of employees to cooperate (Ouchi, 1980). The corporate staff is thought to be active in formulating, communicating, and promulgating these values across the different parts of the firm (Schein, 1985).

From this brief review of the literature, it is apparent that decades of theory ascribe a vital economic role to the corporate headquarters and other, centralized units in the multidivisional corporation to coordinate activity across the enterprise. To be clear, we do not claim that coordination is the only thing that the corporate center does. For example, agency theoretic models (Jensen and Meckling, 1976) and transaction cost perspectives (Williamson, 1975) emphasize the challenges of creating incentive alignment between the overall objectives of the corporation and the business units and of monitoring the operating units to secure compliance with corporate-level policies and objectives. Here, the essential organization design choice is the extent to which headquarters relinquishes decision rights to divisions, versus maintaining central control.

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[3] In the scholarly literature on the M-form, we were surprised to discover relatively few systematic treatments of organizational structures that are primarily divisional but also incorporate one or more centralized functions. In general, we would expect to observe centralized functions in instances in which there are large scale, scope, or coordination benefits for doing so. These benefits can occur at any stage of the value chain, ranging from central research labs (e.g., Argyres and Silverman, 2004) to a corporate-level sales organization like the one we study.

The precise activities of the corporate staff obviously are choices that will vary across companies. For instance, the potential payoff for the transfer of knowledge or capabilities across organizational units hinges on the mix of businesses within the company and on choices about organizational structure and corporate strategy (Rumelt, 1974). Similarly, the extent to which corporate-level executives perceive the need to monitor divisional management and the degree to which the corporate staff attempts to inculcate common values across operating units also will depend on the mix of businesses and the discretion of corporate leaders. Although the strategy, structure, culture, history, location and business mix of the firm will influence the precise activities in which the headquarters unit will engage, we nevertheless believe that the generally accepted theories of the corporate center have at least one common implication for the social structure of the firm: to acquit its duties, corporate-level staff must coordinate across organizational units and functions within the M-form (Hill *et al.*, 1992).

Despite its importance, there is relatively little empirical work that systematically examines the internal functioning of these corporate-level units. Collis, Young, and Goold (2007) report survey results on the cross-sectional relationship between headquarters size and the corporate strategy and governance systems of hundreds of companies in multiple geographies. Their work demonstrates significant variation in the size and activities of the CHQ unit across geographies and corporate-level strategies. In the international business literature, there also has been sustained attention to the functions of headquarters in multinational corporations, with particularly influential contributions by Sumantra Goshal and colleagues (e.g., Ghoshal and Bartlett, 1990; Ghoshal, Korine and Szulanski, 1994; Nohria and Ghoshal, 1994).

Given the importance of coordination by the corporate center in theories of the M-form, a great deal of research on social networks becomes relevant to potential differences in network configurations for individuals in staff versus line jobs. Specifically, it is well know that network structures differ in their ability to affect coordination. Individuals possessing broader networks enjoy superior access to information (Burt, 1992) and may possess the range of contacts that enables them to facilitate smooth interactions across intra-organizational boundaries (Ghoshal *et al.*, 1994). Likewise, people with high

centrality in the internal network possess the ability to disseminate information and ideas to many colleagues and to mobilize a large number of coworkers to coordinated undertaking. If the corporate staff engages in the forms of coordination described in the literature, doing so effectively will necessitate different configurations of communication networks relative to members of the line organization. Specifically, we hypothesize:

> **Hypothesis 1**: Relative to otherwise comparable members of the line organization, employees in corporate staff units will have communication networks that exhibit (a) greater centrality and (b) more structural holes.

If we find support for Hypothesis 1, the observed differences in network structure might arise for three very different reasons. The first is a structural or positional explanation: as classical theorists would argue, the formal job responsibilities of members of the corporate staff lead them to broadly communicate across the many borders of the formal organization as they endeavor to coordinate and supervise activities that take place in disparate organizational locations. If this is the case, the shape of individuals' social structures actually is *causally* influenced by the position the individual occupies in the organization. We label this the position-based explanation for structural differences in network composition, and it implies that there is a causal effect of mobility into corporate staff jobs on the subsequent-to-mobility structure of individuals' networks:

> **Hypothesis 2a**: If members of the corporate staff are more central and less constrained in the intra-firm network than members of the line organization, this difference is causally related to individuals' formal roles in the organization. (Position-based explanation.)

Conversely – or perhaps in addition – members of corporate staff may have networks that are more conducive to coordinating across social and organizational boundaries simply because the individuals who pursue staff positions, or those who are recruited to join the corporate staff, have developed broad networks within the organization. This would suggest that, rather than – or in addition to – a causal effect of CHQ on social network structure, there is an underlying sorting process that results in the assignment of individuals with broad social networks to staff positions. Thus, it may be that individuals with structurally diverse networks select – or are selected – into jobs in the corporate staff, but

conditional on the matching process between individuals and jobs, there is no additional, causal effect of a

staff job on the structure of individuals' social networks.

> **Hypothesis 2b**: If members of the corporate staff are more central and less constrained in the intra-firm network than members of the line organization, this difference is causally related to a selection process that sorts people with larger, structurally autonomous networks into the corporate staff. (Person-based, sorting explanation.)

Another, related possibility is that the selection process operates in precisely the reverse direction:

it may be that individuals in the corporate staff who fail to build broad networks choose to – or are

encouraged to – depart staff roles to join the line organization, where the task environment is better suited

to their smaller, more focused networks. If this were the case, we would expect to observe an effect of

network structure on predicting the staff-to-line transition rate. Specifically, individuals with narrow

networks should be more likely to move from jobs in the staff to positions in the line organization.

> **Hypothesis 2c**: If members of the corporate staff are more central and less constrained in the intra-firm network than members of the line organization, this difference is causally related to a selection process that sorts people with smaller, denser networks out of the corporate staff. (Person-based, screening explanation.)

In summary, if we find support for Hypothesis 1, there are three alternative mechanisms that may

account for the finding. In the first (H2a), there is a causal effect of mobility into the corporate staff on the

subsequent-to-mobility structure of individuals' networks. If, however, we find support for hypothesis

H2b and/or H2c, differences in network structure between members of the corporate staff and members of

the line organization may partially result from a person-based sorting or screening processes that result in

the assignment of individuals with certain intra-organizational network characteristics to certain jobs. In

the following sections, we explore these hypotheses using a unique dataset comprising electronic

communications and mobility events across the line-staff boundary for a group of employees in one large,

multi-division firm. We conclude with a discussion of our findings and their implications for research on

social networks and on corporate strategy.

Data, Measures, and Methods

Data. We situate our analysis in the context of a company that, to preserve anonymity, we will label "BigCo". BigCo is a large information technology company with 29 product divisions, organized into four primary product groups: hardware, software, technology services and business services. In recent years, the company has pursued a corporate strategy of integration among its many hardware, software, and service offerings. Correspondingly, promoting communication and coordination across formal organizational boundaries has been a priority for the company. Although we cannot claim our results to be generalizeable beyond our empirical setting, we believe BigCo to be a good exemplar of the category of large, related-diversified firms.

