

**THE FORMAL STRUCTURE OF INFORMAL NETWORKS:
THE CASE OF A RUSSIAN CORPORATE BUREAUCRACY***

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* Direct all correspondence to Valery Yakubovich at the email address above. Mark Granovetter and Katherine Klein provided detailed comments on early drafts of the paper. Mauro Guillen's and Martin Ruef's suggestions were very helpful for framing the argument. The authors gratefully acknowledge financial support from the Wharton – INSEAD Alliance, the Center for Human Resources at the Wharton School of the University of Pennsylvania, and the University of Chicago Graduate School of Business. Maria Medvedeva and Carla Medalia provided excellent research assistance.

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Abstract

The increasing visibility of networks in the social sciences rests largely on the assumption that they are distinctive social structures irreducible to formal organizations and institutions. Yet, in most instances the interplay between formal and informal in observed social networks remains unspecified. Combining Granovetter's concept of social embeddedness with Stinchcombe's theorizing of informality as "loose joints between different kinds of formalities," we define and test three specific mechanisms that link informal to formal in observed intraorganizational networks: structural embeddedness in formal hierarchies, relational embeddedness in formal hierarchies, and relational embeddedness in joint formal affiliations. Using a unique data file of observed interpersonal and interpositional work ties within the bureaucracy of a large Russian energy company, we show that these mechanisms are distinct from the main generators of work ties: formal hierarchy, institutionalized position-to-position ties, and socio-demographic homophily, whose effects on observed ties they not just complement but mitigate. These theoretical and empirical results provide the first large-scale systematic evidence of the critical importance of hierarchical shortcuts and ties driven by loyalty to former associates for getting things done within the Russian corporate bureaucracy, and offer a new perspective on the interplay between the formal and informal in social networks.

The importance of interpersonal networks for organizations is a core insight of economic sociology and organization theory. Numerous studies persuasively show the relevance of key network concepts, such as tie strength (Granovetter 1973), closure (Coleman 1988), and structural holes (Burt 1992), to a variety of individual and collective outcomes in organizational contexts, such as promotions and rewards, turnover, learning and knowledge sharing, and innovation (e.g., Burt 1992, Hansen 1999, Krackhardt and Porter 1985, Obstfeld 2005, Podolny and Baron 1997). The underlying premise of this literature is the distinctive nature of social networks as an informal coordinating mechanism irreducible to either markets or formal organizations (Powell 1990). However, the distinction between formality and informality is blurred in this literature; “curiously there is little theory to guide us in understanding informal organization” (Smith-Doerr and Powell 2005: 384). By ignoring the degree to which the observed network is shaped by underlying formal structures, we might exaggerate the theoretical and practical impact of informal relationships. This paper develops a fuller account of the role of formal structures in generating observed intraorganizational networks, and by doing so clarifies the linkages between formal and informal organizations.

Following the seminal work of Barnard (1938), Dalton (1959), and Granovetter (1985), numerous theoretical and empirical studies highlight the role of networks as an informal structure that either supports or undermines formal organizations and institutions. Much less attention is paid to the fact that “when formal organizations come into operation, they create... informal organizations” (Barnard 1938: 120). Whether researchers map a network of advice, trust, or communication, they often leave unexplained the role of formal structures in its emergence and reproduction. The image of self-organizing networks running modern organizations is so powerful that the fact that these networks might themselves be a product of formal organizations all but disappears from the academic discourse.

We contend that the news of formal structures’ death proves premature, despite the growing awareness of social networks as a media of transactions, knowledge transfer,

collaboration, and other economic activities. Building on Barnard's insight, we argue that if the contribution of the formal organization is underappreciated, the role of the informal one is necessarily exaggerated. Paraphrasing Bielby and Baron (1980), our goal is to bring the formal organization back into the analysis of intraorganizational networks in order to better understand their origins and reproductive mechanisms. Management's growing appreciation of the importance of networks leads to attempts to cultivate intraorganizational networks by reconfiguring the formal structure towards horizontal ties and collaborative communities (Heckscher and Adler 2006). Thus, our research agenda has not only theoretical but also practical significance.

Following Weber's (1978[1922]) notion of rational bureaucracy, Scott (2003: 20) defines an organization's formal social structure as "one in which the social positions and the relationships among them have been explicitly specified and are defined independently of the personal characteristics and relations of the participants occupying these positions." Accordingly, if a relationship is not explicit or depends on particular individuals who occupy the related positions, the relationship is an informal tie.

To better account for the role of formal structures in generating intraorganizational networks, we begin by replicating socio-metric studies of organizations from the 1950s and 1960s which account for formal hierarchies and are largely ignored in the social networks literature that took root in the 1970s (cf., Tichy and Fombrun 1979) and grew exponentially from the 1990s onward. Going beyond the early socio-metric studies, we argue that the impact of the formal structure on the observed intraorganizational networks cannot be reduced to superior – subordinate ties. First, we point out that work ties can extend beyond immediate superior-subordinate relationships but still lie within the formal chains of command defined on organizational charts. Such ties are informal; at the same time, the formal hierarchy does shape them.

Second, some work ties, vertical or horizontal, might be absent from organizational charts but defined in job descriptions, work flow charts, and other documents which remain unknown to organization members and researchers. Other work ties originate in personal ties among particular individuals but persist beyond the tenure of these individuals. In either case, work ties meet Scott's first criterion of formalization – they are impersonal, or position-to-position, ties in the sense that they do not depend on incumbents. At the same time, they are not explicitly defined but rather are taken for granted or institutionalized. This institutionalization has to be accounted for as a phenomenon overlapping with but distinct from formalization if we want to understand informality in observed intraorganizational networks. To the best of our knowledge, this paper makes the first attempt to do that.

Next, we identify formal components of network formation across individual careers by combining Granovetter's (1985) notion of informality in personal relationships as taking shape through the history of the connected individuals' interactions in multiple roles, and Stinchcombe's (2001: 5) insightful definition of informality as "loose joints between different kinds of formality." The combination suggests that informality of the observed intraorganizational tie between two individuals can be seen as the "joint" between the formal roles in which the individuals interacted in the past and the formal roles in which they interact at present. Intra-organizational and inter-organizational job mobility are the two most common mechanisms that create the joint and thereby contribute to the formation of the observed intraorganizational network. In particular, intra-organizational job mobility is at play when a prior position along the same chain of command becomes a salient factor in a work tie after one or both partners move to other positions within the same organization. Inter-organizational job mobility is at play when a previous shared membership in another organization becomes a salient factor in a work tie in the organization currently observed. Both mechanisms accentuate the dynamic between formal and informal organizations over time; prior formal affiliations become

salient in a new organizational context as a factor in the development of observed work ties, whether those ties are prescribed by the new context or not.

To test these ideas empirically, we use a unique data set from the headquarters of a large Russian energy company. The company emerged out of the process of privatization of state-owned production assets after which the new owners assembled their management team from three different organizations and took the company through a multi-stage restructuring. Therefore we expect that prior formal joint affiliations with the precursor organizations and hierarchical ties within the company before the restructuring shaped the observed work ties within the company. The detailed data allows us to identify each relationship's position-to-position and interpersonal status, and to test the formal and informal mechanisms of network generation outlined above.

The following section discusses the concepts of formal and informal structures and the arguments about the relationship between them as put forward in the extant literature. We outline testable hypotheses about the links between formal superior – subordinate relationships, institutionalized position-to-position ties, shortcuts along chains of commands, prior hierarchical relationships and prior joint affiliations, on the one hand, and observed intraorganizational networks, on the other. Then we describe the empirical setting in which we test these hypotheses, explain the data and statistical method used, and present the actual findings.

We find evidence in support of all the mechanisms of observed networks' formation listed above. Controlling for hierarchical and institutionalized position-to-position ties, we show that the most known informal mechanism, socio-demographic homophily, maintains its influence over the observed network. The informal mechanisms of shortcuts along chains of command, prior hierarchical ties, and joint affiliations are associated with observed relationships above and beyond socio-demographic homophily. Finally, we show that the informal mechanisms not just complement formal hierarchies and institutionalized position-to-position ties but mitigate their

effect on observed ties, thereby empirically confirming the irreducibility of the informal mechanisms to the formal ones.

Formal Structures and the Formation of Interpersonal Networks

In Table 1, we decompose Scott's definition of the formal structure introduced above along two dimensions: whether positions or persons are related and whether the relationship is explicitly defined on organizational charts, in job descriptions and the like. Thus, the upper left cell represents Scott's formal structure of explicit position-to-position ties. Accordingly, the informal structure consists of implicit person-to-person ties in the lower right cell. Organizations do not explicitly define person-to-person ties¹ and therefore the lower left cell is empty. Implicit position-to-position ties present an ambiguous category of ties that are formal on one dimension and informal on the other.

