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Meso-Foundations of Interorganizational Relationships: How Team Power Structures Shape Partner Novelty

Trevor Young-Hyman,[a] Adam M. Kleinbaum[b]

[a] Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, Pennsylvania 15260; [b] Tuck School of Business, Dartmouth College, Hanover, New Hampshire 03755

Contact: trevoryh@katz.pitt.edu, https://orcid.org/0000-0003-2111-3189 (TY-H); adam.m.kleinbaum@tuck.dartmouth.edu, https://orcid.org/0000-0003-3654-2154 (AMK)

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Abstract. Novel external partnerships are valuable but risky, and scholars have examined the organization- and individual-level determinants of firms' decisions to pursue these new relationships. Yet, in organizations performing complex and knowledge-intensive work, decisions about interorganizational relationships are often made within teams. We characterize these decisions as a two-stage process in which a team member proposes a partner and other team members respond, supporting or challenging the proposal. As novel partnerships are risky, and power is a key determinant of risk-taking propensity, we argue that the power of team members—both those who initiate proposals and those who respond—will shape the likelihood that the team will pursue a novel external partnership. Using personnel data from project teams in an automated equipment design and build firm, we find that the effect of power on the likelihood of novel partner adoption depends on both the type of power and the role of the person in the decision process. Novel partner selection is more likely when those initiating proposals hold formal structural power but less likely when initiators hold informal power. Both the formal and informal power of the initiator's teammates attenuate the effect of initiator power, such that the more power one's teammates have, the less one's own power will affect the likelihood of novel external partner selection. Finally, we provide evidence that these effects on likelihood of novel partner adoption are as materially consequential for project outcomes as other strategic choices available to project teams. These findings have implications for the intraorganizational determinants of interorganizational networks.

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How do organizations make risky decisions, such as choosing among external partners? In the project-based organizations that have become increasingly commonplace (Sydow et al. 2004, Galbraith 2009, Levinthal and Workiewicz 2018), workers operate in interdependent groups where it is not isolated executives, but rather interdependent teams that make key decisions (Ancona and Bresman 2007). For example, in software design, teams often have the authority to develop new projects with external partners (Puranam and Håkonsson 2015). In banks engaged in small business financing, teams of lending agents deliberate about support for risky new clients (Canales 2014). And in some hospitals, cross-functional teams of doctors, technicians, and nurses make autonomous decisions about adoption of new technologies or procedures (Gittell et al. 2010).

To understand how team dynamics influence risky decisions in these settings, we focus on a key feature of project-based work teams: the degree of power held by different team members (Pfeffer 1981, Greer 2014). Project-based and knowledge-intensive organizations are commonly characterized by relatively wide distributions of formal and informal power, such that teams are likely to include varied combinations of more and less powerful members (Amabile et al. 2014). And although a long line of research in social psychology finds that power affects individuals' propensity to engage in risk-taking (Keltner et al. 2003, Magee and Galinsky 2008), scholars have only recently begun to explore the power structures of teams, focusing primarily on the relationship between hierarchy and team problem-solving (Bunderson et al. 2016, Greer et al. 2018). However, scholars have paid less attention to the varied sources of power in organizations or the way that power shapes dynamic decision-making processes within teams. Building on this foundation, we theorize how the composition of more and less powerful members within a team impacts its propensity to select novel external partners, partners

that can provide new sources of knowledge but may also introduce risk due to altercentric uncertainty (Podolny 2001) and the absence of established routines (Beckman et al. 2004, Baum et al. 2005, Sorenson and Rogan 2014).

Teams adopt a range of decision processes, even within a given project, from more efficient decentralized processes in which team members operate independently to more reflective, generative decision processes in which team members make decisions collectively (Crawford and LePine 2014). Combining these two modes, teams commonly adopt a sequential, two-stage process of generation and selection (Mueller and Cronin 2009) in decisions involving innovation and creativity (Campbell 1960, Simonton 1988). First, following logic of the division of labor, team members work individually to gather information, explore options, and propose a course of action in their own areas of specialization; and, second, the team as a whole discusses such a proposal, either supporting it or challenging it, until a collective decision is reached. With respect to external partner selection, over the course of a project, team members encounter varied issues where external components or support may be needed, sometimes leading them to propose collaboration with a novel external partner. In response, teammates must either support or challenge this proposal. The dialectical selection process is, fundamentally, a setting in which power dynamics are highly salient. In this paper, we consider the power of both the initiator and his or her teammates—who react to the initiator's proposal by either lending relational support (Mueller and Cronin 2009) or by challenging it—as determinants of the team's likelihood to develop novel interorganizational relationships.

Prior literature on the psychology of power (Keltner et al. 2003, Anderson and Galinsky 2006) suggests that power leads to risk-taking when the source of power is stable and uncontested, such as that rooted in formal authority. Therefore, we argue that, *ceteris paribus*, those high in formal power are more likely to initiate risky proposals to work with novel external partners than initiators who lack formal power. In contrast, power that can be revoked or lost due to underperformance, such as that rooted in the informal social structure, leads to risk-averse behaviors that avoid the risk of power loss (Keltner et al. 2003). For this reason, we argue that informally powerful initiators will, *ceteris paribus*, be less likely to encourage the adoption of risky, novel interorganizational ties, in comparison with initiators who have low informal power.

Turning to the second stage of the decision process, we argue that the power of the initiator's teammates matters as well, such that teammate formal and informal power both attenuate the effect of initiator power. Teammates in positions of formal power are more likely to demand (or preemptively receive) justifications for risky proposals in comparison with teammates who lack formal power, whereas teammates in positions of informal power are more likely to challenge risky proposals, given their own concerns about losing power, in comparison with teammates who lack informal power. Beyond direct pressure from teammates, initiators may anticipate such challenges from powerful teammates and, wanting to avoid these challenges, propose a less risky, more familiar choice instead. In light of this sequential team decision-making process, we theorize an interaction between the power of the initiator and that of his or her teammates: The more power teammates hold, whether formal or informal, the less the power of the initiator will impact the formation of novel supplier ties.

We find support for these arguments in a study of cross-functional project teams within a firm that designs and builds custom automated manufacturing systems. After briefly providing qualitative evidence from the field site to illustrate the two-stage, sequential decision structure, we use linked project-week-level payroll and purchasing data to test our hypotheses on the relationship between initiator power, teammates' power, and teams' supplier choices. Over the course of 243 projects over seven years, different combinations of workers operating in project teams made thousands of choices about suppliers—deciding between returning to familiar partners or forging new, more uncertain supplier ties. We measure team members' stable and legitimate formal power, defined by their position in the firm's partnership structure, and informal power, captured by their centrality in the network of past project collaborations. And we use the prior history of partner choices to identify instances in which a team selects a novel external partner within a given technology category. In addition to support for our hypotheses, we also find evidence consistent with the value of refreshing the interorganizational network—that all else being equal, projects with more novel ties perform better than those that rely on the "same old" set of suppliers. We close by discussing the implications of our results for the literature on teams, power, and interorganizational networks.

Interorganizational Tie Novelty and the Role of Teams

Organization scholars have long recognized that interorganizational relationships are a key resource in knowledge-intensive settings (Salancik and Pfeffer 1978, Burt 1983), and that the benefits to be derived from these relationships are, at least in part, a function of their novelty. On one hand, established interorganizational relationships benefit from greater trust, shared routines, and the potential for collaborative

problem-solving (Uzzi 1997, Beckman et al. 2004, Dyer and Hatch 2006). In highly uncertain situations, familiar external partners provide certainty and stability in the face of unanticipated change (Podolny 1994). Relationships with novel partners (i.e., those with whom the firm has not previously partnered) can benefit firms by providing access to sources of intellectual, financial, social, and human capital that were not previously available (Kogut 1988, March 1991, Powell et al. 1996, Tortoriello and Krackhardt 2010) and can help firms reduce dependence on any single partner (Salancik and Pfeffer 1978). At the same time, given the lack of information about and experience with novel partners, engagement with less familiar partners entails greater variance in potential outcomes (Gulati 1995, Beckman et al. 2004) and, therefore, significant risk (Baum et al. 2005). So although potentially beneficial, the pursuit of novel external relationships entails a greater degree of risk and uncertainty, given "the [greater] lack of information about partners' capabilities, reliability, and motives" (Baum et al. 2005, p. 536).

Most prior explanations of novel external partner selection have focused on environmental characteristics (Beckman et al. 2004); firm characteristics (Baum et al. 2005, Kim et al. 2006); and, recently, individual worker characteristics (Rogan and Mors 2014). However, beyond the macro- and microsocial determinants of interorganizational networks, scholars have paid little attention to the meso-level dynamics of teams. Indeed, interorganizational relationships are often developed and managed by teams, particularly in knowledge-intensive industries. Two areas of prior research suggest this is the case.

First, interorganizational ties are central to innovation and creative work (Aldrich and Herker 1977, Katz and Tushman 1979, Beckman et al. 2004), and firms doing this type of work commonly organize in project-based (Sydow et al. 2004), matrix (Burton et al. 2006), or multiauthority organizational structures (Levinthal and Workiewicz 2018). Frequent cross-functional interaction, collaborative decision-making, and more dispersed authority are thought to make these "new" organizational forms (Greenwood and Miller 2010) better suited for tasks that involve greater information sharing and high interdependence between individual tasks. In these settings, although executives may provide general frameworks for project-based tasks (Valentine and Edmondson 2015, Levinthal and Workiewicz 2018), the focal decision-making unit is the team (Child and McGrath 2001). Speaking directly to the subject of this paper, scholars have documented how the advancement of environmental complexity and uncertainty has pushed decisions about interorganizational relationships down to the level of the team (Yan and Louis 1999).