The headquarters staff of BigCo includes "C-suite" executives and their staffs (CEO, CFO, CIO); corporate communications; human resources; the office of the general council and intellectual property protection; corporate marketing; and corporate strategy. The corporate sales force is a stand-alone unit, separate from the headquarters, whose job is to coordinate across business units so that the company can deliver an integrated suite of products to provide solutions to customers' information systems needs. The organizational purpose of this unit is to provide single points of contact at BigCo for each of the company's major customers, who purchase multiple, often interdependent products and services and to work together with the product units responsible for creating those products and services to ensure their interoperability. Although the activities of the CHQ and CSF staff are quite different, both organizational units stand outside the strategic business unit structure and both possess explicit mandates to coordinate across the autonomous operating companies. Therefore, we (separately) compare the networks of members of the line organization against those of members of both CHQ and corporate sales in our analysis.

The data we analyze include the complete internal e-mail record, as drawn from BigCo's servers, of communications among 30,328 employees during two observation periods: the fourth quarter of 2006 and the first quarter of 2008. We refer to these 30,328 people as the "full sample." All internal e-mail

information that was on the server at the times of data collection was included in our data set. BigCo provided the data in the form of 30,328 text files for each observation period, each representing the communication activity of a single person, which we then cleaned and parsed. To protect the privacy of individual employees, messages were stripped of all content, leaving only information about the sender and recipient(s), time/date sent, size of the message and any attachments, and whether the message was part of a pre-existing thread. The identities of senders and recipients were replaced with encrypted identifiers. We consolidated these files and expanded each multiple-recipient message to include one entry for each unique dyad during each observation period. The complete data set contains 124 million dyadic e-mail communications.

In addition to the e-mail data, BigCo provided matching demographic and HR information. The HR data include each employee's business unit, major job function, job sub-function, tenure with the firm, salary band, state, and office location code. These covariates are updated each month of the observation period and allow us to identify individuals who change jobs within the formal organizational structure.

The sample contains 24% of the firm's U.S. employee population and was collected through a snowball sampling procedure. Our initial point of entry into the organization was the corporate sales force: we invited 180 people in the corporate sales organization to participate in the study. Of the total group, 91 individuals agreed to participate, 25 of whom we were unable to include because they worked outside the U.S.[4] In turn, the remaining 66 individuals (we term this group the "core sample") communicated with an additional 30,262 U.S. employees during the preceding three months. The company then provided complete e-mail data for all 30,328 U.S.-based employees (the 66 core members plus their 30,262 direct contacts).

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[4] Unfortunately, the sample is limited to U.S-based employees because laws protecting employee privacy effectively preclude collection of this sort of data in much of Europe and parts of Asia.

Although this is not a true random sample, it is compellingly large and the sampling procedure assures that we have a very broad cross section of BigCo employees. This is because BigCo provided complete e-mail records for all individuals who were directly linked to one or more of the 66 individuals in the core sample, which casts a wide net in sweeping people into the sample. An example illustrates why: one of the 66 individuals in the core sample received a mass e-mail that was sent to him and 1,214 co-recipients. This single message accounts for over 4% of our full sample because the sampling procedure sweeps the complete e-mail records of the sender and all 1,214 co-recipients into our dataset. In fact, the 66 individuals in the core sample possess an average of 3,415 direct contacts in the full sample, although the vast majority of these contacts exchange only mass e-mails. These e-mails served to broaden our sample, but were not considered as communications for purposes of our analysis. In short, given the protocol for recruiting the sample, we believe that the presence of widely distributed bulk e-mails comes close to generating a random sample.

We focus our analyses on e-mails that were sent to four or fewer recipients, excluding sender-to-BCC pairs and mass mailings[5]. We narrow our sample by excluding 5,888 people because they were administrative assistants, rank-and-file employees[6], or because they left the firm before the end of our observation window. We also drop from the full sample 350 people who changed jobs multiple times or moved within the corporate staff[7]. The final sample contains 3.3 million dyadic e-mail interactions among 24,090 employees. After cleaning and parsing the data, we collapse them into two cross-sectional panels.

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[5] We define "mass" as messages with more than 4 recipients. Comparable to results reported in Quintane and Kleinbaum (2011), 83% of e-mails in the BigCo data set have 4 or fewer recipients; however large-scale announcements occupy a much larger share of all dyadic interactions.

[6] We excluded 2,138 rank-and-file employees from our sample because they are significantly under-represented in our data set. We suspect, but cannot confirm, that they are under-represented in part because many of them play purely support or non-managerial roles (e.g., custodial staff, assembly line, etc) that caused them to be excluded from our snowball sampling strategy. For theoretical clarity we focus on the managerial population. However, all results are substantively unchanged if we include rank-and-file employees in the analysis.

[7] These 350 include 25 people who switched from corporate sales to the headquarters unit and 20 people who moved in the opposite direction, from the CHQ to the CSF. Because these are moves *within* the corporate staff, we exclude these mobility events from the analysis. We also drop from our sample 305 people who changed jobs multiple times during the observation window, many of whom cycle back and forth between staff and line jobs. Our concern is that these individuals are on temporary job assignments and therefore it is unclear what mobility means in these instances.

The first spans the three-month fourth quarter of 2006 and the second wave covers the first quarter of 2008. Thus, the two panels are separated by an interval of approximately one year. We treat these two windows of data as separate cross-sections and compute all network covariates based on a single sociogram that we construct for each of the two periods. For each window, we create a symmetric matrix with counts of, at the dyad level, the total number of $i \leftrightarrow j$ messages, where i and j index all individuals in the sample. In the presentation of the results, we refer to these two cross-sections as the Time 1 and Time 2 periods, respectively.

VARIABLES

We focus on two general properties of individuals' communication networks during each of the two tranches of e-mail data: centrality within the corporate communication network and structural holes. To measure an employee i's centrality, we calculate degree centrality, the number of distinct alters with whom the actor corresponds.[8] Formally:

$$CDegree_{it} = \sum_{j=1}^{n} X_{ijt} \tag{1}$$

where $X_{ijt} = 1$ when actors i and j exchange one or more non-mass e-mail correspondence during period t. In computing this quantity, we ignore self-addressed e-mails, so by construction, $X_{iit} = 0$. In our models, we use the square root of degree, a transformation that improves model fit.