Table 1 about here

Note that nowhere does Scott's definition of the formal structure limit it to the organizational hierarchy of direct reporting relationships between superior and subordinates. At the same time, observers of real organizations do exactly the opposite. In particular, Barnard (1938: 175-176) defines the formal organization's communication system as "a system of objective authority" within which "everyone must report to someone (communication in one direction) and everyone must be subordinate to someone (communication in the other direction)." Any other relationships are informal and the literature documents the disparities between the two. Dalton's (1959) path-breaking study *Men Who Manage* offers a rich ethnographic account of the disparity between formal and informal authority among the top managers of a Milo plant. Blau (1953) reports the same phenomenon in *The Dynamics of*

¹ Although see Heimer's (1992) suggestions towards incorporating particularistic ties into universalistic organizations.

Bureaucracy, an equally influential study of state agencies. He quantifies employees' position in the informal structure by the frequency of interactions in informal settings and shows how this position affects the employee's impact on the agency's decision-making process.

In one of the very first applications of sociometric techniques to large organizations, Weiss and Jacobson (1955) map the closest work relationships among 196 employees of a government agency with the purpose of explaining the differences in the patterns of interactions between the Administrative and Operating Divisions. They find that the observed work groups of the Administrative Unit closely resemble formally prescribed units and the relationships across the groups correspond closely to the agency's organizational chart. At the same time, the observed structure of the Operating Division departs significantly from the prescribed one with a large number of interactions across work groups, irrespective of formal requirements. The authors explain the variance by the difference in the goals of the two divisions. The main goal of the Administrative Division was accountability, while effective coordination was the main goal of the Operating Division.

Another series of studies, while acknowledging the disparity between the formal hierarchy and observed network, focus on the link between the two. Tichy and Fombrun (1979) propose and empirically test a measure of the degree to which the formal hierarchy, or in their terms, the prescribed network, predicts the observed or emergent one. Specifically, they engage a contingency argument which links a type of the formal structure, mechanistic or organic (Burns and Stalker 1961), with characteristics of the interaction and influence networks observed within organizations.

Lincoln and Miller (1979) show empirically that an individual's centrality in an intraorganizational network of instrumental and friendship ties depends on her education and status in the organization's formal hierarchy. They analyze network survey data from five organizations and only in one of them do these attributes have little effect. A case study of that organization shows that at the time of the survey it faced an internal conflict that led to its

dissolution shortly thereafter. The authors conclude that their findings are consistent with the image of organizations as rational systems and, accordingly, contradict the dominant explanations of the origins of intraorganizational networks from the natural systems perspective (for the reviews of the rational systems and natural systems schools in organization theory, see Scott 2003). After all, formal organizations operate on the principles of division of labor and “heterophily” which imply relationships between differentiated functionally interdependent positions. Formal organizations are not communities whose members are free to follow the principle of “homophily,” i.e., to create ties with similar others whom they happen to like.

Shrader, Lincoln, and Hoffman (1989) restate this argument at the level of the organization as a whole and show empirically how the differentiation, centralization, and formalization of the organizational hierarchy, which they call the distributional structure, affect the density, connectivity, clustering, and symmetry of the observed networks of communication flows and client referral ties.

The studies discussed establish the baseline model of the intraorganizational network consistent with the Weberian view of the formal organization. As an ideal type, the Weberian organization solves coordination problems, which are an unavoidable consequence of the division of labor, through bureaucratic interactions up and down the hierarchy. As a result, the observed intraorganizational network is neither more nor less than a tree of hierarchical position-to-position ties between immediate superiors and subordinates:

Hypothesis 1. The existence of a formal direct report relationship increases the likelihood of an interpersonal work tie between the superior and subordinate.

The statement appears so obvious that the reader might argue that it hardly deserves to be designated as a hypothesis. Nevertheless, we assert that the view of observed networks as informal structures, which dominates the current literature, effectively turns this statement into a

testable hypothesis and the initial step in our research strategy of exploring observed intraorganizational networks as emerging “out of the shadow” of the formal hierarchy.

Next, we move beyond direct reports along the chains of command established by formal hierarchies. Organization members vary widely by the degree to which they reach out to indirect bosses and subordinates along the chain of command. The management literature emphasizes the critical importance of such ties for addressing common managerial challenges, such as staying informed, being able to communicate and implement one’s own decisions and ideas, and building a coalition for change (e.g., Kotter 1982). At the same time, constraints on time and attention together with the habitual reliance on the immediate hierarchical ties reduce the likelihood of building work ties with colleagues who are farther away on the chain of command:

Hypothesis 2. The likelihood of an observed work tie is higher along the chain of command than outside it. Within the chain of command, the likelihood of an observed work tie decreases with an increase in the number of the hierarchical levels separating the parties.

The second mechanism that takes observed intraorganizational ties out of the shadow of the formal hierarchy links organization members both within and across different chains of commands. As hierarchies become flatter (Rajan and Wulf 2006), more collaboration and coordination takes place across chains of commands, drastically improving the redistribution and sharing of knowledge (Hansen 1999).

Dodds, Watts, and Sabel (2003) develop a formal model that shows how individual search across an organization’s silos enhances the efficiency and robustness of the organization’s communication network. Such search does not demolish the hierarchy but incrementally adds to it crosscutting ties, whose density decreases monotonically with the depth of the hierarchy. The model explicitly forbids any formal links across the chains of command, which makes it solvable

and overall consistent with most of the relevant literature that juxtaposes crosscutting ties to the formal structure.

We believe, however, that such a view is too simplistic. A small but growing body of research distinguishes between interpersonal and inter-unit networks within organizations (for a brief review, see Kilduff and Tsai 2003: 6-7). There is no doubt that interpersonal networks can induce and facilitate exchanges across units. At the same time, as such exchanges become routine and taken-for-granted, they also become independent of the particular persons conducting them. In our terms, they become institutionalized as position-to-position ties.

Galbraith (2006) describes Nestlé's dealings with global corporate customers like Wal-Mart, Tesco, and Carrefour. The account managers responsible for such customers in individual countries forge relationships and share ideas and experiences at annual sales meetings and maintain regular contacts remotely. These ties do not depend on the individual managers; anybody in the right position is expected to support them. Some organizations go further and explicitly define such position-to-position ties either short-term, for example, as teams or projects, or long-term by establishing positions of full-time coordinators who do not possess authority over the units coordinated but support and facilitate interactions among them (Eccles and Crane 1988, Galbraith 2006). The key point here is that organizations increasingly utilize position-to-position ties, which the literature fails to distinguish from person-to-person ties.

Podolny and Baron (1997) offer one way to make the distinction in terms of tie content: Task Advice and Buy-In ties are typically position-to-position ties, Strategic Information and Social Support ties are more person-to-person ties, and Mentorship ties are somewhere between. They clarify that this choice of content is informed by the previous, not exhaustive, choices made in the network literature and that the distinction between position-to-position, or position-centered, and person-to-person, or person-centered, ties, observed empirically, "is more a matter of degree than of kind" (Podolny and Baron 1997: 677): as a tie's person-centricity increases, its position-centricity decreases.

This approach is consistent with Weber's rational bureaucratic organization and Scott's typology of organizational structures that conceive formality and informality as mutually exclusive categories. The more formal (bureaucratic) an organization becomes, the less relevant is interpersonal trust, even if present, to individual and organizational outcomes. Conversely, if interpersonal affection is relevant, the formal structure is inefficient since it allows personal interests to get in the way of the organization's stated goals.

This zero-sum view of the relationship between formal and informal follows from the rational systems perspective in organization theory (for a review, see Scott 2003) which assumes that organizations have perfect information which allows them to put together all the formal structures for the completion of all consequential work tasks *ex ante*. However, decades of research show that the tasks that modern organizations have to complete are uncertain in rapidly changing technological, economic, political, and social environments (Lawrence and Lorsch 1967, Galbraith 1973). Formalizing such tasks is virtually impossible; to complete unpredictable and rapidly changing tasks, organizations have to rely on informal structures. Formal and informal become complementary. A high level of formalization of routine repetitive tasks does not necessarily preclude flexibility and informality in dealing with novel and idiosyncratic problems. On the contrary, the former might be required for the latter; by formalizing routine tasks organization members can concentrate their time and energy on more uncertain and creative assignments. A high degree of formalization is compatible with a high degree of informality, and the two are intertwined in observed intraorganizational networks (for a review of this argument, see Smith-Doerr and Powell 2005).

As an example relevant to the empirical content of this paper, think about the relationship between the CEO and the Chairman of the Board of Directors of a large Russian company. The Board exists independently of its incumbents, first of all, because it is prescribed and regulated by law. In particular, the law obliges the Board, usually through its Chairman, to evaluate the CEO's performance and provide him feedback using the data furnished by the CEO. The quality

of the evaluation and feedback critically depends on the quality of the data and the willingness of the Chairman to be open and constructive, both of which depend on interpersonal trust between the two. Similar considerations drive the CEO's willingness to follow the advice given to him by the Chairman (Shekshnia 2007). To recast the same argument in terms of tie contents, the performance evaluation and feedback are given because the relationship is highly position-centered while its effectiveness hinges on an information exchange that requires the relationship to be highly person-centered. It follows that effective advice requires a multiplex relationship that is high on both position-centricity and person-centricity.