Second, a growing body of research finds that teams perform better when they leverage external relationships, often called "boundary-spanning behavior" (Tushman and Scanlon 1981, Marrone et al. 2007). Particularly in knowledge-intensive settings, "external boundary activity is a key predictor of team performance" because it allows for "coordination, knowledge transfer, and political maneuvering" (Ancona and Caldwell 2009, p. 295; for review, see Marrone 2010). Most of the research in this area has focused on explanations of team boundary spanning in general (Joshi et al. 2009) and on teams' relationships to other entities within the firm (Hansen 1999), but has given less attention to relationships outside of the focal firm or variation among those external relationships. In sum, though teams are likely to be involved in and have much to gain from decisions about selection of novel external partners, scholars have not explicitly examined this relationship.[1]

Novel Partner Selection and Intrateam Power Dynamics

Teams must balance efficiency and effectiveness in their decision processes and may adapt their decision process to the task at hand. Although efficiency may increase when team members operate autonomously and make decisions independently, coordination and creativity may increase when team members make decisions collaboratively. Alternatively, as in our setting, decisions may combine these two approaches. Team decisions about external partner selection, similar to many other innovative activities, often entail a two-stage process of generation and selection, where ideas are generated and then deliberated and evaluated by the broader group (Simonton 1988, Mueller and Cronin 2009; for an illustration in the case of external partner selection, see Canales 2014). Such an iterative multistage process is common in design fields in the form of the "design charrette" (Roggema 2014), where individual designers introduce ideas and proposals to be critiqued and selected by a broader group of designers. In a project-based setting, following a logic of the division of labor (Smith 1776, Lawrence and Lorsch 1967), different team members focus on different aspects of the project, applying specialized knowledge to determine customer needs and technological requirements, identify potential suppliers, research alternatives, and initiate specific proposals to the team. As such differentiated work is reintegrated, other team members may influence the initiator explicitly by supporting or challenging those ideas (Tetlock 2002), leading to their rejection or adoption. Alternatively, the initiator may anticipate the responses of other teammates and adjust his or her proposal accordingly (Mueller and Cronin 2009, p. 295).

To capture these two modes of participation in the partner-selection process, we distinguish the role of *initiator* from the rest of the team. Each individual within a team will serve, at various times, as an initiator of some proposals and as a teammate providing support or critique to others.

To date, however, theory provides little guidance about the characteristics that might shape behavior in these initiator and teammate roles. In this paper, we focus on power, a team member characteristic that is particularly relevant in knowledge-intensive settings, where complex, interdependent tasks require that individuals collaborate, challenge, and support one another (Bunderson and Reagans 2011, Pfeffer 2013). We define power as control over valued resources, capturing the degree to which actors hold resources that limit their dependence on others (Emerson 1962). Power may be particularly consequential to choices about interorganizational tie novelty for three reasons. First, novel external partners entail greater risk, and power shapes the propensity of individuals to engage in risky behavior (Anderson and Galinsky 2006). Second, power shapes the propensity of individuals to challenge others (Keltner et al. 2003, Schilke et al. 2015). Finally, an emergent body of literature has begun to explore how team power structures shape problem-solving, learning, and creativity (for review, see Greer 2014), emphasizing the costs and benefits of power dispersion, teammate power levels, and heterogeneity of power sources within teams. Although this recent literature encourages closer attention to power within teams, a more nuanced view requires that we consider how power shapes the varied task-specific roles that team members play in problem-solving processes.

In this paper, we attend to the varied sources of power within teams, as the effects of power in teams are likely to depend on the type of power in question. Power derives from a range of sources (French and Raven 1959) that may have varying consequences for the likelihood of novel partner selection. Past research in social psychology has highlighted how the effect of power on individual risk-seeking behavior is contingent on the legitimacy, or "taken-for-grantedness," of the power source (Lammers et al. 2008) and, conversely, the degree to which an individual may lose power subject to negative outcomes (Anderson and Galinsky 2006, Maner et al. 2007). These studies find that when power is relatively uncontested—meaning that it is legitimate and unlikely to be revoked in the face of failure—power leads to risk-taking. The opposite is true when power is contested or less stable (Greer et al. 2018). Considering how these types of power translate to an organizational setting, we distinguish between two key sources of power in organizations: power from formal structure and power from informal structure (French and Raven 1959, McEvily et al. 2014).

Of course, power dynamics may not be relevant to every choice: in situations where no current supplier offers a needed component, there is no choice but to seek a new supplier; conversely, for routine purchases, simply returning to an existing supplier might be an efficient and effective heuristic (Kahneman 2011). But for those situations in which a reasonable choice exists between novel and existing suppliers, we suggest that intrateam power dynamics will play a significant role in the team's decision-making.

Formal Power, Informal Power, and Novel Interorganizational Ties

Formal organization can be defined as the set of codified rules, processes, and procedures that control and coordinate resources and activities (Scott and Davis 2006). Job categories, managerial ranks, and formal titles are all examples of positions within the formal structure that provide different levels of power. In particular, formal structure allocates control over financial resources, policy decisions, and processes of worker evaluation (Thompson 1967). Formal power is backed by legitimate authority, meaning that it is more likely to be accepted as appropriate and a right of the holder (Weber 1947). Consequently, formal power is less contestable than other types of power and is more likely to be a basis on which powerful individuals challenge the proposals of others. Because formal power is bestowed through explicit processes, is backed by organizational leadership, and is highly visible, individuals with formal power are, at least in the short run, less likely to expect that a failure will lead others to challenge the power they hold. Indeed, various studies have found that individuals with legitimate power or power they do not fear losing are more likely to take risks (Anderson and Galinsky 2006, Lammers et al. 2008) and to behave in an uninhibited manner (Keltner et al. 2003) in comparison with holders of more fluid power.

As a result, when formally powerful individuals function as initiators, we anticipate that teams are more likely to select novel external partners for two distinct reasons, in comparison with situations in which the initiator lacks formal power. First, stable power increases willingness to take risks and behave in an uninhibited manner, increasing the likelihood that formally powerful initiators will propose novel solutions. Second, proposals with those with formal power are more likely to be accepted, generally speaking. The formal power of the initiator imbues these proposals with legitimacy, increasing the likelihood that they will be accepted by others. Additionally, others may hesitate to challenge the proposals of those

in positions of formal power for fear of negative repercussions. Although formal power could also legitimize and authorize proposals to maintain the status quo, because proposals necessarily precede acceptance and formally powerful initiators are more likely to propose novel external partners, the increased likelihood of acceptance simply reinforces the push toward novelty. Therefore, we anticipate the following hypothesis.

Hypothesis 1. *Teams are more likely to adopt novel partners when the initiator of a proposal has more formal power.*

Informal organization can be defined as "the emergent patterns of individual behavior and interaction among individuals, as well as the norms, values, and beliefs that underlie such behaviors and interactions" (McEvily et al. 2014, p. 300). Distinct from codified rules and regulations, patterns of interaction are shaped by a diverse set of factors from informal institutions, such as gender norms or racial stereotypes (Reagans 2005), to physical layouts (Allen 1977), which may facilitate some serendipitous interactions more or less than others (Kleinbaum et al. 2013). Put simply, if two individuals have interacted frequently in the past, it increases the familiarity with which they will interact in the future. This familiarity is a resource that can be leveraged to gain other resources. Therefore, control over this resource has been defined as informal power (Barnard 1938, French and Raven 1959, Blau 1964) and measured as a function of one's prior interactions in time-varying collaboration networks.

The key distinction from formal power, which is objectively possessed, is that informal power is subjective (Smith and Hofmann 2016) and is therefore more transient and more likely to be perceived as contestable. Because informal structure is defined by a diverse array of independent factors, from social norms to spatial proximity, the source of a person's informal power is not explicitly identified. Also, the emergent nature of informal power means that, in contrast to power from formal structure, it is not backed by explicit evaluation processes or codified through highly visible artifacts, such as organizational charts or email signatures. Because individuals with informal power are less certain about the source and visibility of their power, they experience uncertainty about the possibility that a failed decision may lead to a loss of power (Greer et al. 2018). Moreover, they may be unsure whether others will defer to them and less confident that their power will serve as an effective basis on which to challenge the proposals of others.

Theories of loss aversion tell us that individuals weigh potential losses more heavily than equivalent potential gains (Kahneman and Tversky 1979). Because informal power is relatively fluid and contestable, we expect that individuals with informal power will see exploratory behavior—such as sourcing a component from a novel supplier—as a risky decision that, if it fails, could result in the loss of power. Conversely, low-power individuals have less to lose, so they are unlikely to be equivalently risk averse; indeed, taking risks that pay off could lead to an increase in informal power for those who presently lack it. There is some evidence of this, as high-power individuals have been shown to take fewer risks than low-power individuals when the source of power is illegitimate (Lammers et al. 2008), unstable (Maner et al. 2007, Hays and Bendersky 2015), or contingent on the outcome of the decision (Anderson and Galinsky 2006). A recent meta-analysis by Greer et al. (2018) articulates precisely this dynamic, emphasizing mutability in power as a critical dimension of hierarchy.