Structural constraint is an inverse measure of the presence of structural holes in an actor's network (Burt, 1992). Actors with low structural constraint have networks in which their contacts are not themselves connected. By contrast, actors with high structural constraint possess networks with clique-like connection densities among their first-degree contacts. Formally:

$$Constraint_{it} = \sum_{j=1}^{n} \left(P_{ijt} + \sum_{q=1}^{n} P_{iqt} P_{qjt} \right)^2 \tag{2}$$

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[8] Although degree centrality is the simplest and most widely used centrality measure, our results do not depend on this choice; we find substantively similar results using eigenvector centrality (Bonacich, 1987), which is a weighted measure in which a focal actor's centrality depends on the centralities of those with whom the actor is directly and indirectly connected.

where P_{ijt} represents the share of actor *i*'s communications that are exchanged with *j* during period *t* (i.e.,

$P_{ijt} = \frac{X_{ijt}}{\sum_{i=1}^{n} X_{ijt}}$). The inner summation in Equation 2 incorporates the indirect constraint imposed on actor

i through connections among *i*'s contacts; more such connections – and therefore more constraint – is

tantamount to fewer structural holes in *i*'s network. In our models, we use the natural logarithm of

constraint, a transformation that improves model fit. We use the StatNet package (Handcock *et al.*, 2008)

in the R statistical computing environment (R Development Core Team, 2010) to calculate these network

measures for each individual in the sample.

BigCo also provided us with rudimentary career histories for the individuals in the data set. We

use these data to construct two variables indicating the number of times the person has moved job

functions or office locations during the prior seven years of their BigCo career. We also include an

individual's gender, tenure with the company, and a dummy variable indicating whether the person is an

executive, defined as having salary grade above 10 on the firm's 14-point scale (1); or a middle manager,

defined as having a salary grade from 7 to 10 (0); rank-and-file employees are excluded from our sample.

Finally, we know the organizational and social networks only for the individuals in our sample. Although

our data include all messages sent or received by these individuals, we do not know anything about the

identities or organizational locations of senders and recipients outside of the sample. Therefore, we

control for the percent of each individual's total e-mail communication volume that involves employees

outside of the sample.

ESTIMATION APPROACH

We will begin the analysis with descriptive statistics of employees' networks broken out by staff

versus line roles. We then estimate three sets of regressions. The first set explores cross-sectional

differences in the two network characteristics between members of the corporate staff and the line

organization and tests Hypothesis 1. The models are estimated using ordinary least squares with robust

standard errors. The distributions of the transformed dependent variables in this analysis – degree

centrality and structural constraint – are approximately normal, making OLS a reasonable estimation

approach. The covariate of interest is either CHQ, a dummy variable set to 1 for individuals with positions in the corporate headquarters, or CSF, a dummy variable set to 1 for individuals with positions in the corporate sales force.

Next, we estimate a set of two-stage regressions that exploits the episodes of mobility across the staff and line divide to illuminate the mechanisms that generate the cross sectional results and to test Hypothesis 2. The first stage examines the effect of initial network position on the probability of mobility (Hypothesis 2b and 2c), while the second stage examines the implications of mobility for subsequent network positions (Hypothesis 2a). Across both stages, we split the sample based on the location of individuals' origin jobs; for example, in models that include the variable *LineToCHQ*, we include all individuals who begin in the line and are therefore at risk of moving to CHQ. In the first stage, we estimate four sets of probit models; in each, the dependent variable is the probability of switching across the line-staff divide:

a) $\text{Prob}(\text{CHQ}_{it2} \mid \text{LINE}_{it1})$, the probability that employee *i* transitions from the line organization to the CHQ before Time 2, conditional on an origin job in the line. The risk set for this regression is all members of the line organization in Time 1.

b) $\text{Prob}(\text{CSF}_{it2} \mid \text{LINE}_{it1})$, the probability that employee *i* transitions from the line organization to the corporate sales force before Time 2, conditional on an origin job in the line. The risk set for this regression is all members of the line organization in Time 1.

c) $\text{Prob}(\text{LINE}_{it2} \mid \text{CHQ}_{it1})$, the probability that employee *i* transitions from CHQ to the line organization before Time 2, conditional on an origin job in CHQ. The risk set for this regression is all members of CHQ in Time 1. And,

d) $\text{Prob}(\text{LINE}_{it2} \mid \text{CSF}_{it1})$, the probability that employee *i* transitions from CSF to the line organization before Time 2, conditional on an origin job in the CSF. The risk set for this regression is all members of corporate sales in Time 1.

The second-stage models examine the effect of (both directions of) CHQ ↔ line and CSF ↔ line mobility on characteristics of individuals' communication networks at Time 2. In these regressions, the two measures of communication network structure (degree centrality and structural constraint) serve as the dependent variables and the covariates of interest are dummy variables indicating whether the focal actor made one of the four possible line ↔ staff transitions in the one-year interval between the two tranches of e-mail data.

One can think of estimation of the effect of job mobility on communication network structure as a standard form of a treatment effect. Estimating the true effect of mobility across the line / staff boundary on network structure is challenging because of the general problem of non-random assignment of individuals to the treatment condition (i.e., mobility), which biases the estimate of the effect of mobility. The identification problem occurs because it is possible to observe the outcomes of interest for each individual either in the treatment (i.e., mobility) or the control (i.e., no mobility) condition, but not in both. Because we do not possess any instrumental variable that is exogenously associated with mobility but does not affect our outcome variables (i.e., network structure), the only option to potentially address the non-random assignment problem is to employ a propensity score estimator (Rosenbaum and Rubin, 1984).

The propensity score for an individual i is the conditional probability that the individual is treated, given her particular vector of observable covariates. The propensity score may eliminate bias by comparing individuals in the treatment (i.e., mobility) and control (i.e., no mobility) conditions who have similar values of the observable, pre-treatment covariates; that is, we compare people with similar *ex ante* propensity for mobility. The reliability of the propensity score, however, hinges on the (strong) assumption that outcomes are independent of assignment to treatment, conditional on observed covariates. If this is the case, matching estimators will yield an unbiased estimate of the effect of mobility on network structure. Following the notation in Dehejia and Wahba (2002), the treatment effect for the treated population is defined:

$$\tau|_{T=1} = E(\tau_i|T_i = 1) = E(Y_{i1}|T_i = 1) - E(Y_{i0}|T_i = 0) \tag{3}$$

where T_i=1, 0 if individual i is in the treatment or control group, respectively. The difference:

$$\tau^e = E(Y_{i1}|T_i = 1) - E(Y_{i0}|T_i = 0) \tag{4}$$

is easily estimated but may be biased if the untreated outcome, Y_{io} (in our case, properties of employee i's network) would differ for members of the treatment (movers) and control (stayers) groups. However, Rubin (1977) shows that if, given an observed covariate vector X_i, it is the case that Y_{i0} is independent of treatment status conditional on the observables X_i, the treatment effect for the treated $\tau|_{T=1}$ is identified and can be estimated via a propensity-score based matching algorithm. The intuition behind this approach is that if assignment to treatment is captured by the observed covariates, then the propensity score can be used to create a weighted (or matched) sample in which assignment to treatment is effectively random conditional on observables, thus approximating a controlled experiment.