Accordingly, an observed intraorganizational tie is generated and supported by both position-to-position and person-to-person mechanisms. The former includes explicit prescriptions of the tie in organizational documents as well as its implicit taken-for-grantedness by organization members. The latter includes interpersonal trust, loyalty, and commitment. The two groups of mechanisms have to be theorized as distinctive and relatively independent of each other.

Our first hypothesis above points to the organizational hierarchy as one position-to-position mechanism which is purposefully designed to align communication channels with work flows. However, there exist multiple possible communication channels in a typical organization and the way prescribed by the formal hierarchy might not be optimal under all circumstances. That is why organizations resort to task forces, project teams, and other temporary but explicitly decreed structures; as these structures disappear, ties induced by them might find other uses unanticipated by the organizational design but nevertheless are an effective means for achieving a variety of organizational and individual goals. Alternatively, organization members themselves seek contacts with colleagues in the functional areas needed for the task at hand. In either case, as successful contacts are repeated, a relationship between the positions emerges and becomes taken-for-granted, so it perseveres through personnel changes. Like formal hierarchical

relationships in Hypothesis 1, such institutionalized ties result in the formation of an observed work tie among the individuals who occupy the positions:

Hypothesis 3. The presence of an institutionalized position-to-position tie is positively associated with the likelihood of an interpersonal work tie between the occupants of the positions.

To summarize our discussion so far, Hypotheses 1 and 3 cover the main impersonal processes revealed in the extant literature that are relevant to the reproduction of observed intraorganizational networks. Both link position-to-position ties, which can be formal, i.e., explicitly codified on the organizational chart or in job descriptions, or institutionalized, i.e., taken-for-granted and routinized by organization members, to observed work ties among organization members. Formalization and institutionalization are relatively independent; there exist formal positions which are not institutionalized and vice versa.

Hypothesis 2 is different. It predicts the existence of an informal work tie as a shortcut for a chain of formal superior-subordinate relationships. This corresponds to Stinchcombe's (2001: 5) definition of informality as "loose joints between different kinds of formality." As an example, Stinchcombe describes appeals courts' practice of judging cases on the basis of precedent. It turns out that in many cases, "the appeals court decides on the basis, not of the reason for the decision in the precedent, but of a reason in the "other reasons" given as legitimate in the precedent" (Stinchcombe 2001: 5). Some reason that did not play a major role in deciding the precedent becomes salient in the decision of the case under consideration. Both decisions are formal judicial judgments. Informality here is in the link between the two: the appeals court's decision is contingent on the precedent but not in the way formalized by the precedent.

Since Stinchcombe equates formalities with abstractions, informality effectively means concreteness. This links our argument to the embeddedness approach where "concrete personal

relations and structures (or “networks”) of such relations” are defined as the opposite of abstract interpersonal ties that are “extremely stylized, average, “typical” – devoid of specific content, history, or structural location” (Granovetter 1985: 486). From Granovetter’s perspective, Hypothesis 2 is a specific case of structural embeddedness whereby a relationship is concrete when it is placed in the context of other ties among relevant actors (Granovetter 1992); an informal hierarchical shortcut is embedded in the formal chain of commands that link the parties of the shortcut.

Granovetter (1992) also introduces relational embeddedness of a tie in a history of interactions between the same parties which means, in Stinchcombe’s terms, that informality can arise from temporal rather than cross-sectional joints between formalities. This insight has a very intuitive appeal in the case of professional or work ties whose participants have a history of interactions in various formal positions within and across multiple bureaucratic organizations. As the same individuals encounter each other in various roles, they are more likely to appreciate each other as concrete persons and their relationship as a concrete relationship, beyond any specific formal role. We focus on the two main types of relational embeddedness in the history of formal interactions found in organizations.

The first type of relational embeddedness manifests itself within the same formal organization and generates an informal tie from a superior – subordinate relationship. Such a tie is often consequential for both parties long after the formal relationship ceases to exist. In fact, one common path towards a powerful network is the maintenance of personal ties with previous bosses who become mentors, partners, and sometimes even subordinates, as Ego’s career develops, especially so when the former superior and subordinate stay with the same organization. As an example, consider Dalton’s finding from a seminal study cited above in which he explains power differences between Milo plant manager Stevens and his assistant Hardy:

“Hardy’s tie with his subordinates was strong from his having been both a departmental and divisional superintendent at Milo, an experience Stevens lacked. This gave Hardy a personal knowledge of his associates that, with his other qualities, enabled him to outstrip Stevens as a power in the plant” (Dalton 1959: 24).

Therefore we expect that the following hypothesis will hold:

Hypothesis 4. A prior formal hierarchical relationship within the same organization is associated with a higher likelihood of a current work tie.

The second type of relational embeddedness of observed work ties in the history of formal interactions takes us beyond the observed company. On one hand, it can be derived from the general principle of homophily which stipulates a higher rate of tie formation between similar people than dissimilar people, where similarity can be on virtually any characteristic, even unobservable ones such as values, attitudes, and abilities (for a review, see McPherson, Smith-Lovin, and Cook 2001). The literature does not consider membership in the same work organization as a source of homophily. On the contrary, research shows that organizations nurture relatively heterogeneous ties, in particular, on race and religion (Marsden 1990). Indeed, a joint formal affiliation with the same organization does not necessarily produce any relationship when the affiliated persons still belong to that organization and are surrounded by others with the same affiliation. However, we argue that the situation changes if the same individuals end up together in a different organization. The prior joint affiliation with the same company suddenly becomes salient and manifests itself in common interests, values, and behaviors which in turn lead to a relationship. Alternatively, it is the relationship forged in one workplace that brings the persons together in another. In fact, the vast literature on getting a job presents this as a major mechanism of labor market mobility; as our colleagues leave, they move

to other firms and create opportunities there for us (Granovetter 1995). Whatever specific mechanism is at work, the following hypothesis should hold:

Hypothesis 5. Prior formal joint affiliations are associated with a higher likelihood of a current work tie.

The informal mechanisms of observed ties' formation specified by Hypotheses 2, 4, and 5 – shortcuts across chains of commands, prior hierarchical relationships, and prior joint affiliations – are theorized as independent of and supplementary to the formal hierarchy and institutionalized position-to-position ties specified by Hypotheses 1 and 3. However, the literature emphasizes the interplay between formal and informal structures and infers their propensity to mutually affect each other's operation (Mintzberg 1979, Smith-Doerr and Powell 2005). On one hand, formalization stifles relationships and makes them incapable of addressing by themselves all possible contingencies, which is the primary reason why the positions' incumbents rely on informal relationships, in general, and preexisting ties and affiliations, in particular, to ease communication and to build and maintain mutual trust (Gross 1953, Granovetter 1985). If this logic is correct, the following hypothesis should hold:

Hypothesis 6a. Informal mechanisms enhance the effect of formal hierarchies and institutionalized position-to-position ties on the observed intraorganizational network.

On the other hand, an old research tradition in industrial and economic sociology suggests that informal mechanisms provide alternative routes for work flows and thereby diminish the relevance of the formal hierarchy and other position-to-position ties (Roethlisberger and Dickson 1939, Dalton 1959). We do not imply that the formal structure is necessarily

dysfunctional; to the degree in which work and information flows are uncertain, ties of mutual attraction and trust provide a natural path for the search for solutions to emerging problems. At the same time, we do assert that less coordination, collaboration and information exchange will be taking place through more formal channels:

Hypothesis 6b. Informal mechanisms weaken the effect of the formal hierarchy and institutionalized position-to-position ties on the observed intraorganizational network.

The Research Context

There are a few reasons why we find it attractive to use Russian network data to refine theories that originate in the Western, primarily American, context. First and foremost, the Russian data help clarify the theories' limitations and scope conditions. Second, social networks play a critical role in the post-socialist Russian economy and are consequential for individuals (Yakubovich 2005), organizations (Sediatis 1998), and markets (Guseva 2008). However, social networks in the Russian context are often treated exclusively as legacies of the socialist past rooted in traditional values (e.g., Schrader 2004) rather than dynamic structures that evolve in tandem with the post-socialist economic system.

Observers of the Russian nascent capitalism show how new entrepreneurs with modest backgrounds accumulated vast wealth by building from scratch extensive social networks encompassing government officials at federal and regional levels, legislators, representatives of law-enforcement bodies, and fellow businessmen and skillfully leveraging them to procure resources, sell goods and services, and receive special privileges (Kets de Vries, Shekshnia, Korotov, and Florent-Trecy 2004). These trends culminated in the privatization wave of the mid-1990s when recently developed informal social ties to key government officials and their economic advisors allowed a handful of private investors to appropriate significant parts of the

national economy and led to the formation of powerful financial-industrial groups (Pappe 2000). Thus, informal networks undermined the formal structure of the emerging economic and political institutions and transformed them into an oligarchic system, under which powerful businessmen had a strong impact on key economic and political decisions of a de-jure democratic government (Puffer, McCarthy, and Naumov 2000).