In turn, when those with informal power make risky proposals, they are more likely to be challenged due to their lack of legitimate authority. Because informal power is less visible and is not backed by the organizational structure, it may be less apparent to others that a person with informal power has the influence or the license to diverge from the status quo. As a result, and in contrast to initiators high in formal power, we suggest the following.

Hypothesis 2. *Teams are* less *likely to adopt novel partners when the initiator of a proposal has more informal power.*

Due to the unfamiliarity and absence of prior information associated with a novel supplier, proposals to utilize novel suppliers are generally more likely to face challenge than proposals to use more familiar suppliers (Das and Teng 1998, Beckman et al. 2004). However, we anticipate that this tendency to challenge novel suppliers will be accelerated when teammates hold formal or informal power. Research finds that individuals face greater pressure to justify decisions when teammates have the legitimate authority to demand justifications (Tetlock 2002). When individuals with formal power make criticisms or demands for justification, others will perceive such demands to be legitimate and worthy of consideration (Ibid.). If the adoption of novel partners is more risky (Baum et al. 2005) and, therefore, requires greater justification than preservation of the status quo, greater demands for justification magnify the political costs of tie novelty. Literature on group decision-making also finds that groups are less likely to deviate from the status quo when a higher proportion of team members are formally authorized to participate, as more decision-makers increase the costs of reaching consensus (Sah and Stiglitz 1988).

High levels of informal power in teammates, even if not backed by formal authority, might give them a greater sense of subjective power (Smith and Hofmann 2016) and lead them to be more assertive in demanding

justification for risky projects. Moreover, because informal power is less stable, teammates may also be risk averse about the possibility of losing their power; if so, it would also lead them to challenge risky initiatives. Finally, a set of experimental studies using diverse decision situations found that powerless individuals are more likely to perceive their partners as trustworthy and place trust in their partners, and that this effect is mediated by a hope that placing trust will lead to valuable outcomes (Schilke et al. 2015).

For all these reasons, powerful teammates will be averse to risky supplier choices and will feel emboldened to challenge initiatives to contract with a new supplier. By contrast, routine proposals for repeat interaction with existing suppliers are less easily challenged and require less justification. Said differently, low-risk decisions—such as going back to a supplier whose skills match the needs of a given project and whose work has been of high quality in the past—are relatively uncontroversial, so team members are unlikely to have significant objections. Because teammates can only exert influence in response to an initiator's proposal, we do not expect that the power of teammates will exert an independent effect on the team's risk-taking behavior. But risky decisions are more likely to raise concerns and objections in the minds of team members. And when these team members are powerful, they will feel emboldened to articulate their objections or demand justification, reducing the likelihood that a proposal will be accepted. As a result, we argue that in the presence of powerful teammates, risky initiatives will be less likely to be accepted by the team. Thus, teammate power should moderate the effects of initiator power on partner novelty.

Hypothesis 3. *The positive effect of formal initiator power on novel partner adoption is attenuated (less positive) by the power (both formal and informal) of his or her teammates.*

Hypothesis 4. *The negative effect of informal initiator power on novel partner adoption is amplified (more negative) by the power (both formal and informal) of his or her teammates.*

Empirical Setting and Data

We examine partner selection by project teams at Northern Automation, a professional services firm that designs and builds custom automated manufacturing systems. Whereas our primary analysis relies on detailed, longitudinal, archival data from the firm, our understanding of the setting's appropriateness for our research question and conceptual model was informed by the first author's eight months of fieldwork at the company in 2015. A number of characteristics make this setting particularly appropriate for the purposes of our study, and in the following section, we draw on field notes and transcripts of audio recordings collected at the site to motivate our analysis.

At Northern Automation, project teams use a range of external partners for knowledge-intensive tasks, ranging from other engineering firms providing "design concepting" to machine shops that serve as "custom fabricators" for fixtures and high-tolerance components required for these complex systems. Beyond standardized component suppliers, it is common for suppliers to work with the project teams at Northern Automation to solve problems during the design phase or "follow up after the project's been installed at the customer's facility." At Northern Automation, team members saw both the benefits of familiar partners and the potential—but also the risks—of new partners. Team members recognized the "efficiencies" and "mutually beneficial relationship[s]" that resulted from long-standing partnerships (Uzzi 1997). At the same time, the firm was "continually looking" for new partners with the "latest equipment and processes," even though working with new partners was widely seen as more uncertain (March 1991, Beckman et al. 2004, Baum et al. 2005).

Project teams are composed of engineers, machinists, and electricians who focus on different parts of the systems they build and, as one machinist described, supplier selection: "we do the ordering ourselves for the stuff we're working on." Because "each project is really unique" and "the clock starts ticking" on projects, project teams are authorized to select their own suppliers in order to customize solutions and speed up completion time. At the same time, project teams meet at least weekly to discuss the status of their work on the project, to receive feedback, and to make collective decisions. In those meetings, teams commonly discuss, among other things, the external partners they are planning to use and exchange suggestions. During field work, the first author sat in and observed these meetings. Initiators described the sources of their information about a potential supplier, such as the "steel ruled dye cutting enthusiasts [online] forum" where one engineer had been spending time or the "trip out to this new paint shop" they had taken to gather information about a potential provider. Other team members made comments about whether a supplier "meets the needs of the job," expressing their familiarity with a given supplier and that they "knew the technical person at the distributor by name." Underscoring the importance of supplier decisions, after a particularly contentious discussion of a team member's proposal to utilize a particular provider, another engineer stated the following in the next day's meeting: "I couldn't sleep at night thinking about that supplier." In short, although the division of

labor leaves one team member to initiate the choice about which supplier to work with for any given purchase, the decision must ultimately be ratified by the team as a whole through a dialectical process of challenging or supporting a proposal. Thus, the structure of decision-making in our context corresponds closely with the two-stage process described in earlier research (Simonton 1988, Mueller and Cronin 2009). Within this setting, power dynamics among team members are highly salient, providing an excellent context to examine their role in initiating or responding to risky proposals and, consequently, to study the team's collective partner-selection behavior.

The setting is also ideal for our analysis because workers with varying degrees of formal and informal power move between project teams, both within projects and over the course of different projects.[2] As is common in many professional service industries (Greenwood and Empson 2003), a high proportion of the workers are partners in the firm, meaning that they are in stable positions of formal power (Maister 1993). Notably, workers in all occupational categories can become partners.[3] Moreover, workers necessarily begin their tenure at the firm as employees and only become partners at a later point, creating within-person variation in formal power over time. In addition, workers are continually allocated to different projects, leading them to interact with different subsets of coworkers. This pattern of interactions provides the foundation for an informal structure that empowers individuals to varying degrees. Because the firm has only approximately 50 employees and all work is completed by cross-functional teams of engineers, machinists, and electricians, there are no divisional separations that closely align the formal structure with the informal structure (Kleinbaum et al. 2013), enabling us to independently measure both (which is not to say they are completely unrelated; more on this in the Results section). Finally, the composition of teams changes over the course of each project, as workers move between projects, depending on the availability of workers and the demands of different projects. In the 10 years of data in the full data set, there is an average of five ongoing projects in each week of the data set, and sometimes as many as 15. As a result, we observe substantial variation in the formal and informal power of team members both across and within projects.

We measure interorganizational tie novelty by looking at project team decisions about external suppliers. Each automated manufacturing system is unique to the particular client and product line to be manufactured, requiring teams to utilize unique combinations of customized subcomponents, external technical consultants, and commercial distributors. For many commodified inputs, such as cable wire and screws, the company uses standardized distributors. However, for noncommodity materials, which account for approximately one-third of inputs into these systems and are distinguished in the purchase records, project teams have authority to select suppliers. Project teams make weekly decisions about sourcing robotics, conveyor systems, custom-fabricated enclosures, and other inputs. Because of the unique nature of each project and the need for responsiveness to customer demands, for this subset of inputs, project teams are free to choose the suppliers that best meet their needs. In sales meetings with potential clients, observed by the first author, the company advertised that they do not agree to single-source supplier contracts for noncommodity inputs, such that they can use whichever technologies and partners best fit the unique needs of each project. The company's longitudinal archival purchase order data allow us to link supplier choices to project teams during a given week and then look at whether the firm had worked with that supplier previously.

The raw data are drawn from Northern Automation's administrative archives, which track labor allocations on projects and supplier choices at the individual purchase level. The data set includes weekly records of 546 projects occurring over 10 years, with an average of 38 noncommodity purchase decisions per project. For each project week, the archival data set identifies which individuals worked on the project at that time and what company supplied each of the purchases made during that week. These purchase history data are linked to personnel data that indicate each team member's partnership status during each week and the number of hours worked on each project. The purchase data include information on the content of the purchase and the supplier used. Last, these data were joined with an additional data set providing detailed information on the financial performance of each project.

For a subset of 9,998 purchase decisions within 243 projects, we are also able to identify the individual who initiated the supplier choice and, by extension, identify the other team members in a given week. For the first seven of the 10 years in our sample, the firm maintained the practice of documenting which team member had initiated the order from a given supplier. In the archives, that individual is listed as the "orderer." At a later point, the firm shifted its practice to have a single purchasing agent always listed as the orderer. After identifying this nuance of the archival data, the first author confirmed with the firm that this interpretation of the "orderer" title as the initiator was accurate. Because the availability of this subset is a function of a change in corporate policy, it is systematically unrelated to purchase decisions, so sample selection bias is not a concern.