Because the covariate vectors differ in each first-stage regression, we calculate separate propensity scores corresponding to each regression and we trim from the sample the top ten percent and bottom ten percent of propensity scores.[9] In our second-stage models, we could weight each observation by the inverse of its propensity score to create a pseudo-population that would give consistent, unbiased estimates of the treatment effect of mobility (Robins, 1999). However, if covariates are strongly associated with mobility, variability in propensity scores can result in extreme outlying values of the weighting factor; as a result, these outliers could contribute heavily to the pseudo-population, giving the resulting estimator a large variance. The use of a stabilized weight alleviates this potential problem. The stabilized weight is calculated as the propensity score, estimated on the full model divided by the propensity score estimated when excluding the covariate of interest (Azoulay, Ding and Stuart, 2009). This modification does not affect the consistency of the estimator, but does increase its efficiency

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[9] Trimming removes treated observations with propensity scores that are higher or lower than those in the control group (in other words, observations for which there are less good matches in the control group). Results are robust to a variety of different trimming rules.

(Hernán, Brumback and Robins, 2000). We report results using stabilized weights, but the findings are substantively unchanged when we use unstabilized weights.

Results

The majority of the sample is in the line organization in the Time 1 data and remains there throughout the observation window. In the data, there are 16,563 "stayers" in the line organization; 1,003 "stayers" in CHQ; and 4,841 "stayers" in Corporate Sales. A total of 102 employees begin in the line organization but move into CHQ at some point during the observation period, and 29 travel in the reverse direction. We refer to these groups, respectively, as line-to-CHQ and CHQ-to-line switchers. A total of 515 people move from the line into the Corporate Sales force and 555 people move in the reverse direction. We refer to these as line-to-CSF and CSF-to-line switchers, respectively.

Table 1 reports summary statistics and correlations among Time 2 variables. We begin our analysis with a set of cross tabulations. Table 2 describes the network positions of all individuals in the data, broken out by (a) whether the person remains in either a line or staff role between the two data collection windows, versus switches from the staff to the line or vice versa, and (b) characteristics of their network positions in the two time periods. Comparing the upper left to the upper right quadrant shows, respectively, the Time 1 network positions of job "stayers" and "switchers". The two lower quadrants of the table present exactly the same information, but for the network in Time 2. (In this and all subsequent tables, variable names ending with "_1" are calculated using Time 1 data, corresponding to the fourth quarter of 2006 and "_2" represents Time 2 data, corresponding to the first quarter of 2008.)

The primary conclusion from Table 2 is that job switchers in either direction across the line ↔ staff boundary have more central networks that are richer in structural holes than do employees who remain within the line or the staff throughout both time periods. At Time 1, stayers, individuals who do not subsequently switch between staff and line roles between the two observation windows, have lower degree and access to fewer structural holes than do switchers. The bottom two quadrants in the table reveal exactly the same patterns, but for the network in the Time 2 observation window. Of course, this

table is purely descriptive; it does not address the issue of casual ordering between mobility and the structure of individuals' networks.

Table 3 presents a similar set of cross tabulations, but this time we report network properties broken out by individuals' origin and destination roles and we differentiate between the headquarters unit and the corporate sales force. To conserve space, we report only the Time 1 network descriptors, but the patterns are identical in the Time 2 data. The top left quadrant in Table 3, Panel A describes the Time 1 network positions for individuals who were in line jobs in Time 1 *and* in Time 2 (*i.e.*, stayers in line). The lower right quadrant represents individuals in the headquarters in both time periods, and the off-diagonal quadrants represent individuals who moved from CHQ to line roles (upper right) and from jobs in the line to CHQ (lower left). Table 3, Panel B shows analogous descriptors about transitions between corporate sales and the line.

Inspection of the two panels in this table surfaces a number of points. First, the individuals who are most central in the communication network and richest in structural holes are those who began in staff roles – particularly in corporate sales – and then transitioned to positions in the line. Second, the differences between individuals who stay in line jobs versus in staff jobs is seen in the comparison between the upper left and the lower right quadrants of the tables. We see that stayers in both corporate headquarters and the corporate sales force (the lower right quadrants) possess considerably more central communication networks than stayers in line jobs (upper left quadrant): the mean stayer-in-line has 68.2 contacts, compared to 95.9 for the typical member of the headquarters and 101.5 for the average member of the corporate sales force. Similarly, stayers in line have the fewest structural holes of the groups represented in Table 3. Their mean constraint score is 0.197, compared to 0.163 for stayers-in-CHQ and 0.127 for stayers-in-sales.

We conclude our cross-sectional analysis by examining differences between the corporate staff and the line organization in a multivariate regression framework in Table 4. We regress dummy variables indicating whether an individual occupies a headquarters job or a corporate sales job on dependent

variables measuring network characteristics. Because our theoretical interest is in making comparisons between line and staff, we include in each regression observations for all members of the line organization as well as either members of the headquarters (Models 1 and 2) or the sales force (Models 3 and 4). We report only the Time 1 network descriptors, but the conclusions to be drawn are identical in the Time 2 data. We find that in the cross section, members of both the headquarters and corporate sales units are more central and possess networks that are more structurally diverse holes than do members of the line organization. To contextualize the magnitudes of these effects, we observe that the CHQ effect is equivalent to an 11.0% increase in degree centrality and a 3.1% decrease in structural constraint; the CSF effect is equivalent to an 11.7% increase in centrality and an 11.3% decrease in constraint. Therefore, in support of Hypothesis 1, a cross sectional snapshot of the communication network within BigCo is consistent with the classic conceptions of the coordinating role of corporate staff: relative to otherwise similar members of the line, CHQ and CSF members have networks that appear to be more optimized to gather information and activate coordination initiatives within BigCo.

The control variables are of interest as well. Women in BigCo are more central and have more structural holes in their electronic communication networks than do men (see also Kleinbaum, Stuart and Tushman, 2011). Centrality and structural autonomy also both increase with the log of tenure within the company, and executives have more central and less constrained networks than do middle managers, which is the omitted group.

The strong association between staff position and network characteristics begs the question of causality: does occupancy of a staff role *cause* individuals in the company to develop broader networks with more structural holes (H2a)? Or, as implied in the person-based hypotheses (H2b, H2c) do members of the corporate staff possess broader networks because individuals that possess them are sorted into or screened out of staff roles. We explore this question more thoroughly in the next set of tables. Recall that the estimation strategy proceeds in two stages: in the first, we model the probability that individuals in line roles in Time 1 transition to corporate headquarters or corporate sales positions in Time 2, or vice

versa for employees who enter the data in staff jobs and are therefore at risk of transitioning to the line. These regressions are estimated to generate propensity scores, but also are of interest in their own right.

The first two models in Table 5 report estimates of $\text{Pr}(\text{CHQ}_{it2}|\text{line}_{it1})$, the probability that employee i transitions from a line to a CHQ job, conditional on beginning in a line job in Time 1. Models 3 and 4 are estimates of $\text{Pr}(\text{line}_{it2}|\text{CHQ}_{it1})$. Models 5-8 estimate analogous probabilities of mobility between the line and the corporate sales force: $\text{Pr}(\text{CSF}_{it2}|\text{line}_{it1})$ and $\text{Pr}(\text{line}_{it2}|\text{CSF}_{it1})$. In other words, this table explores the determinants of individuals' mobility across the staff (CHQ and Sales) $\leftrightarrow$ line divide for risk sets defined by employees' origin job locations.