The oligarchic system did not last either, as the network of “*siloviki*”² greatly reduced the oligarchs’ economic and political influence by skillfully using the formal levers of the state: renationalizing some oligarchs’ assets, prosecuting alleged wrong-doings, and placing its own representatives in key government and business organizations in the 2000s (Puffer and McCarthy 2007). Anecdotal evidence suggests that this network’s control pervades big Russian business.

The *siloviki* is one albeit very successful network that vividly demonstrates the power of preexisting social ties across all the levels of the Russian economy. Our understanding of the interplay between formal and informal relations in Russian organizations is based primarily on qualitative case studies (e.g., Clarke 1995). Such studies consistently report a high degree of centralization of decision-making and inefficiencies of formal hierarchies which, if taken together, appear to explain the critical role of informal relationships.

One exception is a study by Gradoselskaya (2009) which combines focus-groups, surveys, and network analysis of the relationships among top managers to describe the organizational structure of the central office of a large refinery. Two aspects of the study are particularly informative for our argument. First, it finds that the employees perceive the prevalence of informal relations within the company as an indication of “corporate democracy” in contrast to “corporate bureaucracy” embodied in the formal hierarchy. It turns out that they particularly value the direct access to the top management, i.e., the informal shortcuts across the formal hierarchy specified in Hypothesis 2. Second, the study documents and analyzes the

² *Siloviki* is the Russian term for the representatives of power-enforcing agencies such as Federal Security Service, Interior Ministry, Prosecutor’s Office, etc.

intraorganizational network on the level of business units rather than individuals, which indicates the salience of institutionalized position-to-position ties specified in Hypothesis 3.

The company we study (called here RUSLAN for reference purposes) emerged in the process of the incorporation of Russia's federal ministries and agencies, which followed Russian government's swift move toward a market economy in the early 1990s and overnight turned government bureaucrats into managers of a state-owned firm struggling to cope with new market realities. After the state privatized RUSLAN, a major Russian bank gained control of it through a series of acquisitions. The new owners took steps to modernize and revitalize the business using its own employees as a pool of management talent to supplement the engineering and industry expertise of the former civil servants. As the new managers brought costs under control and the business opportunities in the energy sector improved on the back of Russia's economic recovery in the early 2000s, the firm became attractive for professional executives from the outside and immediately used its attractiveness to lure employees from a successful oil company. As a result of these recruitment efforts, by the time of our data collection the company had three distinct groups of managers: those who worked there before the privatization, transfers from the bank-owner, and ex-managers of the oil company.

Data

The data for this project consist of four parts:

The HR department's personnel records for all the 589 people employed at the time of the study, including name, date of birth, education, and the title, pay grade, and salary of each job occupied by the employee within the firm. After removing those who did not participate in the study, we ended up with 515 employees whose characteristics are presented in Table 2.

Table 2 about here

Men and women are equally represented in the firm. An average employee is about 37 year old and has been with the company for almost two years.³ An overwhelming majority of the employees, almost 92%, have higher education which is not surprising for a company headquarters.

The employees' prior affiliations. We collected information on the origins of the firm's current labor force. The first group, let us call it Old Guard, is comprised of those 65 managers who worked for the firm under state ownership; they constitute about 13% of the personnel. The second group, Bankers, is smaller by just four managers, or a percentage point, and includes those who were sent to the firm by its new private owner. The third group, Oilmen, consists of ten relatively recent arrivals from the dismantled oil company, and constitutes 2% of the sample. The remaining people (the group Other) either ended up with RUSLAN as a result of mergers and acquisitions or joined the firm independently of any interorganizational ties.

The formal organizational structure of the firm. We identified five hierarchical levels on RUSLAN's organizational chart at the time of the survey. Since the top two executives did not take part in the study, our analysis focuses on four levels only. We coded 176 distinctive units on these levels: 9 units on the senior executive level, 32 units on level 2, 61 units on level 3, 74 units on level 4. An average employee is positioned almost exactly in the middle of the hierarchy, As Table 2 shows.

Work ties. In November 2005, the senior management of RUSLAN commissioned an outside consulting firm to conduct a network study with the goal of identifying "employees in demand," defined as those who had become critically important work contacts for many organization members.⁴ All the employees of RUSLAN were asked to nominate up to ten personal contacts, five within their immediate organizational units and five outside that are the

³ We start counting tenure from January 1st, 2001 when RUSLAN was incorporated. Those who worked at the company prior to its incorporation, when it was part of a federal ministry, have longer actual tenure.

⁴ The paper is based on secondary analysis of the study data. We neither designed nor administered the study..

most critical to their ability to get things done. A preliminary analysis of the data showed that employees' conceptions of their immediate unit's boundaries vary; some limit their within-unit contact choices to their immediate functional unit, while others include higher units within which their unit is nested (e.g., group (*otdel*) within department (*departament*) or units nested within theirs. To take into account this variation, we count only contacts within the immediate functional units as within-unit contacts and control for the number of such nominations in regression analysis.

As Table 2 shows, the number of possible Alters varies from 503 to 514 with the average of 510. According to Table 2, the average number of nominations is 4.5. Only 11 respondents, or 2.1% of the sample, nominated the maximum ten contacts possible according to our definition of out-of-unit Alters.

Dependent Variable

Our unit of analysis is an asymmetric dyad composed of Ego, an employee who nominates a tie, and Alter who is at risk of being nominated. Table 3 contains descriptive statistics for various characteristics of all the 262,898 dyads of RUSLAN's employees. It is a few thousand dyads smaller than the maximum 264,710 dyads possible among 515 nodes. The difference stems from the fact that we only include the Alters external to the Ego's functional unit.

Table 3 about here

For each Ego – Alter dyad, we define a dummy variable equal to one if Ego nominated Alter as her work tie. 2,327 dyads, or about 1% of the sample, are actual nominations.

Independent Variables

Following our theoretical reasoning, we are interested in the overlays between observed work ties and the following kinds of relationships: formal superior-subordinate relationships, shortcuts across the formal hierarchy, institutionalized position-to-position ties, prior formal ties and joint affiliations.

Two variables in Table 3 identify formal hierarchical relationships. A dummy variable is equal to one if Ego and Alter occupy positions on the same chain of command as it is depicted on the organizational chart. Overall, 2,358 dyads lie on a chain of command.

If a dyad belongs to the chain of command, the second variable measures the distance between the dyad's nodes by the number of the hierarchical levels that separate them. Since RUSLAN's formal hierarchy is five levels deep, this variable may vary within the interval [-4;4], with positive values indicating that Alter is Ego's boss and vice versa. Since two top managers, under whom the chain of command reaches the fifth and last level of the organizational hierarchy, did not take part in the study, the distance varies from -3 to 3 in practice. As Table 3 shows, the average distance between Ego and Alter who belong to the same chain of command is 1.8 levels of the hierarchy.

Position-to-position ties are hard to capture in a network survey for an obvious reason – it is impossible to interview a position. Ideally, one needs a longitudinal study in order to see if the tie among the incumbents of the same position perseveres as the incumbents themselves change. In our cross-sectional setting, we rely on the survey question that asks a respondent to nominate up to five organizational units that are critical to her for getting things done. To account for the possibility that a respondent could nominate any unit up the chain of command of her contact, we treat all the contacts down the chain of command from the nominated unit as the respondent's potential position-to-position ties. Thus, the corresponding dummy variable is equal to one if Alter works in a unit that Ego listed as critical or down the chain of command from that unit. 41,235 dyads, or 15.7% of the sample, meet this condition, as it is evident from Table 2.

Certainly, it is possible that the respondent considers the tie to a position to be important precisely because it is occupied by an employee with whom she has a personal relationship. If this is the case, our assumption about some degree of formalization of the tie might underestimate the informality of the observed network. Since our main claim is that the literature underestimates the importance of formal structures, some movement in the opposite direction towards more conservative estimates of the importance of informal structures should be welcomed.

Prior affiliations can be numerous. Our goal in this paper is not to offer an exhaustive list of options but to articulate a general mechanism and test its particular incarnations. Specifically, we create two dummy variables. The first one indicates whether Ego and Alter had a formal hierarchical relationship within RUSLAN in the past when at least one of them occupied a different position. The relevant statistic in Table 3 shows that a tiny portion, 1,128 dyads or less than .4% of the sample did. The second dummy variable indicates whether Ego and Alter came to RUSLAN from the same organization which turns out to be the case for 7,712 dyads which comprise 2.9% of the sample.