Interorganizational Supplier Novelty

Northern Automation keeps detailed records of supplier choices through their purchase order records, documented on a weekly basis and linked to a given project. We identify novel suppliers by capturing when a supplier is used for the first time within the focal technology category in the company's records. Because we theorize about the formation of new interorganizational ties, we operationalize our dependent variable using a binary indicator.

Formal Power

To measure formal power, we identify whether a team member is a partner in the firm. Northern Automation is a worker cooperative, so between 50% and 75% of the workers are partners who have ownership rights and sit on the board of directors in any given week. Partnership is, in a sense, the clearest manifestation of formal power, as a partner is the highest individual position in the formal hierarchy, his or her power is backed by law, and he or she is personally liable for the losses of the firm. At Northern Automation, each partner has an equal vote on the board of directors, receives a portion of profits, participates in firm-level oversight processes, and has unrestricted access to information on worker performance and supplier histories. For a partner to be fired, 90% of the partners would need to vote to remove that individual; empirically, there were zero instances of partners losing their partnership status in all of the years that we studied. Further, across all years of data we collected, no individuals left the firm once they became partners (some partners were approaching retirement but had not yet retired). Thus, our characterization of formal power as stable accords closely with the reality at Northern Automation.

To measure the formal power of the initiator, we identify the individual listed as the orderer on a given supplier choice and use a binary measure to capture whether that person is a partner in the firm. To calculate the formal power of the teammates, we identify the set of individuals who worked on the project during the week when the supplier choice occurred, excluding the initiator, and calculate the proportion of partners.

Informal Power

In an "organic" (Burns and Stalker 1961), project-based organization such as this one, the frequent mobility of people between projects means that relationships, individual reputations, and, consequently, power accrue not within the team but across the organization. To measure employees' work-based informal power across the firm, we extract time-varying collaboration networks from the raw labor allocation data. The notion that power can derive from one's relationships has a long history in organization theory, dating at least as far back as the French and Raven (1959) concept of referent power. In the ensuing decades, network theory has elaborated the idea of informal power as resident in one's collaboration network. We used the administrative records of weekly project assignments over the 10-year period to construct dyadic collaboration matrices for each week of observation. Significant prior research has used collaboration networks constructed from work allocation data to measure informal structure (Singh et al. 2010, Briscoe and Tsai 2011, Kneeland 2019). To move from short-term, contemporaneous project collaboration to more stable and enduring relationships (i.e., network ties), we assume (a) that a tie is formed when two people work on the same project in the same week for at least five hours each and (b) that a tie persists for a period of 40 weeks (the median project duration) after the last time the two people worked together. Although there is voluminous work on tie formation and some (albeit less) work on tie decay, we nevertheless have little theory to guide our choice of these assumptions a priori, so we performed significant sensitivity analyses. These analyses confirm that our results are quite robust to alternative assumptions for the number of collaborative work hours before a tie is formed and for the length of the tie decay lag. However, we do note some patterned changes in the results as we vary these measures and devote some attention to these variations in a section of the Discussion on this ex post theoretical extension.

Based on these assumptions, we constructed a sequence of moving-window, longitudinal networks corresponding to week 41 through the end of our observation period in week 691, where each network is based on dyadic project collaborations during the focal week and the preceding 40 weeks. No networks were constructed for the first 40 weeks of the observation period because those data are censored by our assumption that ties persist from a collaboration that occurred up to 40 weeks earlier. Finally, we calculated measures of each individual's informal power in each weekly network using the Bonacich (1987) beta measure of power centrality, as implemented in the igraph package (Csardi and Nepusz 2006) for the R statistical computing environment (R Core Team 2019). This eigenvector power centrality measure is calculated recursively, with each person's informal power a function of both whom the individual has worked with and the informal power of those contacts, and is the classic network measure of informal power in organization theory (see Ibarra and Andrews 1993 or, more recently, Friedkin et al. 2016). Intuitively, being well connected with well-connected others across the firm gives one good access to the firm's disparate knowledge resources and, as such, is a source of

informal power. We use the centrality of the initiator in a given week to measure the initiator's level of informal power and the average centrality of other team members to capture their informal power.

Consistent with our characterization of informal power as being less stable and more contestable than formal, we found that individuals' informal power waxes and wanes throughout the observation period, exhibiting some stability but also significant variation across time.

Controls

We also include a number of controls for characteristics that may impact the novelty of the selected supplier or the composition of the team. The first set of controls focuses on project and purchase characteristics. With respect to projects, we include a measure of the total project size, captured by the logged value of the total revenue earned on the project. Teams may be less inclined to take risks on more valuable projects, or conversely, larger projects may give teams more leeway to experiment with new external partners. We include the logged total dollar value of the purchase in question, as more expensive items may lead teams to rely on a more familiar supplier or may be less common, thus leading them to rely on a novel supplier.

With respect to purchase or supplier characteristics, we include a set of control variables for supplier categories. These 10 supplier categories, identified by the firm, capture variation in supplier types that may influence the importance of selecting a novel supplier. We also include a control for the novelty of the particular product or service purchased in that week. Using product descriptions in the purchase order documents, we count the number of times that the product or service selected in a given week has been used in previous weeks. This accounts for the possibility that, instead of taking a risk with a new supplier, teams instead take risks by selecting new products from a familiar supplier.

We also include a number of controls related to team member characteristics. We include measures for the tenure of the initiator and the tenure of the initiator's teammates, captured as the number of days that the individual has worked at the company. This is to account for the possibility that partnership is serving as a proxy for tenure. More tenured employees may be more socialized to using familiar suppliers, or their tenure might confer a certain status that makes them more willing to take risks. Acknowledging past work on team power structures and risk-taking (Bunderson and Boumgarden 2010, Bresman and Zellmer-Bruhn 2013), we include controls for the dispersion of formal and informal power among teammates during a given project week. It is important to include a dispersion measure because it may be correlated with the average level of power in a team, and past research suggests that it should shape risk-taking. To measure dispersion, we use the standard deviation, though we also found consistent results using a coefficient of variation.

We include a measure of the number of employees working on the project during a given week. Studies of creativity also suggest that team size increases coordination costs and, therefore, reduces creativity (for review, see Edmondson et al. 2007). We include a measure to capture the stage of the project when the relevant project week occurs, as different stages of a project may be both more likely to involve firm partners and more likely to demand novel suppliers. For this, we use the proportion of weeks completed on the project so far at the time of the purchase. Lower numbers indicate earlier stages of the project, whereas higher numbers indicate later stages.

Finally, we include some variables to capture temporal changes that might impact supplier selection. Prior literature argues that recent underperformance, particularly when unanticipated, can lead firms to experiment with or avoid novel external partners (Beckman et al. 2004, Baum et al. 2005). Although we do not have information on performance expectations, we do include a measure of recent firm performance. We calculate the prior three months of firm revenue and include that variable in our models. Second, we recognize that projects may hit unanticipated obstacles or complications that impact both the composition of the team and the types of suppliers that are used. An unanticipated complication might lead the company to assign more high-level workers to a project and drive them to use more or less novel suppliers. We seek to address this issue by including a measure of the change in the relative importance of the project compared with other ongoing projects. Therefore, we include a measure of the change in the proportion of total labor hours in a given week that are assigned to a particular project, compared with the prior week. With this variable, we seek to capture evidence that the project has taken on an urgency that might alter both team composition and supplier selection. All variables are listed and described in Table 1.

Model and Primary Estimation Methods—Multiple Interaction Fixed-Effects Logit with Multiclustered Standard Errors

We conduct the main analysis at the purchase level using the subset of data in which we are able to identify the initiator. Although our data do not allow us to empirically distinguish between proposal and acceptance phases of the decision process, we are able to model and test a process of interaction between initiators and teammates in the decision process. To capture this dynamic, where the power of teammates moderates the effect of initiator power on likelihood

Table 1. Variable Descriptions

Variable name	Variable description
New supplier (main analysis)	Binary variable capturing whether the supplier is being used for the first time. The base category (0) is a familiar (nonnovel) supplier.
Project stage	Proportion of weeks that have been completed on the project when the supplier is selected.
Purchase price (log)	Logged dollar value of the purchase from the supplier.
Team size	Number of employees working on the project in the given week.
Orderer tenure	Number of days from the orderer's company start date to the date of the current purchase.
Teammates' tenure	Average number of days from each teammate's start date to the date of the current purchase.
Part novelty	Proportion of prior purchases, within a supplier category, that have involved the particular technology being selected in the current purchase.
Change in project importance	Change from previous week in proportion of total hours that are allocated to project in which purchase is made.
Total project revenue (log)	Logged total revenue earned on project in dollars.
Firm past three months' revenue	Total revenue earned by firm in past three months in dollars.
Teammates' formal power dispersion	Standard deviation of partnership (0, nonpartner; 1, partner) status among the initiator's teammates.
Teammates' informal power dispersion	Standard deviation of Bonacich centrality among the initiator's teammates (five-hour threshold, 40-week tie decay lag).
Teammates' informal power	Average of Bonacich centrality among the initiator's teammates (five-hour threshold, 40-week tie decay lag).
Teammates' formal power	Average of partnership (0, nonpartner; 1, partner) status among the initiator's teammates.
Initiator informal power	Bonacich centrality of purchase orderer (five-hour threshold, 40-week tie decay lag).
Initiator formal power	Partnership status (0, nonpartner; 1, partner) of purchase orderer.

of novel supplier adoption, we introduce a series of interactions between initiator power and teammate power. We construct these interactions for all combinations of initiator and teammate formal and informal power. In our analysis, we introduce them incrementally and include them all together in the full model, assuming that the effects of formal and informal power operate simultaneously. Because the dependent variable is binary, either zero or one, we use a logit estimator. To estimate the effect of power dynamics on supplier selection, the challenge is to exclude unobservable sources of variation that would impact both the power of team members and the novelty of the suppliers they choose. We seek to address these concerns by including a number of fixed effects in the models.