The findings indicate that network centrality and structural holes are significantly associated with mobility from line to staff jobs, but the correlations generally are insignificant for mobility in the reverse direction, from staff to line jobs. Results appear in regressions 1 and 2 (Line-to-CHQ), as well as 5 and 6 (Line-to-CSF). High centrality is strongly correlated with mobility from the line to both staff units, and high structural constraint decreases the likelihood of line-to-CSF transitions (Model 6). To provide a sense for magnitudes of the effects of network position on mobility, *ceteris paribus*, members of the line organization whose degree centrality is at the 75th percentile of our sample are 38% more likely to switch into CHQ and 25% more likely to switch into CSF than are those at the 25th percentile of our sample. The corresponding numbers for constraint (reverse-scored, to measure structural holes) are 21% and 55%, respectively. So the magnitudes of these effects are practically, as well as statistically, significant.

Regressions 3 and 4 (CHQ-to-Line), as well as 7 and 8 (CSF-to-Line) in Table 5 show, conversely, the probability of moving from staff to line jobs for the individuals who are in corporate staff jobs in Time 1. In these regressions, *none* of the network variables is statistically significant. Properties of individuals' communication networks therefore are associated with moving from the line into CHQ and corporate sales, but do not predict the transition from either corporate staff unit to line jobs. In other words, there appears to be network-based sorting or selection into the corporate staff such that employees with communication networks that are optimized for coordination are more likely to make the line-to-staff

transition, but we find no evidence of a weeding-out process in which individuals with narrow networks transition at an accelerated rate from staff to line jobs. Therefore, we can reject Hypothesis 2c, the person-based screening hypothesis.

Turning to the control variables, past mobility across other boundaries within the firm, which we incorporate as controls for any form of unobserved heterogeneity that drives a general tendency for mobility (Heckman and Borjas, 1980), also correlates with the propensity to transition. A count of the number of prior moves between offices increases the probability of transitioning between the staff and the line in both directions; a similar measure of prior changes in job function increases moves between corporate sales and the line. *Ceteris paribus*, short-tenured employees are more likely to move from the sales force into the line. On the other hand, executives are more likely to move from the corporate staff into the line and less likely to move into the corporate sales force.

Thus far, we conclude that individuals with networks that are optimized for gathering information from diverse sources and those who are central in the corporate network are more likely to move into corporate staff jobs, but is there an additional, causal effect of corporate staff position on employee networks? We tackle this question in Table 6. The first two models report the effect of *LineToCHQ*, a dummy variable set equal to one for those who transition from the line to corporate headquarters between the observation windows. The comparison group is the set of individuals who *began* and *stayed* in jobs in the line organization (*i.e.*, the population that was at risk of switching into staff roles but did not). Models 3 and 4 report the effect of *CHQtoLine*, a dummy variable set equal to one for those who transition from headquarters to line jobs between the observation windows. The comparison group is the set of individuals who began and stayed in jobs in the corporate headquarters (*i.e.*, the population that was at risk of switching into line roles but did not). In Models 5-8, we estimate similar effects of transitions between the corporate sales force and the line organization. Recall that in the regressions in the table, we adjust for all observed determinants of mobility (including the network characteristics that serve as the dependent variables in the second stage regressions) via inverse probability of treatment weights (IPTW).

Table 6 does show effects of moving from line to staff roles on network composition. The effect of a line-to-staff transition is positively related to employees' degree centrality and negatively related to employee's structural constraint for moves from the line organization to *both* the corporate headquarters and the corporate sales force (Models 1 and 2 for CHQ; Models 5 and 6 for CSF). Thus, exactly as strategic theories of the role of the corporate staff imply, in BigCo making the transition into either CHQ or CSF leads to increases in employees' network centrality and decreases in structural constraint, even after accounting for the fact that individuals with broader and more central networks are more likely to sort into jobs in CHQ. This result supports Hypothesis 2a.

The results of the effect of transitions <u>from</u> a staff <u>to</u> a line role on Time 2 network characteristics are somewhat surprising given the findings in our first stage models. Individuals who are highly central and who possess broad networks that are rich in structural holes sort into CHQ jobs and their networks appear to expand in consequence, but the reverse is not true: not only is there no indication that individuals with constrained or narrow networks are more likely to move from corporate staff jobs to positions in the line organization, but the transition from the corporate staff to line roles is not clearly associated with any change in network structure. On one hand, the transition from the corporate headquarters into the line has a marginally significant, positive effect on degree centrality (Model 3); on the other hand, moving out of the corporate sales force causes a significant *increase* in structural constraint (i.e., a decrease in structural holes; Model 8). However, the coefficient magnitudes in the regressions of network constraint are much larger for moves *into* corporate staff roles and they are for exits from these positions—e.g., the estimated reduction in network constraint for moving into the corporate sales force from the line organization, -0.268, is about 3.5 times larger than the estimated increase in constraint, 0.076, associated with a move from CSF to the line organization. Across the sets of regressions in Tables 5 and 6, by both selection processes and possible treatment effects, moving *out* of the corporate staff and into the line organization appears to have relatively little impact on the structure of an actor's network. Thus, support for Hypothesis 2a is asymmetric: we find that moving into the

headquarters is causally associated with a broadening of networks, but moving out of the headquarters is not associated with any change in network structure.

These findings beg the question, when individual employees move across the line-staff divide, *how* do their networks change? We are limited by space and information, but a few additional, descriptive views of the data provide a glimpse of this process. Table 7 includes, for both movers and stayers, the proportion of each individual's contacts in the Time 1 network who remain contacts in the Time 2 period. For stayers in line jobs, the number is 28.2%; for stayers in CHQ, it is 31.5%; and for stayers in corporate sales, it is 27.8%. These percentages indicate that individuals likely have a core set of contacts who remain constant across time, while the majority of their contacts are engaged in a set of short-term interactions that are of a more episodic nature that shift with the ebb and flow of work tasks.

When we look at movers between line and staff roles, the number of retained contacts falls by about a third. For those who switch from the line into CHQ or CSF jobs, respectively, only 21.8% and 19% of Time 1 contacts are maintained (or reactivated) a year later. For employees who travel in the opposite direction, from CHQ into Line or CSF into Line, the numbers are, respectively, 23.8% and 20.0%. In other words, *all* individuals at BigCo experience significant changes in their communication networks over time, but the replacement of past contacts with new ones is accelerated for individuals who move across the line-staff divide.