Model

As any other dichotomous variable, our dependent variable can be modeled using logistic regression. However, our outcome of interest is rare; less than 1% of the dyads in the sample are nominated as a critical instrumental tie. Logistic regression underestimates the probabilities of rare events and the biases can be of a magnitude comparable with some estimated effects (King and Zeng 2001). To adjust coefficient estimates, we use the rare event logistic regression model as it is implemented in Stata (King and Zeng 2001; also see Sorenson and Stuart (2001) for a prior application to dyadic data). To correct for interdependencies induced by multiple observations of the same Respondents and Contacts, we use robust standard errors of coefficient estimates.

The model controls for Ego's and Alter's socio-demographic characteristics such as gender, age, and education, tenure at the firm and the current level in the hierarchy, as well as prior affiliation. Since our analysis focuses on the formal structures underlying observed ties' formation, we control for *socio-demographic homophily* as the most common network-generating mechanism (McPherson, Smith-Lovin, and Cook 2001).

Table 3 presents the descriptive statistics for three measures of socio-demographic homophily. Half of the dyads in our sample share gender. The age difference between Ego and Alter can be as large as 48 years with 12 years on average. Their level of education matches in 84% of cases which is not surprising since the sample is highly homogeneous in this regard in the first place.

Hypotheses Testing

Nine models organized into three Tables 4a-4c report the coefficient estimates from rare event logistic regression of the likelihood of a work tie on a set of Ego's and Alter's individual characteristics and dyadic characteristics of the relationship between them.

Tables 4a,4b,4c about here

Model 1 includes only individual characteristics which are not of any substantive interest to our argument but are necessary as controls as well as a reality check. It is not surprising that most of Ego's characteristics do not make much difference for the likelihood of naming someone as a tie, since the study design requires all RUSLAN's employees, independently of their socio-demographic characteristics, to report the same number of work ties.

Ego's tenure within the firm and level in the organizational hierarchy are the only variables that correlate with the likelihood of nominating someone as a work tie. The coefficients for tenure indicate a non-linear pattern in the first two models but the nonlinearity becomes

negligible when the presence of a hierarchical relationship between Ego and Alter is taken into account. The positive linear effect of tenure persists through all the models and leads us to a intuitively realistic conclusion that employees gain work ties with tenure. The lower Ego's level in the hierarchy, the more likely she is to nominate Alter, which is consistent with the idea that lower-level employees are more dependent on others.

The coefficients for Alter's characteristics offer first substantive insights into the nature of work contacts. All other things being equal, women play that role less often than men. Employees in their late 30s are the most sought after Alters, reflecting the fact that representatives of this age group currently run RUSLAN. The uneven distribution of power along an organizational hierarchy explains the finding that the chance to be nominated is lower, the closer Alter is to the bottom of the hierarchy. Finally, note that members of the Old Guard are more likely to be nominated than employees with any other prior affiliation.

Model 2 introduces the first set of relational variables which shows the role of socio-demographic homophily in shaping the observed network. The results are remarkably consistent with the extant literature. Ego is significantly more likely to nominate Alter of the same gender and education. Each additional year of age difference between them decreases the likelihood ratio by about 2.5%.

Model 3 adds three variables that capture Ego's and Alter's positions vis-à-vis each other on chains of command. Belonging to the same chain of command increases the nomination's odds-ratio by a whopping factor of 93.7. The estimates for the linear and quadratic terms of the level difference between the nominator and nominee from the same chain of command suggest that the contacts in the units immediately beyond and above Ego's unit are the most likely nominees (recall that we exclude the contacts from Ego's unit) and the likelihood of nomination decreases as Ego and Alter get farther apart on the chain of command. These findings support our first two hypotheses by showing the prevalence of work ties with immediate superiors and

subordinates, which compose the formal hierarchy, as well as shortcuts along the chain of commands beyond these superiors and subordinates.

Model 4 shows that the presence of an institutionalized position-to-position tie is associated with a 3.6-fold increase in the odds-ratio of the likelihood of nomination which justifies our decision to go beyond the existing literature and directly incorporate such unit-to-unit ties in our framework as a component of the impersonal structure.

Model 5 includes two additional variables representing the dyad's prior hierarchical tie within RUSLAN or joint tenure in another company that became a provider of employees to RUSLAN. Both variables show statistically significant effects, albeit varied in magnitude; the odds-ratio increases by a factor of 4.3 for a prior hierarchical tie and 2.7 for a prior joint employment. The findings clearly point to the role of prior formal affiliations as a source of informal ties even when the current formal hierarchy, institutionalized ties, and socio-demographic homophily are accounted for.

Next, we explore whether prior formal ties weaken the hold of the formal hierarchy and institutionalized position-to-position ties on the pattern of work interactions within the firm. To make the interpretation of interaction coefficients easier, we include them one at a time in Models 6 to 9. The corresponding coefficients estimates in all the models confirm that the hierarchy becomes less important in the presence of prior formal ties. If Ego is connected to Alter by a prior hierarchical relationship, the position of the dyad on a chain of command increases the odds-ratio of a work tie only by a factor of 10.7 in comparison with a factor of 81.0 when the prior tie is absent. The difference in the case of the prior joint tenure in another organization, depicted in Model 7, is relatively modest albeit still substantial, 34.1 and 68.9.

Models 8 and 9 assess the impact of prior ties on the effect of institutionalized position-to-position ties. While a prior hierarchical relationship decreases the need for a position-to-position connection to underpin the work tie, a prior joint affiliation with another firm has little effect.

Discussion

The distinction between the formal and informal is a cornerstone of organization theory.

Therefore, we find it striking that recent advances in understanding the role of networks in organizations and markets have not been accompanied by comparable advances in understanding the interplay of formality and informality in observed networks. A progress towards such understanding is critical for identifying the proper place of intraorganizational networks as distinctive social structures. Their distinctiveness vis-à-vis formal organizations stems from their interpersonal aspects, primarily, trust. However, as formal organizations pervade modern societies (Coleman 1990), we rarely forge personal ties “on the street;” one way or another, they tend to arise in formal contexts. Our approach builds on this observation by treating informality as “loose joint between different kinds of formality,” the definition proposed by Stinchcombe (2001: 5) in his analysis of the interplay between formal and informal in the court of law.

The “looseness” in Stinchcombe’s definition points, in our view, to the latitude exercised by organization members in creating and maintaining their work ties. There are an infinite number of formalities from which informal relationships can emerge - which ones get reproduced in a consistent structural pattern is a theoretical and contextual question.

Theoretically, the concepts of structural and relational embeddedness (Granovetter 1992) guide our search for relevant “loose joints” in the context of intraorganizational work ties.

Contextually, we rely on anecdotal evidence and limited but more systematic case studies that strongly suggest that shortcuts to higher levels of the organizational hierarchy and ties driven by loyalty to former associates are critical for getting things done within the Russian corporate bureaucracy. Our study is the first large-scale systematic evidence of the prevalence of such ties.

To show the role of prior formal relationships in shaping an observed network, we first carefully account for the formal structure in which it is currently situated. In this regard, we move beyond earlier socio-metric studies which explore the contribution of formal hierarchies

but ignore other position-to-position ties which typically have a strong, although not necessarily explicit, impersonal component and which therefore we call institutionalized. Although in our analysis the effect of formal hierarchy is stronger, the effect of institutionalized ties is rather significant both statistically and substantively, and therefore should not be overlooked.

After accounting for the effects of the formal hierarchy and institutionalized position-to-position ties, we explore the role of personal relationships. In agreement with the existing literature, socio-demographic homophily in terms of gender, age, and education remains a significant tie-generating mechanism in our case. Most importantly for our core argument, the work ties in the observed network are associated with chains of command within the formal hierarchy, prior hierarchical relations within the same organization, and prior joint affiliations with other organizations.

A richer account of the role of formal structures in the formation of observed interpersonal ties sheds new light on the durability of personal ties. Network scholars rightly emphasize that social ties help control uncertain environments but neglect the equally important fact that they are full of uncertainty themselves. Introducing the embeddedness concept, Granovetter (1985) clarifies that while trust-based social networks control opportunism, opportunistic actions are potentially more damaging within such networks. Agent-network-theorists question the very ability of individuals to maintain “far-reaching and long-lasting associations” (Latour 2005: 65) and invoke material objects as distinct nodes in emerging network structures that work as mediators of interpersonal ties. From our perspective, interpersonal ties do not last in a vacuum but within formal organizations which are typically built to last and which provide a platform for joint activities that sustain personal relationships.

Our approach points to the need for studies of network outcomes that assess the importance of distinctive network-generating mechanisms. For example, a number of studies document correlations between the structure of personal intraorganizational networks and wages (Burt, Hogarth, and Michaud 2000; Seibert, Kraimer, and Liden 2001). It is far from clear

whether these correlations result from individuals' superior performance in a particularly structured network. Already in the 1950s, labor economist John Dunlop (1957) and his students discovered that in a large firm wages are assigned to jobs and determined, among other things, by interdependencies among jobs within the division of labor. Building on this insight, Doeringer and Piore found "an especially tight relationship among the wages of jobs whose incumbents have regular and frequent contact at the workplace" and that "jobs which involve wide contacts with other workers acquire a strategic position in the internal wage structure which make it impossible to change their wages without adjustments throughout the system" (Doeringer and Piore 1971: 89). In our terms, wages are shaped, at least partially, by the interpersonal network among workers and the position-to-position network among jobs. To separate their effects, we need to decompose common parameters of ego-centric networks, for example, density and constraint, into the components generated by each mechanism involved.