Because workers bring unique skills, personalities, and backgrounds that may influence their assignment to teams or their willingness to experiment with a new supplier, but they are involved in multiple projects over time, we include person fixed effects. We also include quarter-year fixed effects, which account for the unobserved changes occurring at the organizational level, such as unanticipated underperformance, that might impact both team composition and supplier selection. We also use the clus_nway multiway clustering algorithm for Stata (Cameron et al. 2011, Kleinbaum et al. 2013) to cluster standard errors by project and by quarter. Together, clustering and fixed effects ensure that it is not residual project- or quarter-level variance, but variance in the covariates of interest, that drives our estimates. We also conduct a series of tests with alternative models and variable specifications, which are reported in a subsequent section.

Results

Table 2 provides descriptive statistics and pairwise correlations of the key variables for the purchase-level data set.[4] Most importantly, we observe that novel suppliers are selected in 2% of purchase decisions, which amounts to approximately 200 instances of a novel supplier. Given the rarity of this event, we check the robustness of our results here with a series of penalized maximum likelihood estimators, which are better suited for dealing with rare event data, though they compromise our ability to use multiple fixed effects and multiclustered standard errors. Additionally, we note that formal and informal initiator power are positively correlated ($r = 0.37$), suggesting that informally powerful employees are more likely to be partners and, conversely, that partners tend to have more informal power than nonpartners. We note, however, that average teammate formal and informal power are uncorrelated ($r = -0.01$, $p = 0.47$) in the purchase-level data set. To explore this issue more fully, we reorganized the data set to the person-week level, where each week of each employee's tenure at the company is treated as a unique observation, regardless of whether any purchases were made. Then, at this level of analysis, we conducted a t test of the difference in informal power between partners and nonpartners. We find no difference in mean informal power between partners and nonpartners ($d = 0.001$, $t = 0.109$, $p = 0.913$). To look beyond mere central tendency, we performed a two-sample Kolmogorov-Smirnov test to examine whether the distribution of informal power is the same among partners as among nonpartners and found that the distributions of these samples differ slightly ($D = 0.0651$, $p < 0.001$).

Table 2. Descriptive Statistics and Pairwise Correlations

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Novel supplier selection	0.02	0.15	0	1	1.00															
2 Project stage	0.41	0.22	0.02	1.00	−0.09	1.00														
3 Purchase price (log)	3.55	1.95	−3.00	11.84	0.21	−0.16	1.00													
4 Team size (# employees)	10.22	5.18	1	25	−0.09	−0.05	−0.09	1.00												
5 Orderer tenure (# days)	127.98	93.98	1	330	0.07	−0.01	0.30	0.08	1.00											
6 Teammates' tenure (average)	141.45	71.09	4.00	339.33	0.09	0.04	0.09	0.06	0.65	1.00										
7 Part novelty	2.48	1.88	1.00	37.67	−0.07	−0.15	0.10	−0.03	0.25	0.23	1.00									
8 Change in project importance	0.01	0.10	−0.73	0.47	−0.04	−0.11	0.02	0.17	0.01	−0.02	0.04	1.00								
9 Total project revenue (log)	13.15	1.45	5.78	15.03	0.03	−0.13	0.09	0.48	0.09	0.04	0.00	0.06	1.00							
10 Firm past three months' performance (log)	14.04	1.11	10.61	16.14	0.01	−0.02	0.08	−0.05	0.11	0.14	0.09	0.07	0.04	1.00						
11 Teammate formal power dispersion	0.44	0.14	0.00	0.71	−0.08	0.04	−0.08	0.46	0.04	0.02	−0.03	0.10	0.27	−0.06	1.00					
12 Teammate informal power dispersion	0.18	0.11	0.00	0.96	−0.02	−0.19	0.10	0.11	0.02	−0.04	0.04	0.02	0.11	−0.04	0.20	1.00				
13 Teammate informal power (average)	1.60	0.13	0.40	1.95	−0.14	0.13	−0.22	0.18	−0.07	−0.03	−0.10	0.02	0.01	−0.18	0.21	−0.43	1.00			
14 Teammate formal power (average)	0.54	0.20	0.00	1.00	0.07	−0.08	0.13	−0.06	0.13	0.19	0.01	−0.03	0.02	−0.11	−0.20	−0.11	−0.01	1.00		
15 Initiator informal power	1.42	0.44	0.00	1.93	−0.02	0.00	0.17	−0.04	0.40	0.18	0.06	0.01	−0.02	−0.08	−0.01	−0.09	0.14	0.13	1.00	
16 Initiator formal power	0.61	0.49	0	1	−0.01	−0.02	0.22	−0.02	0.42	−0.06	0.10	0.06	0.02	−0.10	0.01	−0.03	0.11	0.12	0.37	1.00

Notes. All pairwise correlations with absolute value above 0.0226 are statistically significant at $p < 0.05$. SD, standard deviation.

These results suggest that, although there is not a systematic correlation between formal and informal power that may bias our results, formal and informal power are not wholly unrelated, as might be expected. We return to this issue in the discussion.

Table 3 reports the results of our primary analyses. Column 1 reports the main effects of initiator and teammate power prior to the addition of interaction terms. Although we see coefficient signs that are consistent with expectations, we find a statistically nonsignificant positive main effect of initiator formal power ($\beta = 0.81$, $p = 0.30$) and a marginally significant negative main effect of initiator informal power ($\beta = -1.63$, $p < 0.10$). Generally, the weakness of these main effects, and the strength of the subsequent models with interacted variables, highlights how the decision-making process in these teams is better specified as an interactive, multistakeholder process.

When we do include interaction variables, a more complete picture emerges. We hypothesize that formal teammate power and informal teammate power will attenuate the positive effects of formal initiator power (Hypothesis 3) and amplify the negative effects of informal initiator power (Hypothesis 4) on the likelihood of selecting novel suppliers. In Models 2–5, we add each interaction term severally to our baseline model. Model 6 contains the fully interacted specification. Reporting results from Model 6, we find main effects of initiator power that are consistent with Hypothesis 1 ($\beta = 25.82$, $p < 0.01$) and Hypothesis 2 ($\beta = -50.05$, $p < 0.01$). Turning to the interactions, we find a highly significant negative moderating effect of teammate formal power on initiator formal power ($\beta = -7.70$, $p < 0.001$), a highly significant negative moderating effect of teammate informal power on initiator formal power ($\beta = -12.86$, $p < 0.01$), and a highly significant positive moderating effect of teammate informal power on initiator informal power ($\beta = 29.01$, $p < 0.01$). We find no statistically significant moderating effect of teammate formal power on initiator informal power ($\beta = 4.18$, $p = 0.40$).

Coefficient values and p-values, however, offer limited insight on the interpretation of interaction effects in logit models because they may be artifacts of the nonlinear link functions being used (Simonsohn 2017, Mize 2019). To confirm and effectively interpret these effects, scholars have suggested calculating average marginal effects for the variables of interest (Ai and Norton 2003) and plotting these marginal effects at different levels of each variable of interest (Ai and Norton 2003, Greene 2010). We take both of these steps for each interaction with a statistically significant coefficient.

First, holding other variables at their mean values, we calculated average marginal effects of changes in teammate formal power on high- and low-formal-power initiators.

Table 3. Main Analysis Results of Relationship Between Team Member Power and Novel Supplier Selection

	1 New supplier	2 New supplier	3 New supplier	4 New supplier	5 New supplier	6 New supplier
Initiator formal power	0.81	4.28*	8.27	0.80	0.82	25.82**
	(0.85)	(1.79)	(7.49)	(0.83)	(0.85)	(8.55)
Initiator informal power	–1.63^{+}	–1.91*	–1.70^{+}	–1.06	–35.14*	–50.05**
	(0.93)	(0.95)	(0.94)	(1.85)	(15.30)	(16.53)
Teammates' formal power	–2.50	1.14	–2.30	–0.72	–2.11	–3.51
	(1.79)	(2.02)	(1.69)	(4.79)	(2.06)	(5.33)
Teammates' informal power	–2.36^{+}	–2.15^{+}	–0.39	–2.48	–34.08*	–41.70**
	(1.37)	(1.12)	(2.18)	(1.52)	(14.95)	(15.19)
Initiator formal power × teammates' formal power		–6.24*				–7.70***
		(2.42)				(2.22)
Initiator formal power × teammates' informal power			–4.70			–12.86**
			(4.68)			(4.97)
Initiator informal power × teammates' formal power				–1.26		4.18
				(3.54)		(3.71)
Initiator informal power × teammates' informal power					20.97*	29.01**
					(10.17)	(9.94)
Supplier group Fixed Effects	Y	Y	Y	Y	Y	Y
Employee Fixed Effects	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
N	6,749	6,749	6,749	6,749	6,749	6,749
Log likelihood	–301.0	–293.4	–297.2	–300.8	–291.9	–269.0

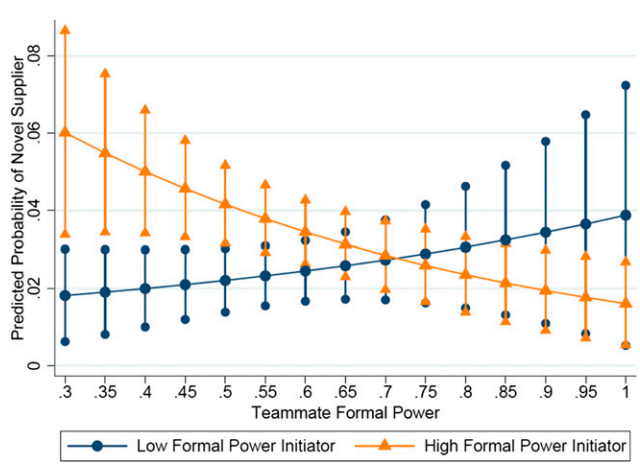
Notes. Standard errors are in parentheses. All models use logit estimation technique; all models cluster standard errors by project and quarter year; all models control for project stage, purchase price, team size, orderer tenure, teammates' tenure, part novelty, change in project importance, total project revenue, teammates' formal power dispersion, and teammates' informal power dispersion.