For the small fraction of moves that occur inside the first three-month email window in Q4 2006, we can gain additional insight into the rate at which the members of an individual's network turn over as a consequence of moving. Figure 1 displays these data. Specifically, we constructed two charts showing the percentage of an individual's total communications that are exchanged with members of the corporate headquarters (Panel A) or the sales organization (Panel B) during the period surrounding a job change. In each chart, we show weekly percentages for two different populations: people who transition from line to staff and those who move in the opposite direction during the month of November, 2006. We focus on this month because this is the middle month in the first tranche of e-mail data, so we can examine

communication patterns both before and after the transition. To see how the transition unfolds over a longer interval of time, we then append a final data point from the second / Time 2 window of e-mail data, corresponding to the first quarter of 2008. This final point most likely approximates an individual's steady-state, post-transition rate of communicating within each represented group. Each chart also includes upper and lower bounds, indicating the overall e-mail patterns of employees who stay in the line organization (lower) or the corporate staff (upper) throughout the observation period, spanning from late 2006 through early 2008.

The upper bound in Figure 1, Panel A shows that for stayers in CHQ, approximately 65% of their interactions occur with other individuals in CHQ. The lower bound indicates that for stayers in the line organization, only about 2.5% of their total interactions occur with members of headquarters. The dotted, upward sloping curve shows, *for individuals who switch from line to CHQ jobs* in November 2006, the weekly percentage of email interactions with members of the corporate staff. The most important point to draw from the figure is that there appears to be a relatively quick shift in communication partners upon job changes, but even a full year later, movers have networks that are less concentrated within the line or staff than colleagues who do not move. For instance, one month after their move to CHQ, former members of the line already have shifted approximately 45% of their interaction to CHQ (versus 2.5% for a typical member of the line organization at baseline). A little more than a year later, this number increases to 60%, but it is still below the 65% level for employees who began and remained in staff jobs. For individuals who move from CHQ to the line (dashed line), within-CHQ communications drop below 20% by the second week after the move, and fall to about 10% at the end of our observation window. Once again, the data show a relatively quick shift in network composition, but they also suggest that individuals who move from headquarters retain more contacts in CHQ than do typical members of the line organization.

Discussion and Conclusion

Theories of the multi-divisional firm place a significant emphasis on the role of the corporate staff, but empirical research on the staff's function has been scant. In this paper, we begin to open the black box of the corporate staff and reveal its internal wiring through the analysis of e-mail communications. We know from the literature that coordination among autonomous organizational units is one of the central purposes of the corporate headquarters and other corporate-staff units. To achieve that coordination, we argue that members of the corporate staff units should, on average, have broader and less constrained networks than members of the line organization. Consistent with this first hypothesis, we find that, relative to members of the line organization, members of the headquarters unit and the corporate sales force do possess larger networks that are richer in structural holes, consistent with their role requirements to effect coordination across organizational units.

To understand the sources of this difference, we attempt to separate a non-random selection/assignment process from a true treatment effect. We exploit HR data on intra-firm mobility and the temporal dimension of the electronic communication data to study how communication networks change when employees transition between the line organization and either the headquarters or the corporate sales force. Our analysis uses propensity scores in an effort to control for the endogeneity of mobility. We present evidence that the differences in network structure between the line organization and the corporate staff stem partially from the structure of the organization *per se*, but also result from a sorting process that tends to assign individuals with broader networks in corporate staff roles. We find do not find evidence that people with narrow, closed networks generally move out of corporate staff jobs to join the line organization.

Taken together, our findings are consistent with the existence of a "corporate imprimatur" effect, in which, (i) people with broader networks move into corporate staff roles, (ii) the move to the corporate staff on average broadens individuals' network, and (iii) individuals who have cultivated broad networks in corporate staff jobs take this network with them when they move into the line organization. Because the observation window of our data is relatively short, we do not explicitly examine people who move

into the headquarters on temporary assignments before returning to the line organization. However, such a phenomenon has long been described anecdotally, dating at least as far back at Kanter's study of Indsco: "…[people moving to the headquarters] would have exposure and make connections that would further their careers. No one ever advances who had not spent some time in headquarters," (Kanter, 1977:33). The mechanism to which Kanter attributes the effect – exposure and connections – is a causal effect of being in headquarters on one's network structure. It is consistent with the findings of our study. But our findings highlight the fact that this "corporate imprimatur" may not be distributed randomly. Rather, it follows a sorting or selection process in which people with large networks that are rich in structural holes are systematically more likely to move from the line organization into the corporate staff.

This research has a number of limitations. First, in spite of the large volume of email data, this is a case study of a single firm. We have no basis on which to claim that the findings are generalizable beyond our empirical context. The company we study is one with numerous business units that are closely related and journalistic accounts of the firm's strategy (and our own knowledge from interviews at the company) indicate that both headquarters and the corporate sales force are designed actively coordinate across SBUs. As such we believe that BigCo is a good exemplar of large, related-diversified firms, but we cannot generalize beyond this case.

Second, our analysis is limited by the relatively small number of people who exit the corporate headquarters to return to the line organization. Despite the small number of observations, the parameter on the effect of CHQ-to-line mobility is estimated with a reasonable level of precision. On one hand, it is tempting to claim that this renders the test of the hypotheses conservative. On the other hand, given the small number of mobility events, it is difficult to know if the results may be idiosyncratic to movers in some way that is not addressed by the controls for endogenous selection via inverse probability of treatment weights.

Despite these limitations, we believe this research makes several contributions to the literature. First, it provides a rare empirical glimpse inside the black box of the corporate staff, a set of

organizational entities that have been the subject of much theorizing, but scant empirical research. We show that members of the corporate staff may well play a role in coordinating across the structurally differentiated units of the firm, as manifest in the broader and less constrained communication networks of its staff, relative to members of the line organization.

Second, we find evidence that organizational members either sort or are selected into different roles based on the structure of their networks: employees with broader, sparser networks are more likely to transition into the corporate staff. To some extent, there is a "corporate staff type". There is a long history of research showing that people sort into different organizational roles based on ascribed characteristics (Bielby and Baron, 1986), but ours is the first study we know of that offers evidence of systematic sorting of people into corporate staff roles. This finding is particularly important because it suggests that having the right lateral coordinating structures in place may not be sufficient to realize the coordination benefits of diversification. It is also critical to populate those structures with the right people – namely, "corporate types" who are more prone to create broad networks.

Third, our results suggest that formal organizational structure sometimes – but not always – has the intended effect on networks. Tom Allen, echoing Thompson (1967), has argued, "The real goal of formal organization is the structuring of communication patterns" (Allen, 1977: 211). If this assertion is accurate, and if the role of headquarters is to coordinate the activities of a disparate set of actors in the line organization, our results suggest that moving people into the corporate staff has the intended effect: it serves to broaden their networks. But we also find that moving people out of the corporate staff does not serve to focus their networks more narrowly. A tentative conclusion might be that, like Gulati and Puranam (2009) and Corredoira and Rosenkopf (2010), our results suggest that formal structure appears better suited to facilitate the formation of ties than the dissolution of ties.

We conclude by returning to Rumelt, Schendel and Teece's (1994) question, which we cited in opening this paper: "What are the functions of the headquarters unit in a multibusiness firm?" We build on strategic theories of corporate-level value creation and of the formation of a so-called "parenting

advantage," which suggest that coordination is a critical function of the headquarters unit. And taking e-mail as a lens through which to view the interactions of members of the corporate staff, our results show that, the communication networks of members of the corporate staff units at BigCo do appear to be optimized for coordination.