Although the focus of our discussion is on intraorganizational ties, the framework of the paper is applicable to inter-organizational ties as well, if organization-to-organization ties are substituted for position-to-position ties. Organization researchers rarely map both organizational and personal dimensions of interorganizational ties and use secondary data on formal arrangements such as alliances, investment syndicates, patent citations, etc. which are, arguably, formal relationships and might lack an informal component altogether. Padgett (1993) is probably the best from a handful of papers that address this problem head-on.

To make clear, our results do not imply a causal effect of formal structures discussed on observed intraorganizational ties. One could argue that formal hierarchical and institutionalized position-to-position ties often themselves have informal origins. Bosses often choose subordinates from their personal networks, while holders of idiosyncratic jobs forge interpersonal ties which only later become formalized explicitly, on organizational charts or in job descriptions, or implicitly, in social norms and habits. We agree with these arguments with the clarification that they do not invalidate our estimates of the effects of the specified informal

mechanisms, only make them more conservative. Our caution is entirely justified, as the current literature overwhelmingly takes the opposite stand by ignoring the formal structures altogether. Future research should develop finer tools for exploring the evolving interplay between the formal and informal in concrete relationships. In particular, longitudinal data on both changes in the formal structures and on the incumbents of reoccurring positions might help shed better light on the issues raised in the paper.

Another limitation of our study is its focus on a limited number of the most critical, from the respondent's standpoint, work ties. We believe that this limitation does not invalidate the results because we deal with a cross-sectional snapshot of RUSLAN's operation. Employees need only so many ties to handle their ongoing projects, and our observations of RUSLAN suggest that five ties outside an employee's immediate unit is a reasonable number in our context. Also, the availability of network data from all the employees of a large company is pretty rare in the literature and therefore is a strength of our data that serves to counterbalance the limited information on the ties of a particular employee.

Finally, we do not claim that our findings for one albeit large and economically important Russian company are readily generalizable. We consider our paper as a case study which raises an important theoretical issue, proposes a novel way to address it, and shows its empirical application in an important context, in the hope that other studies in a variety of contexts might be inspired.

While the omission of the role of formal organizations in generating observed networks has always been problematic, we believe it is particularly problematic at a time of rapid innovation in formal organization and management. Project and self-managed teams, ad-hoc committees, communities of practice come and go, leaving behind a myriad of new relationships which continuously reconfigure observed networks. Our inability to trace these fluid arrangements does not make them less formal or institutionalized and therefore does lead to the exaggeration of the role of informality in organizational life.

As they become increasingly aware of the benefits of personal ties, managers help employees develop and maintain them. As a result, it becomes even more difficult to understand the personal dimension of a relationship that remains in its original organizational context. Organization scholars promote “collaborative communities,” which formalize collaboration, learning, and knowledge sharing, as a step beyond traditional informal networks (Heckscher and Adler 2006). Business schools teach students how this can be done and thereby make network theory self-fulfilling (e.g., Ferraro, Pfeffer, and Sutton 2005; Merton 1968). The formalization of networks is becoming increasingly transparent, rendering the formal structural approach to their analysis even more valid. We do not imply that this trend is unambiguous and self-reproducing. On the contrary, we believe that, unless managers learn how to shape work ties non-invasively, leaving enough space for their spontaneous self-organization, it might create unnecessary workplace tensions leading to a backlash from the informal organization. This is an important subject for future research.

Bibliography

Barnard, Chester I. 1938. *The Functions of the Executive*. Cambridge, MA:

Harvard University Press.

Baron, James N. and William T. Bielby. 1980. “Bringing the Firms Back in: Stratification,

Segmentation, and the Organization of Work.” *American Sociological Review*, 45(5):

737-765.

Blau, Peter M. 1953. *The Dynamics of Bureaucracy*. Chicago: The University of Chicago Press.

Burns, Tom and G.M. Stalker. 1961. *The Management of Innovation*. London: Tavistock.

Burt, Ronald S. 1992. *Structural Holes: the Social Structure of Competition*. Cambridge, MA:

Harvard University Press.

Burt, Ronald S., Robin M. Hogarth, and Claude Michaud. 2000. “The Social Capital of French

and American Managers.” *Organization Science*, 11: 123-147.

- Clarke, Simon (editor). 1995. *Management and Industry in Russia: Formal and Informal Relations in the Period of Transition*. Aldershot: Edward Elgar.
- Coleman, James. 1988. "Social Capital in the Creation of Human Capital." *The American Journal of Sociology*, 94(Supplement): S95-S120.
- Coleman, James. 1990. *Foundations of Social Theory*. Cambridge, MA: Harvard Univ Press.
- Crozier, Michael. *The Bureaucratic Phenomenon*. Chicago, IL: the University of Chicago Press.
- Dalton, Melville. 1950. *Men Who Manage*. New York: John Wiley.
- Doeringer, Paul and Michael Piore. 1971. *Internal Labor Markets and Man Power Analysis*. Lexington, MA: Heath.
- Dodds, Peter Sheridan, Duncan J. Watts, and Charles F. Sabel. 2003. "Information Exchange and the Robustness of Organizational Networks." *Proceedings of the National Academy of Sciences of the United States of America*, 100(21): 12516-12521.
- Dunlop, John T. 1957. "The Task of Contemporary Wage Theory." In *New Concepts of Wage Determination*, edited by G.W. Taylor and F.C. Pierson. New York: McGraw-Hill Co.
- Eccles, Robert G. and Dwight B. Crane. *Doing Deals: Investment Banks at Work*. Boston, MA: Harvard Business School Press.
- Ferraro, Fabrizio, Jeffrey Pfeffer, and Robert I. Sutton. 2005. "Economics Language and Assumptions: How Theories Can Become Self-Fulfilling." *Academy of Management Review* 30(1): 8-24.
- Galbraith, Jay R. 1973. *Designing Complex Organizations*. Reading, MA: Addison-Wesley.
- _____. 2006. "Mastering the Law of Requisite Variety with Differentiated Networks." Pp. 179-197 in *The Firm as a Collaborative Community. Reconstructing Trust in the Knowledge Economy*, edited by C. Heckscher and P.S. Adler. Oxford, UK: Oxford University Press.
- Gradoselskaya, Galina. 2009. *Business-Networks in Russia*. In Russian. Moscow: State University – Higher School of Economics. Forthcoming.

- Granovetter, Mark. 1973. "The Strength of Weak Ties." *The American Journal of Sociology*, 78(6): 1360-1380.
- Granovetter, Mark. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *The American Journal of Sociology*, 91(3): 481-510.
- Granovetter, Mark. 1992. "Problems of Explanation in Economic Sociology." Pp. 25-56 in *Networks and Organizations*, edited by N. Nohria and R.G. Eccles. Boston, MA: Harvard Business School Press.
- Granovetter, Mark. 1995. "Afterword 1994: Reconsiderations and New Agenda." Pp. 139-182 in *Getting a Job: A Study of Contacts and Careers*. 2nd edition. Chicago: University of Chicago Press.
- Gross, Edward. 1953. "Some Functional Consequences of Primary Controls in Formal Work Organizations." *American Sociological Review* 18(4): 368-373.
- Guseva, Alya. 2008. *Into the Red: the Birth of the Russian Credit Card Market*. Palo Alto, CA: Stanford University Press.
- Hansen, Morten T. 1999. "The Search-Transfer Problem: the Role of Weak Ties in Sharing Knowledge Across Organization Subunits." *Administrative Science Quarterly*, 44(1): 82-111.
- Heckscher, Charles and Paul S. Adler. 2006. *The Firm as a Collaborative Community*. Oxford, UK: Oxford University Press.
- Heimer, Carol. 1992. "Doing Your Job and Helping Your Friends: Universalistic Norms about Obligations to Particular Others in Networks." Pp. 143-164 in *Networks and Organizations*, edited by N. Nohria and R.G. Eccles. Boston, MA: Harvard Business School Press.
- Kapferer, B. 1969. "Norms and the Manipulation of Relationships in a Work Context." Pp.181-244 in *Social Networks in Urban Situations*, edited by J.C. Mitchell. Manchester: Manchester University Press.