$^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

We find that increases in teammate power negatively moderate the influence of formally powerful initiators ($\beta = -0.01$, $p < 0.01$) but not of initiators with low formal power ($\beta = 0.001$, $p < 0.43$), and that this difference is statistically significant ($\beta = -0.01$, $p < 0.01$). The effect becomes clearer when we plot the predicted likelihood of novel supplier selection for high- and low-power initiators at 5% increments between 30% and 100% teammate formal power.[5]

As Figure 1 illustrates, the nonsignificant main effect of initiator formal power is likely explained by the fact that its effect depends on the power of teammates. When teammate formal power is low, high-formal-power initiators are more likely to propose novel suppliers and face little resistance from teammates who are low in formal power. Compared with a baseline rate of novel suppliers being selected in 2% of instances, decisions involving an initiator with formal power and teammates without lead to a 6% likelihood of novel supplier selection, an approximately threefold increase. Conversely, initiators with low formal power are unlikely to propose novel suppliers, and their risk aversion is accepted by teammates who are low in formal power. As the formal power of teammates increases, they constrain the risk-taking of the formally powerful initiator, as evidenced by the statistically significant negative moderating effect. However, given that novel supplier selection is a rare event, occurring in approximately 2% of instances on average, an increase in teammate formal power places no downward pressure on the low-formal-power initiator, who is already unlikely to propose a novel supplier. Therefore, as evidenced by the earlier average marginal effect calculation, we observe a statistically nonsignificant change in the effect of low-formal-power initiators.

Figure 1. (Color online) Predicted Probability of Novel Supplier Selection with Changes in Formal Initiator and Formal Teammate Power



Next, we calculated and plotted the marginal effects of teammate informal power on high- and low-formal-power initiators to explore the statistically significant interaction effect we found in the main analysis. These calculations clarify that the statistically significant interaction between formal initiator power and informal teammate power only captures an effect of informal teammate power in instances where the initiator has high formal power. Increases in teammate informal power have a statistically significant average negative moderating effect on the influence of formally powerful initiators ($\beta = -0.01$, $p < 0.001$) but a nonsignificant average effect on the influence of low-power initiators ($\beta = 0.001$, $p < 0.26$); the difference between these two trends is statistically significant ($\beta = -0.01$, $p < 0.001$). When we plot the predicted values from these marginal effects, we plot smaller increments of changes in teammate informal power because the values cluster within a smaller band, between 1.45 and 1.75. As illustrated in Figure 2, a situation with a high-formal-power initiator and teammates with low informal power leads to an average rate of novel supplier selection around 8%, which is nearly four times the baseline. However, increases in informal power place downward pressure on the likelihood of novel supplier selection. However, when the initiator has low informal power, there is no statistically significant change in the likelihood of novel supplier selection as teammate informal power increases.

Finally, we calculated and plotted the marginal effects of interactions between teammate informal power and high and low initiator informal power. These results clearly illustrate the distinction between initiators with formal and informal power. Increases in teammate informal power have a statistically significant average negative moderating effect on influence of initiators with low informal power ($\beta = -0.18$, $p < 0.001$) but a nonsignificant average effect on the influence of high-informal-power initiators ($\beta = 0.01$, $p = 0.69$), and the difference between these two trends is statistically significant ($\beta = 0.19$, $p < 0.001$). When we plot the predicted values from these marginal effects, because values of informal teammate power have a narrow range, we report increments of 0.025 between 1.5 and 1.75, one standard deviation above and below the mean. We use a value of one standard deviation below and above the mean to capture low and high initiator power, respectively. Figure 3 shows a similar pattern of results, where the line that is higher at lower levels of teammate power converges with the lower line. However, in this case, the higher line is the low-informal-power initiator. When an initiator has low formal power and the teammates also have low formal power, on average they will select a novel supplier in nearly 7% of instances, over three times more than the baseline rate. When the initiator has high informal power, there is no statistically significant change in the likelihood of novel supplier selection as teammate informal power increases.[6] In all, we find strong support for Hypotheses 1–3 and partial support for Hypothesis 4.

Robustness Tests

Given the combination of a binary rare event outcome, the longitudinal and heterogeneous nature of our data, and the presence of interactions, statistical estimation of our model presents a range of difficulties. The logit function with fixed effects and multiple clustered standard errors simultaneously addresses the most significant challenges with our data, so we use it in our main analysis; however, some of these features of the data present particular challenges where an alternative specification or model might be more reliable.

Figure 2. (Color online) Predicted Probability of Novel Supplier Selection with Changes in Formal Initiator and Informal Teammate Power

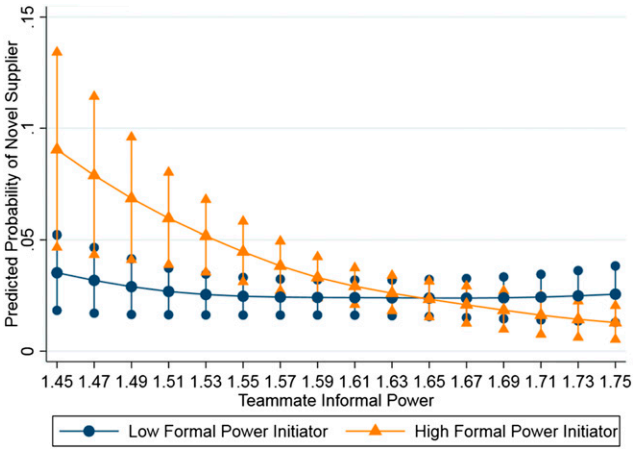
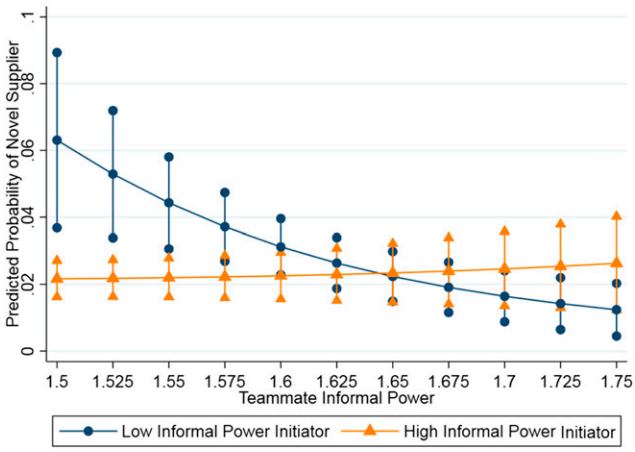


Figure 3. (Color online) Predicted Probability of Novel Supplier Selection with Changes in Informal Initiator and Informal Teammate Power



As a result, to confirm the robustness of our results, we reran Model 6 using a series of alternative specifications. The results are presented in Table 4.

First, as mentioned earlier, the signs of estimates in logit models may not correspond to their actual effect on the dependent variable, and some have proposed to confirm its robustness by estimating linear probability models (Ai and Norton 2003). We did this, and as shown in Model 1 of Table 4, the results remain consistent. Given that logit and probit models are often used interchangeably, in Model 2, we reran our main analysis with a probit model and found consistent results. Some scholars have recently found that, with rare events data, a logit model with conditional fixed effects yielded more conservative estimates and smaller confidence intervals than unconditional fixed effects (Cook et al. 2018). However, unlike unconditional fixed effects, conditional fixed effects do not allow us to cluster standard errors on multiple, nonnested variables. In Model 3, we reran our main analysis using a conditional logit estimator, only clustering standard errors on quarter years, because projects were nonnested. The pattern of results remained consistent.