Table 1: Summary Statistics and Correlation Matrix for Time 2 data

		Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	Line-To-CHQ	0.42%	6.46%	1												
(2)	CHQ-To-Line	0.12%	3.51%	-0.002	1											
(3)	Line-To-CSF	2.12%	14.42%	-0.010	-0.005	1										
(4)	CSF-To-Line	2.30%	14.98%	-0.010	-0.005	-0.023	1									
(5)	Degree_2	72.6	62.1	0.013	0.023	0.036	0.054	1								
(6)	Constraint_2	0.196	0.168	-0.008	-0.013	-0.047	-0.042	-0.530	1							
(7)	Exec_2	11.4%	31.8%	-0.001	0.021	0.005	0.030	0.385	-0.169	1						
(8)	NumMoves_Function	0.72	0.99	0.001	0.001	0.029	0.039	0.129	-0.108	0.063	1					
(9)	NumMoves_Office	1.28	1.37	0.013	0.020	0.000	-0.004	0.001	0.009	0.032	0.089	1				
(10)	Female	31%	46%	0.031	0.017	-0.012	0.021	0.108	-0.051	-0.045	0.047	0.013	1			
(11)	Tenure_2	16.6	10.0	0.006	-0.002	0.001	0.018	0.169	-0.136	0.162	0.045	-0.058	0.014	1		
(12)	TotalComms_2	875	874	0.013	0.023	0.022	0.036	0.841	-0.374	0.396	0.103	0.009	0.109	0.129	1	
(13)	PctInSample_2	52	23	0.002	0.003	0.059	0.044	0.451	-0.250	0.222	0.109	0.016	0.032	0.037	0.474	1

Table 2: Descriptive Statistics by Time Period and By Whether an Actor Switches Between the Headquarters and the Line

		Stayers			Switchers		
		Mean	**StDev**	**Median**	**Mean**	**StDev**	**Median**
Time 1	**Degree_1**	73.78	62.47	59	95.06	57.56	84
	Constraint_1	0.18	0.15	0.13	0.13	0.09	0.10
Time 2	**Degree_2**	71.91	62.13	57	91.51	60.89	78
	Constraint_2	0.20	0.17	0.14	0.15	0.13	0.11

Table 3: Descriptive Statistics of Time 1 Network Data by Actors' Time 1 and Time 2 Positions

> **Panel A**: Switchers between positions in Corporate Headquarters and the line. The upper-left quadrant represents stayers-in-line; the lower left quadrant represents line-to-CHQ switchers; the upper right quadrant represents CHQ-to-line switchers; the lower right quadrant represents stayers-in-CHQ.

CHQ ↔ Line Transitions		ACTORS IN LINE AT TIME 1				ACTORS IN CHQ AT TIME 1			
		Mean	**StDev**	**Median**	**N**	**Mean**	**StDev**	**Median**	**N**
LINE IN TIME 2	**Degree_1**	68.2	63.3	51	16,563	95.9	50.0	82	29
	Constraint_1	0.197	0.161	0.148		0.136	0.079	0.108	
CHQ IN TIME 2	**Degree_1**	93.4	57.9	85	102	85.9	69.9	73	1,003
	Constraint_1	0.150	0.105	0.108		0.163	0.112	0.133	

> **Panel B**: Switchers between positions in the Corporate Sales Force and the line. The upper-left quadrant represents stayers-in-line; the lower left quadrant represents line-to-CSF switchers; the upper right quadrant represents CSF-to-line switchers; the lower right quadrant represents stayers-in-CSF.

CSF ↔ Line Transitions		ACTORS IN LINE AT TIME 1				ACTORS IN CSF AT TIME 1			
		Mean	**StDev**	**Median**	**N**	**Mean**	**StDev**	**Median**	**N**
LINE IN TIME 2	**Degree_1**	68.2	63.3	51	16,563	101.5	57.6	89	555
	Constraint_1	0.197	0.161	0.148		0.119	0.074	0.100	
CSF IN TIME 2	**Degree_1**	88.5	57.2	77	515	90.2	54.5	80	4,841
	Constraint_1	0.136	0.109	0.104		0.127	0.086	0.104	

Table 4: Results of multivariate regression of organizational position (CHQ or Corporate Sales) and other covariates on network variables in Time 2. Similar results obtain in Time 1.

Comparison of Line against:	HEADQUARTERS		CORPORATE SALES	
DV:	Degree	Constraint	Degree	Constraint
	(1)	(2)	(3)	(4)
CHQ_1	0.837	-0.059		
	(0.088)**	(0.020)**		
CSF_1			0.902	-0.219
			(0.039)**	(0.009)**
Female	0.710	-0.088	0.696	-0.078
	(0.044)**	(0.011)**	(0.038)**	(0.009)**
LogTenure	0.623	-0.111	0.584	-0.097
	(0.023)**	(0.006)**	(0.021)**	(0.005)**
Exec_1	2.906	-0.364	2.950	-0.351
	(0.067)**	(0.013)**	(0.061)**	(0.012)**
NumMoves_Function	0.435	-0.080	0.295	-0.055
	(0.020)**	(0.005)**	(0.017)**	(0.004)**
NumMoves_Office	-0.092	0.026	-0.063	0.023
	(0.014)**	(0.003)**	(0.013)**	(0.003)**
PctInSample_1	0.068	-0.011	0.067	-0.010
	(0.001)**	(0.000)**	(0.001)**	(0.000)**
Constant	1.733	-0.974	1.948	-1.057
	(0.072)**	(0.019)**	(0.064)**	(0.017)**
Observations	18,271	18,271	22,637	22,637
R-squared	0.43	0.22	0.43	0.23

Robust standard errors in parentheses

** significant at 1%

Table 5: Results of first-stage regression of network variables and other covariates on the probability of switching from line to headquarters (Models 1 and 2); from headquarters to line (Models 3 and 4); from line to corporate sales (Models 5 and 6); and from corporate sales to line (Models 7 and 8), condition on initial assignment.