- Kets de Vries, M.F.V., Shekshnia S.V., Korotov K., Florent-Treacy, E. (2004) The New Global Russian Business Leaders: Lessons from a Decade of Transition. *The European Management Journal*, 6(22), 637-648
- Kilduff, Martin and Wenpin Tsai. 2003. *Social Networks and Organizations*.
- King, Gary, and Langche Zeng. 2001. "Logistic Regression in Rare Events Data." *Political Analysis* 9(2): 137-163.
- Kotter, John P. 1982. *The General Managers*. Free Press.
- Krackhardt David and Lyman W. Porter. 1985. "When Friends Leave: A Structural Analysis of the Relationship between Turnover and Stayers' Attitudes." *Administrative Science Quarterly*, 30(2): 242-261.
- Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford, UK: Oxford University Press.
- Lawrence, Paul R. and Jay W. Lorsch. 1967. *Organization and Environment: Managing Differentiation and Integration*. Boston, MA: Graduate School of Business Administration, Harvard University.
- Lincoln, James R. and Jon Miller. 1979. "Work and Friendship Ties in Organizations: A Comparative Analysis of Relation Networks." *Administrative Science Quarterly*, 24(2): 181-199.
- McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 27: 415-444.
- Marsden, Peter V. 1990. "Network Diversity, Substructures and Opportunities for Contact." Pp. 397-410 in *Structures of Power and Constraint: Papers in Honor of Peter Blau*, edited by C Calhoun, M Meyer, R Scott. New York: Cambridge.
- Merton, Robert. 1968. *Social Theory and Social Structure* (3rd edition). New York: Free Press.
- Mintzberg, Henry. 1979. *The Structuring of Organizations*. Englewood, NJ: Prentice Hall.

- Obstfeld, David. 2005. "Social Networks, the Tertius Lungen Orientation, and Involvement in Innovation." *Administrative Science Quarterly*, 50 (1): 100-130.
- Padgett, John F. and Christopher K. Ansell. 1993. "Robust Action and the Rise of the Medici, 1400-1434." *American Journal of Sociology* 98(6): 1259-1319.
- Pappe, Yakov S. 2000. *Oligarkhi* (in Russian: The Oligarchs). Moscow: State University – Higher School of Economics.
- Podolny Joel M. and James N. Baron. 1997. "Resources and Relationships: Social Networks and Mobility in the Workplace." *American Sociological Review*, 62(5): 673-693.
- Powell, Walter W. 1990. "Neither Market Nor Hierarchy: Network Forms of Organization." Pp. 295-336 in *Research in Organizational Behavior*, volume 2, edited by L.L. Cummings and B Shaw. Greenwich, CT: JAI Press.
- Puffer, Sheila M. and Daniel M. McCarthy. 2007. "Can Russia's State-managed, Network Capitalism be Competitive?: Institutional Pull versus Institutional Push," *Journal of World Business*, 42(1): 1-13.
- Puffer, Sheila M, Daniel M. McCarthy, and Alexander I. Naumov. 2000 *The Russian Capitalist Experiment*. Edwar Elgar.
- Rajan, Raghuram G. and Julie Wulf. 2006. "The Flattening Firm: Evidence from Panel Data on the Changing Nature of Corporate Hierarchies." *The Review of Economics and Statistics*, 88(4): 759-773.
- Roethlisberger, Fritz J. and William J. Dickson. 1939. *Management and the Worker*. Cambridge, MA: Harvard University Press.
- Schrader, H. 2004. "Social Capital and Social Transformation in Russia." *Journal for East European Management Studies*, 9(4): 391-410.
- Scott, W. Richard. 2003. *Organizations: Rational, Natural, and Open Systems*. 5th edition. NJ: Prentice Hall.

- Sediatis, Judith. 1998. "The Alliances of Spin-offs versus Start-ups: Social Ties in the Genesis of Post-Soviet Alliances." *Organization Science* 9(3): 368-381.
- Seibert, Scott E., Maria L. Kraimer, and Robert C. Liden. 2001. "A Social Capital Theory of Career Success." *Academy of Management Journal*, 44(2): 219-237.
- Shekshnia, Stanislav. 2007. "Pulling Together". *World Business*, June 2007: 52-55.
- Shrader, Charles B., James R. Lincoln, and Alan N. Hoffman. 1989. "The Network Structures of Organizations: Effects of Task Coningencies and Distributional Form." *Human Relations*, 42(1): 43-66.
- Smith-Doerr, Laurel and Walter W. Powell. 2005. "Networks and Economic Life." Pp. 379-402 in *The Handbook of Economic Sociology*, edited by Neil J. Smelser and Richard Swedberg.
- Sorenson, Olav and Toby E. Stuart. 2001. "Syndication Networks and the Spatial Distribution of Venture Capital Investments." *The American Journal of Sociology*, 106(6): 1546-1588.
- Stinchcombe, Arthur L. 2001. *When Formality Works*. Chicago, IL: The University of Chicago Press.
- Tichy, Noel and Charles Fombrun. 1979. "Network Analysis in Organizational Settings." *Human Relations* 32(11): 923-965.
- Weber, Max. 1978[1922]. *Economy and Society*. Berkeley: University of California Press.
- Weiss Robert S. and Eugene Jacobson. 1955. "A Method for the Analysis of the Structure of Complex Organizations." *American Sociological Review* 20(6): 661-668.
- Yakubovich, Valery. 2005. "Weak Ties, Information, and Influence: How Workers Find Jobs in a Local Russian Labor Market." *American Sociological Review*, 70(3): 408-421.

Table 1. Types of Intraorganizational Ties

	Explicit	Implicit
Position-to-Position	Formal	Institutionalized
Person-to-Person		Informal

Table 2. Descriptive Statistics for Respondents. Sample = 515 employees

Discrete Variables	Frequency	Percent
Female	258	49.9
<u>Education:</u>		
Higher	471	91.5
Incomplete higher	17	3.3
Other	27	5.2
<u>Affiliation:</u>		
Old guard	65	12.6
Oilmen	10	2.0
Bankers	61	11.8
Other	73	14.2
None	244	59.4

Continuous Variables	Mean	Std.Dev.	Min	Max
Age	36.7	10.5	20	68
Tenure (months)	20.7	14.4	0	65
Level in the hierarchy	3.4	1.2	1	5
Possible alters	510.0	2.7	503	514
Actual alters	4.5	2.7	0	10

Table 3. Descriptive Statistics for Ego – Alter Dyads. Sample = 262,898 dyads

Discrete Variables	Mean	Std.Dev.	Min	Max
Work Tie	.01	.09	0	1
Hierarchical Relationship				
Yes	.01	.10	0	1
Level difference*	.00	1.75	-3	3
Position-to-Position Tie	.16	.36	0	1
Ego – Colleague Homophily				
Gender match	.50	.50	0	1
Age difference (in years)	11.8	9.1	0	48
Education match	.84	.37	0	1
Prior Formal Tie				
Hierarchical relationship within the firm	.004	.065	0	1
Affiliation match	.03	.17	0	1

*This variable is defined only for hierarchical relationships (2,358 dyads).

Table 4a. Rare Event Logit Regressions of the Likelihood of a Critical Work-Related Tie to a Colleague
Sample = 262,898 dyads

Independent variables	Model 1		Model 2		Model 3	
	Coeff.	Z-score	Coeff.	Z-score	Coeff.	Z-score
Intercept	-7.776	-17.06	-7.075	-14.82	-7.181	-14.35
Ego's Individual Characteristics						
Female	-.006	-0.13	.091	1.95	.094*	1.97
Age	.009	0.60	-.039*	-2.45	-.049*	-2.96
Age ²	.000	0.03	.001*	3.11	.001**	3.55
<u>Education (Higher):</u>						
Incomplete higher	.020	0.16	.611**	3.86	.654**	4.03
Other	.176	1.94	.713**	5.55	.779**	6.03
Tenure	.017**	3.76	.017**	3.69	.018**	3.85
Tenure ²	-.0002*	-2.08	-.0002*	-2.02	-.0002	-1.71
Level in the hierarchy	.098**	4.90	.098**	4.88	.120**	5.93
<u>Affiliation (Old guard):</u>						
Oilmen	-.281	-1.28	-.289	-1.32	-.211	-0.92
Bankers	-.035	-.37	-.041	-0.43	.036	0.38
Other	.084	1.03	.078	0.96	.062	0.73
None	.014	0.20	.010	0.13	.025	0.34
Number of within-unit ties	-.036*	-3.06	-.036*	-3.02	-.015	-1.25
Alter's Individual Characteristics						
Female	-.164**	-3.63	-.191**	-4.02	-.230**	-4.72
Age	.147**	9.06	.112**	6.84	.101**	5.87
Age ²	-.002**	-8.03	-.001**	-5.42	-.001**	-4.69
<u>Education (Higher):</u>						
Incomplete higher	-.554*	-3.00	-.015	-0.08	-.051	-0.25
Other	.041	0.40	.531**	4.04	.659**	5.00
Tenure	.035**	6.64	.035**	6.57	.034**	6.37
Tenure ²	-.001**	-5.73	-.001**	-5.68	-.001**	-5.37
Level in the hierarchy	-.100**	-5.06	-.101**	-5.06	-.014	-0.70

<u>Affiliation (Old guard):</u>						
Oilmen	-1.461**	-6.62	-1.470**	-6.66	-1.416**	-6.43
Bankers	-.542**	-6.25	-.550**	-6.33	-.388**	-4.36
Other	-.165*	-2.33	-.171*	-2.41	-.147*	-1.98
None	-.826**	-12.34	-.831**	-12.40	-.830**	-11.92
Ego – Alter Homophily						
Gender match			.603**	13.62	.529**	11.64
Age difference (in years)			-.026**	-9.28	-.026**	-9.44
Education match			.649**	5.42	.675**	5.60
Hierarchical Relationship						
Yes					4.475**	42.27
Level difference					.297**	6.57
Level difference ²					-.423**	-10.10
Position-to-Position Tie						
Prior Formal Tie						
Hierarchical relationship within the firm						
Affiliation match						
Interaction Effects						
Hierarchy(Yes)*Prior hierarchy						
Hierarchy(Yes)* Prior affiliation						
Position-to-Position Tie*Prior hierarchy						
Position-to-Position Tie*Prior affiliation						
-2LogLikelihood (df)	25,857.90 (24)		25,541.32 (27)		23,366.58 (30)	
Pseudo R ²	.0291		.0410		.1227	

Significance levels: * < .05, ** < .001 (two-tailed test). Reference groups are in parentheses.