Finally, when fixed effects are combined with rare events data, penalized maximum likelihood estimators are thought to be attractive (King and Zeng 2001) because they avoid the "separation" problem, common to conventional logit functions, where observations whose dependent variable values do not vary within a fixed-effect unit are excluded from the model. Given the rarity of our outcome, the separation problem leads to exclusion of over 1,000 observations, and these excluded observations may bias our results. Therefore, we ran two models with penalized maximum likelihood estimators, which do not exclude observations: a rare events logit in Model 4 and a Firth logit in Model 5. At the same time, the cost of solving the separation problem is that these models are unable to solve other problems: the Firth logit cannot include clustered standard errors, and maximum likelihood estimation of neither model converged when we included multiple fixed effects. As a result, we present results with only supplier group

Table 4. Alternative Specifications of Main Analysis

	1 OLS New supplier	2 Probit New supplier	3 C-logit New supplier	4 RE logit New supplier	5 Firth logit New supplier
Initiator formal power	0.50*	10.70**	25.22**	14.10***	11.80***
	(0.24)	(3.37)	(8.20)	(3.78)	(3.42)
Initiator informal power	–0.82*	–23.50***	–48.78**	–18.95**	–15.32**
	(0.32)	(6.12)	(15.88)	(7.01)	(5.11)
Teammates' formal power	–0.02	–2.71	–3.19	–2.31	–2.48
	(0.06)	(2.67)	(5.04)	(2.53)	(2.33)
Teammates' informal power	–0.75**	–19.71***	–40.72**	–13.93*	–11.40*
	(0.27)	(5.65)	(14.39)	(7.09)	(4.74)
Initiator formal power × teammates' formal power	–0.09^{+}	–3.26***	–7.51***	–4.72*	–4.39^{+}
	(0.05)	(0.91)	(2.00)	(1.94)	(2.36)
Initiator formal power × teammates' informal power	–0.27^{+}	–5.29**	–12.56**	–6.67**	–5.15*
	(0.14)	(1.99)	(4.76)	(2.36)	(2.39)
Initiator informal power × teammates' formal power	0.05	2.45	3.94	3.48	3.24
	(0.05)	(1.70)	(3.65)	(2.40)	(2.26)
Initiator informal power × teammates' informal power	0.48*	13.53***	28.32**	9.97^{+}	7.71*
	(0.20)	(3.75)	(9.69)	(5.09)	(3.50)
Supplier group Fixed Effects	Y	Y	Y	Y	Y
Employee Fixed Effects	Y	Y	Y	N	N
Quarter Fixed Effects	Y	Y	Y	N	N
Standard errors clustered by project	Y	Y	N	Y	N
Standard errors clustered by quarter	Y	Y	Y	Y	N
N	8,399	6,749	7,340	8,415	8,415
Log likelihood		–276.7	–234.5		–495.88
R^2 (pseudo)	0.301	0.699	0.705		

Notes. Standard errors are in parentheses. All models control for project stage, purchase price, team size, orderer tenure, teammates' tenure, part novelty, change in project importance, total project revenue, firm past three months' revenue (excluded when quarter Fixed Effects are included), teammates' formal power dispersion, and teammates' informal power dispersion.

$^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

fixed effects. These results, too, are consistent with our earlier analysis.

Supplementary Mechanism Analysis

Underlying our model is an argument that formally powerful initiators are risk-seeking, whereas formally powerful teammates will tend to discourage risk-taking. To explore this mechanism, we reran the models with measures of supplier novelty that capture incrementally lower levels of risk. Our primary measure identified a supplier as novel only for the first interaction; we constructed alternative measures that identify novelty as a first or second interaction, and then a first, second, or third interaction. The intuition is that, after each collaboration with a supplier, the organization learns more about that supplier and the degree of risk declines. In turn, if the effect of initiator power and its moderation by his or her teammates' power is driven by risk perceptions, we should see weaker effects of those team characteristics as the degree of risk declines. At the same time, we should not see reductions in effect size or predictive power for variables whose effect on supplier novelty is unrelated to risk.

In Table 5, we re-estimated the main interaction model from Model 6 in Table 2 including the full complement of controls and fixed effects for a quarter year. In the first column, we reproduced the results from Model 6 to facilitate comparison. In Model 6-A, we reran the analysis with a dependent variable that treats a supplier as novel when selected for the first or second time. In Model 6-B, we reran the analysis with a dependent variable that treats a supplier as novel for the first, second, or third interaction. In this table, we also present the coefficients for several control variables to serve as points of comparison with the changing effects of our variables of interest.[7] Even though the sample size increases as we relax the stringency of our novelty definition and we lose fewer observations due to lack of variance within fixed-effect units, the coefficients of our variables of interest become smaller and nonsignificant. Team size is another variable that shapes supplier novelty through the mechanism of risk aversion. Larger teams reduce

Table 5. Main Model with Incrementally Fewer Risky Supplier Choices

	6 Primary results (first interaction)	6-A New supplier (first two interactions)	6-B New supplier (first three interactions)
Initiator formal power	25.82**	11.86*	6.56
	(8.55)	(5.53)	(4.75)
Initiator informal power	–50.05**	–18.32**	–9.07
	(16.53)	(6.17)	(6.16)
Teammate formal power	–3.51	4.41	1.79
	(5.33)	(3.58)	(2.52)
Teammate informal power	–41.70**	–15.28**	–8.04
	(15.19)	(5.51)	(5.86)
Initiator formal power × teammates' formal power	–7.70***	–4.43*	–2.38^{+}
	(2.22)	(1.99)	(1.43)
Initiator formal power × teammates' informal power	–12.86**	–5.67^{+}	–3.28
	(4.97)	(3.22)	(3.09)
Initiator informal power × teammates' formal power	4.18	–1.83	–0.17
	(3.71)	(1.95)	(1.50)
Initiator informal power × teammates' informal power	29.01**	11.02**	4.98
	(10.21)	(4.04)	(4.09)
Team size	–3.37^{+}	–2.85*	–2.12*
	(1.91)	(1.44)	(1.00)
Purchase price (ln)	0.49***	0.50***	0.44***
	(0.13)	(0.11)	(0.09)
Supplier Fixed Effects	Y	Y	Y
Employee Fixed Effects	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y
N	6,749	6,673	7,417
Log likelihood	–269.0	–396.6	–554.9

Notes. Standard errors are in parentheses. All models use logit estimation technique; all models cluster standard errors by project and quarter year; all models control for project stage, purchase price, team size, orderer tenure, teammates' tenure, part novelty, change in project importance, total project revenue, teammates' formal power dispersion, and teammates' informal power dispersion.

$^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

the likelihood of novel supplier selection because they require more conflict resolution and coordination around a risky decision. When we look at less risky choices, we see that the negative effect of team size becomes weaker, though the statistical precision remains relatively consistent. Conversely, purchase price is positively associated with supplier novelty through mechanisms unrelated to risk aversion. Suppliers may offer lower prices to more established customers, or teams may select novel suppliers for unique inputs that are likely to be more costly. In either case, the mechanism is not risk aversion, and we see both significance levels and coefficient sizes remaining stable even as the stringency of our novelty variable declines. These analyses provide suggestive evidence consistent with our argument that the power effects we observe may be driven by an unobservable mechanism of preference for risk.

Post Hoc Analyses: Can Informal Power Behave More Formally?

Our models were quite robust to small changes in the assumptions about how to construct the network used to calculate informal power,[8] but we were intrigued to find that bigger changes in these assumptions yielded results that differed in interesting ways. Although we did not hypothesize any such differences, we report these ex post empirical extensions in hopes of informing future theory development. To remind the reader, informal power was measured in the standard way using Bonacich power centrality, calculated on a collaboration network that was constructed from labor allocation data, and based on two key assumptions: that a meaningful working relationship was formed when two people worked on the same project in the same week for at least five hours each, and that such ties would persist for 40 weeks (the median project duration) after the last time two people worked together.

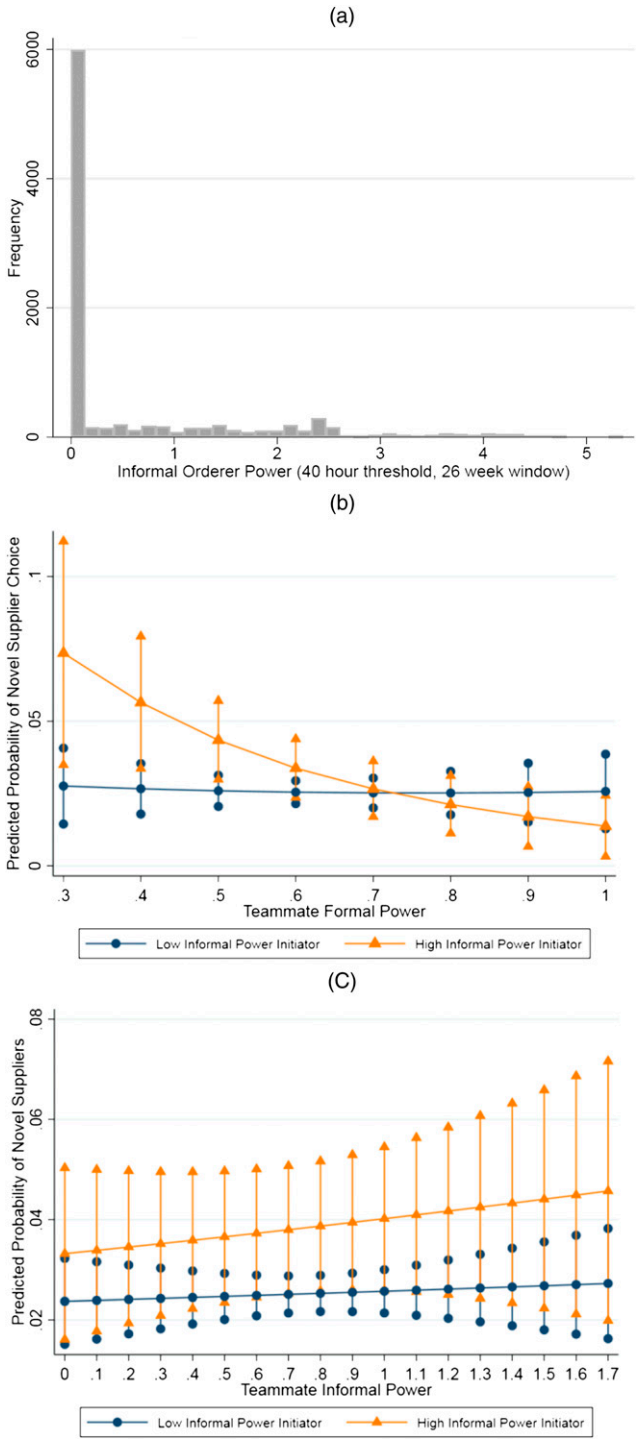
When we recalculate Bonacich centrality with lower tie formation thresholds and longer tie decay lags and then re-estimate our models, we find that both the effect size of informal initiator power and the size of the moderating effect of informal teammate power increase. In reflecting, ex post, on how we might substantively interpret these two parameters, we believe that both inform the degree to which we measure the average strength of ties in the network. On the margin, the ties formed when people work together on a project for five hours in a week are likely to be weaker than those formed by working a larger number of hours together in that week. Similarly, an assumption that ties persist for a full 40 weeks after the last time two people worked together, generally speaking, is likely to capture more weak ties than a tie decay lag that only counts ties between people who have worked together more recently. The relatively weak tie network that results from a smaller tie-formation threshold and a longer tie decay lag is likely to be a network that involves less trust (Krackhardt 1992)—and therefore, a network in which a central position implies less confidence about one's ability to preserve the influence that results from that centrality. In turn, it is this lack of security—this perceived instability—that leads to risk aversion among high-informal-power initiators and teammates, which we hypothesize and our results support. That is, in networks that include more weak ties, our theory holds more strongly.