	CORPORATE HEADQUARTERS				CORPORATE SALES FORCE			
DV	Line-To-CHQ		CHQ-To-Line		Line-To-CSF		CSF-To-Line	
Key Covariate	Degree	Constraint	Degree	Constraint	Degree	Constraint	Degree	Constraint
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
sqrtDegree_1	0.038		0.028		0.033		0.009	
	(0.011)**		(0.023)		(0.006)**		(0.010)	
logConstraint_1		-0.064		-0.129		-0.184		-0.018
		(0.052)		(0.126)		(0.030)**		(0.044)
NumMoves_Function	-0.030	-0.020	0.003	0.004	0.060	0.060	0.054	0.053
	(0.038)	(0.036)	(0.086)	(0.086)	(0.019)**	(0.019)**	(0.020)**	(0.020)**
NumMoves_Office	0.036	0.035	0.183	0.181	-0.018	-0.016	0.020	0.021
	(0.021)+	(0.020)+	(0.050)**	(0.050)**	(0.014)	(0.014)	(0.018)	(0.018)
PctInSample_1	0.003	0.005	-0.009	-0.008	0.007	0.007	0.007	0.007
	(0.002)+	(0.002)**	(0.004)*	(0.004)*	(0.001)**	(0.001)**	(0.002)**	(0.001)**
Female	0.316	0.341	0.115	0.125	-0.111	-0.102	0.083	0.089
	(0.072)**	(0.072)**	(0.160)	(0.161)	(0.044)*	(0.044)*	(0.049)+	(0.049)+
logTenure	0.059	0.079	-0.121	-0.119	0.033	0.034	-0.108	-0.106
	(0.043)	(0.043)+	(0.105)	(0.104)	(0.026)	(0.026)	(0.031)**	(0.031)**
Exec_1	-0.177	-0.088	0.508	0.549	-0.271	-0.234	0.328	0.349
	(0.121)	(0.116)	(0.209)*	(0.199)**	(0.068)**	(0.066)**	(0.083)**	(0.078)**
Constant	-3.278	-3.279	-1.862	-1.957	-2.603	-2.737	-1.654	-1.648
	(0.139)**	(0.141)**	(0.353)**	(0.390)**	(0.089)**	(0.095)**	(0.127)**	(0.143)**
Observations	17,216	17,216	1,055	1,055	17,216	17,216	5,421	5,421
Log Likelihood	-599.51	-603.64	-123.00	-122.93	-2234.01	-2227.81	-1747.38	-1747.67

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 6: Results of second-stage regression of the treatment effect of switching from line to headquarters (Models 1 and 2); from headquarters to line (Models 3 and 4); from line to corporate sales (Models 5 and 6); and from corporate sales to line sales (Models 7 and 8) on network centrality and structural constraint.

| Key Covariate	CORPORATE HEADQUARTERS				CORPORATE SALES			
	Line-To-CHQ		CHQ-To-Line		Line-To-Sales		Sales-To-Line	
DV	Degree	Constraint	Degree	Constraint	Degree	Constraint	Degree	Constraint
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LineToCHQ	1.074	-0.147						
	(0.300)**	(0.079)+						
CHQtoLine			1.015	-0.087				
			(0.537)+	(0.127)				
LineToSales					0.963	-0.268		
					(0.134)**	(0.033)**		
CSFtoLine							-0.121	0.076
							(0.132)	(0.032)*
Female	-0.584	0.125	0.864	-0.099	0.821	-0.127	0.578	-0.037
	(0.052)**	(0.014)**	(0.199)**	(0.046)*	(0.052)**	(0.013)**	(0.083)**	(0.019)+
logTenure	0.354	-0.042	0.148	-0.027	0.431	-0.045	0.448	-0.068
	(0.028)**	(0.007)**	(0.135)	(0.031)	(0.027)**	(0.007)**	(0.056)**	(0.013)**
PctInSample_1	0.036	-0.005	0.065	-0.007	0.035	-0.003	0.040	-0.001
	(0.001)**	(0.000)**	(0.007)**	(0.001)**	(0.001)**	(0.000)**	(0.003)**	(0.001)
Exec_1	3.151	-0.452	1.872	-0.163	3.385	-0.543	2.263	-0.245
	(0.085)**	(0.016)**	(0.313)**	(0.067)*	(0.082)**	(0.017)**	(0.225)**	(0.043)**
NumMoves_Function	0.456	-0.085	0.171	-0.030	0.162	-0.028	-0.217	0.028
	(0.024)**	(0.006)**	(0.100)+	(0.024)	(0.025)**	(0.006)**	(0.035)**	(0.008)**
NumMoves_Office	-0.186	0.037	-0.258	0.029	-0.021	0.007	0.041	0.003
	(0.016)**	(0.004)**	(0.089)**	(0.022)	(0.016)	(0.004)+	(0.031)	(0.007)
Constant	3.937	-1.395	4.311	-1.385	3.429	-1.359	5.285	-1.934
	(0.099)**	(0.027)**	(0.484)**	(0.111)**	(0.091)**	(0.025)**	(0.178)**	(0.043)**
Observations	13773	13771	844	844	13769	13770	4333	4333
R-squared	0.30	0.13	0.26	0.08	0.29	0.11	0.15	0.02

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 7: The proportion of the average individual's Time 1 contacts retained in Time 2, reported for categories of employees defined by job at both Time 1 and Time 2. The "staff" categories refer specifically to CHQ or to CSF, as indicated in the headers of data columns, not to CHQ and CSF combined.

Category	Corporate Headquarters	Corporate Sales Force
Stayers-in-Line	28.2%	28.2%
Line-to-Staff	21.8%	19.0%
Staff-to-Line	23.8%	20.0%
Stayers-in-Staff	31.5%	27.8%

Figure 1: Weekly communication patterns among employees who change jobs between the corporate staff (headquarters and sales force) and the line organization during the month of November, 2006.

Panel A: Switchers between positions in Corporate Headquarters and the line organization.
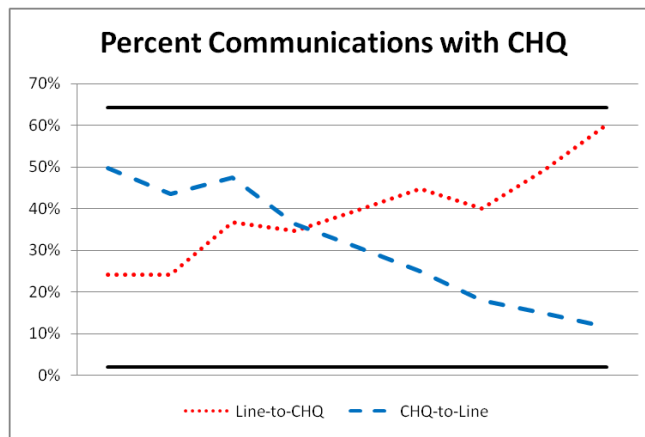
Panel B: Switchers between positions in the Corporate Sales Force and the line organization.
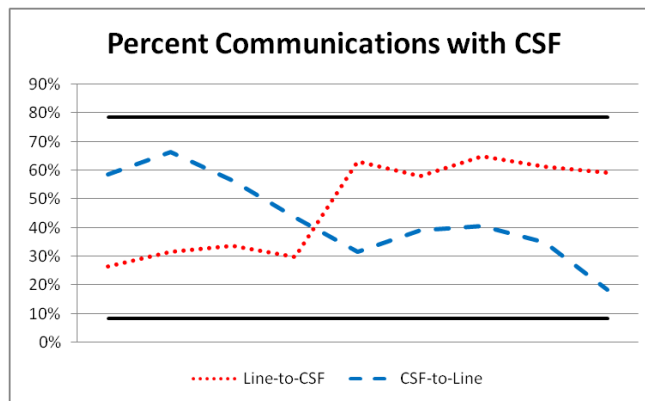
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