Table 4b. Rare Event Logit Regressions of the Likelihood of a Critical Work-Related Tie to a Colleague.
Sample = 262,898 dyads

Independent variables	Model 4		Model 5		Model 6	
	Coeff.	Z-score	Coeff.	Z-score	Coeff.	Z-score
Intercept	-7.150	-14.08	-7.477	-14.57	-7.433	-14.42
Ego's Individual Characteristics						
Female	.145*	2.94	.138*	2.77	.136*	2.73
Age	-.044*	-2.66	-.046*	-2.75	-.045*	-2.69
Age ²	.001*	3.12	.001*	3.23	.001*	3.17
<u>Education (Higher):</u>						
Incomplete higher	.687**	4.20	.688**	4.16	.673**	4.05
Other	.809**	6.21	.786**	5.97	.768**	5.71
Tenure	.015*	3.16	.011*	2.32	.011*	2.35
Tenure ²	-.0001	-1.11	-.0001	-0.63	-.0001	-0.77
Level in the hierarchy	.137**	6.74	.136**	6.63	.138**	6.75
<u>Affiliation (Old guard):</u>						
Oilmen	-.211	-0.93	.108	0.47	.058	0.25
Bankers	.064	0.66	.143	1.41	.120	1.18
Other	.056	0.65	.325*	3.36	.316*	3.29
None	.020	0.27	.317**	3.69	.287*	3.35
Number of within-unit ties	-.023	-1.93	-.025*	-2.05	-.025*	-2.03
Alter's Individual Characteristics						
Female	-.286**	-5.73	-.290**	-5.72	-.297**	-5.88
Age	.099**	5.72	.099**	5.64	.099**	5.65
Age ²	-.001**	-4.52	-.001**	-4.44	-.001**	-4.47
<u>Education (Higher):</u>						
Incomplete higher	-.186	-0.91	-.177	-0.86	-.209	-1.01
Other	.602**	4.55	.581**	4.35	.556**	4.08
Tenure	.032**	5.86	.028**	5.16	.028**	5.16
Tenure ²	-.001**	-4.66	-.001**	-4.25	-.001**	-4.39
Level in the hierarchy	-.138**	-6.56	-.140**	-6.60	-.140**	-6.68

Affiliation (Old guard):						
Oilmen	-1.662**	-7.13	-1.362**	-5.97	-1.459**	-6.29
Bankers	-.355**	-3.95	-.316*	-3.42	-.341**	-3.70
Other	-.194*	-2.56	-.023	-0.29	-.028	-0.35
None	-.822**	-11.56	-.626**	-8.16	-.657**	-8.61
Ego – Alter Homophily						
Gender match	.519**	11.27	.496**	10.61	.478**	10.25
Age difference (in years)	-.025**	-8.69	-.025**	-8.73	-.024**	-8.46
Education match	.630**	5.20	.619**	5.06	.596**	4.75
Hierarchical Relationship						
Yes	4.513**	38.87	4.159**	32.32	4.395**	36.01
Level difference	.191**	3.83	.213**	3.90	.195**	3.84
Level difference ²	-.477**	-10.21	-.497**	-9.78	-.477**	-10.10
Position-to-Position Tie	1.286**	26.16	1.287**	25.87	1.272**	25.61
Prior Formal Tie						
Hierarchical relationship within the firm			1.459**	9.73	2.530**	18.10
Affiliation match			.999**	9.64	.953**	9.14
Interaction Effects						
Hierarchy(Yes)*Prior hierarchy					-2.025**	-9.48
Hierarchy(Yes)* Prior affiliation						
Position-to-Position Tie*Prior hierarchy						
Position-to-Position Tie*Prior affiliation						
-2LogL		22,702.22 (31)		22,459.74 (33)		22,359.12 (34)
Pseudo R ²		.1476		.1567		.1605

Significance levels: * < .05, ** < .001 (two-tailed test). Reference groups are in parentheses.

Table 4c. Rare Event Logit Regressions of the Likelihood of a Critical Work-Related Tie to a Colleague.
Sample = 262,898 dyads

Independent variables	Model 7		Model 8		Model 9	
	Coeff.	Z-score	Coeff.	Z-score	Coeff.	Z-score
Intercept	-7.489	-14.59	-7.455	-14.53	-7.488	-14.59
Ego's Individual Characteristics						
Female	.140*	2.81	.134*	2.71	.137*	2.74
Age	-.046*	-2.74	-.044*	-2.61	-.046*	-2.73
Age ²	.001*	3.23	.001*	3.06	.001*	3.21
<u>Education (Higher):</u>						
Incomplete higher	.692**	4.20	.689**	4.18	.689**	4.16
Other	.788**	6.01	.786**	5.98	.786**	5.98
Tenure	.011*	2.34	.010*	2.19	.011*	2.31
Tenure ²	-.0001	-0.67	.000	-0.46	-.0001	-0.60
Level in the hierarchy	.137**	6.66	.139**	6.73	.136**	6.64
<u>Affiliation (Old guard):</u>						
Oilmen	.105	0.46	.109	0.48	.104	0.46
Bankers	.139	1.38	.131	1.30	.137	1.35
Other	.321*	3.31	.318*	3.29	.322*	3.33
None	.314**	3.66	.314**	3.66	.315**	3.66
Number of within-unit ties	-.026*	-2.11	-.026*	-2.14	-.025*	-2.07
Alter's Individual Characteristics						
Female	-.288**	-5.70	-.284**	-5.63	-.289**	-5.71
Age	.100**	5.66	.096**	5.49	.010**	5.66
Age ²	-.001**	-4.46	-.001**	-4.27	-.001**	-4.46
<u>Education (Higher):</u>						
Incomplete higher	-.153	-0.75	-.191	-0.93	-.175	-0.85
Other	.582**	4.37	.582**	4.37	.581**	4.35
Tenure	.028**	5.16	.028**	5.25	.028**	5.17
Tenure ²	-.001**	-4.28	-.001**	-4.38	-.001**	-4.27
Level in the hierarchy	-.140**	-6.59	-.149**	-7.00	-.140**	-6.60

<u>Affiliation (Old guard):</u>						
Oilmen	-1.370**	-5.99	-1.391**	-6.06	-1.363**	-5.97
Bankers	-.318**	-3.46	-.324**	-3.52	-.319*	-3.46
Other	-.025	-0.30	-.030	-0.37	-.026	-0.32
None	-.630**	-8.22	-.644**	-8.45	-.627**	-8.20
Ego – Alter Homophily						
Gender match	.459**	10.62	.493**	10.60	.496**	10.60
Age difference (in years)	-.025**	-8.74	-.025**	-8.71	-.025**	-8.72
Education match	.616**	5.05	.615**	5.04	.620**	5.07
Hierarchical Relationship						
Yes	4.232**	32.97	4.130**	31.94	4.158**	32.32
Level difference	.206**	3.83	.239**	4.47	.213**	3.90
Level difference ²	-.504**	-10.00	-.492**	-9.88	-.497**	-9.78
Position-to-Position Tie						
Prior Formal Tie						
Hierarchical relationship within the firm	1.458**	9.84	2.039**	12.54	1.462**	9.76
Affiliation match	1.067**	10.43	1.011**	9.88	1.047**	9.28
Interaction Effects						
Hierarchy(Yes)*Prior hierarchy						
Hierarchy(Yes)* Prior affiliation	-.704*	-2.20				
Position-to-Position Tie*Prior hierarchy			-2.075**	-7.38		
Position-to-Position Tie*Prior affiliation					-.140	-0.76
-2LogL (df)	22,452.14 (34)		22,379.22 (34)		22,459.0 (34)	
Pseudo R ²	.1570		.1597		.1567	

Significance levels: * < .05, ** < .001 (two-tailed test). Reference groups are in parentheses.