To examine the extreme case of networks of very strong ties, we defined the collaboration network to only include people who worked together full time (more than 40 hours each on the same project during the same week) and quite recently (during the preceding half year). Using these parameters to measure informal power, the very narrow definition of a network tie leaves most people with few ties (the average person has just 3.8 collaborators) and informal power near zero (see the histogram in Figure 4(a)). Although we lose substantial statistical precision due to this lack of variance, we find that the main effect of the initiator's informal power and its moderation by teammates' informal power both reverse. In contrast to our earlier results, purchases initiated by informally powerful people are *more* likely to come from novel suppliers (Figure 4, (b) and (c)). Also in contrast to our prior results, teammates with higher informal power may *increase* the likelihood of novel supplier selection (though this result is imprecisely estimated with $p > 0.10$). This pattern of results suggests the intriguing possibility that in networks of very strong ties, the dominant logic of informal power is not one of loss aversion, as theorized earlier, but one of influence, in which central people feel confident that they can mobilize the support of their close collaborators. Thus, with very strong ties, informal power begins to look more like formal power in its effect on risk-taking behavior. Additionally, though the support here is less clear, teammates with informal power also begin to support more risk-taking, in contrast to teammates with formal power. To be clear, we did not hypothesize these results and we cannot claim to have demonstrated them definitively, but we report these exploratory post hoc analyses here in hopes that future research will further analyze the possibility that informal power in a network of strong ties begins to look like formal power.

Material Consequences of Novel External Partner Selection

Finally, we conducted a supplementary analysis to examine the material consequences of new supplier selection and to better understand the importance of the outcome we document. The use of novel suppliers could help workers solve problems more efficiently

Figure 4. (Color online) Exploratory Analysis of the "Strong Ties Network"



Notes. (a) Histogram of initiator informal power; (b) predicted probability of novel supplier selection with changes in informal initiator and formal teammate power; (c) predicted probability of novel supplier with changes in informal initiator and informal teammate power.

by providing them new sources of advice and technical assistance, but it could also lead to less efficient work due to a lack of established routines and trust with the external parties. Therefore, we examined how the utilization of a novel supplier impacts labor productivity and compared its effect with other recognized determinants of labor productivity, such as customer novelty and project complexity.

One empirical challenge in this endeavor is that labor productivity is measured at the project level, whereas supplier novelty was analyzed at the purchase level in the earlier analysis. Because a novel supplier is only used in 2% of purchases, and each project involves dozens of purchases, an aggregate measure such as the proportion of project purchases that use a novel supplier would generate very small values that are limited in range. Instead, we use a binary measure that is coded as one if the project uses any completely novel suppliers and zero if the project does not use any completely novel suppliers. Approximately 40% of projects use at least one completely novel supplier.

We include a range of controls that could also shape labor productivity, allowing us to compare the effect size of supplier novelty with other determinants of performance. We include a measure of the percentage of total labor hours that are conducted by engineers. The two main occupational groups on projects are engineers and assemblers, and we expect that the occupational composition of the team will shape labor productivity. We also include the percentage of electrical engineering hours on the project, as this is commonly used as a measure of the technological complexity of a project (Turner et al. 2002). We include a calculation of the average number of previous projects in which any technology on the project has been used, drawing on the technology inventories collected by the firm. We controlled for the size of the project, calculated as the total number of labor hours, as larger projects may be more profitable. We also include a price-weighted measure of customer novelty, calculated as the proportion of all past revenue that has come from the customer on the current project, as teams may work more efficiently with more familiar customers or receive better contract terms. As workers' varying skillsets, differing customer demands, and temporally specific market characteristics could all impact labor productivity, we include customer, employee, and year fixed effects. We use year instead of more fine-grained temporal fixed effects because projects are an average of six months in duration. We cluster standard errors by customer but not by employee, as employees do not provide mutually exclusive categories, or year, because the number of years is smaller than the advised minimum number of clusters (Angrist and Pischke 2009).

We include the full results in Table 6. In sum, we find that using a novel supplier improves labor productivity ($\beta = 0.132$, $p < 0.05$). This suggests that the effects of selecting novel suppliers are materially consequential.

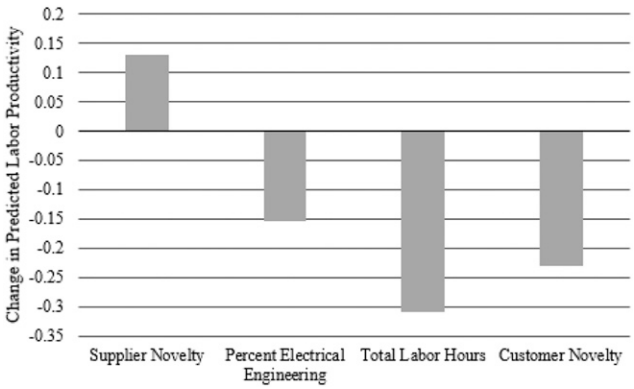
Table 6. Effect of Novel Supplier Selection on Project Performance

Dependent variable	Labor productivity (log)	Labor productivity (log)
Number of purchases	0.001***	0.001***
	(0.00)	(0.00)
Percentage of engineering hours	0.168	0.160
	(0.29)	(0.29)
Percentage of electrical engineering hours	–0.574^{+}	–0.548^{+}
	(0.32)	(0.32)
Total labor hours	–0.001**	–0.001**
	(0.00)	(0.03)
Technological novelty	0.007	0.013
	(0.04)	(0.04)
Customer novelty	–1.797*	–1.677*
	(0.80)	(0.84)
Novel supplier use		0.132*
		(0.05)
Customer Fixed Effects	Y	Y
Employee Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
N	546	546
R^2	0.447	0.450

Notes. Standard errors are in parentheses. All models use ordinary least-squares estimation technique; all models cluster standard errors by customer.
$^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

To illustrate the substantive effect of the changes in supplier novelty generated by differences in power, we calculated the predicted values of labor productivity based on changes in supplier novelty and compare them with the predicted changes in labor productivity from changes in other significant variables. To protect the confidentiality of Northern Automation's project profitability data, we report all effects in changes in logged labor productivity but do not calculate profit margins directly. In Figure 5, we plotted the values of labor productivity at levels of supplier novelty and an alternative key predictor variable for an increase from one standard deviation below the mean to one standard deviation above. This allows us to compare the size of the effect of supplier novelty with the effect size of other project and team characteristics that the company could manipulate. The figure shows that a change from using no completely new suppliers to using at least one, which is the equivalent of a two-standard-deviation increase in that value, will yield an increase of 0.126 in logged labor productivity. A two-standard-deviation increase in the proportion of hours completed by electrical engineering yields an effect of similar magnitude, but in the opposite direction. Finally, a two-standard-deviation increase in customer novelty yields a reduction in labor productivity that is nearly twice the magnitude of the effect of supplier novelty, but in the opposite direction. Firms must decide whether to reinforce existing customer relationships or find new customers, yet this analysis shows that decisions about upstream partners are similarly consequential.

Figure 5. Effect of Novel Supplier Selection on Project-Level Labor Productivity



Discussion and Conclusion

How teams make risky, consequential decisions—such as choosing external partners—is a long-standing question in organizational scholarship. Although voluminous research has explored the psychology and sociology of power, scholars have only more recently begun to explore power in the setting of project-based work teams (for a review of this work, mostly over the preceding decade, see Greer 2014), despite the fact that power dynamics within project-based teams are highly salient during the dialectical process of initiating, reviewing, challenging, and approving collective decisions. Bringing these elements together, we argue, and our results confirm, that individuals with formal power will be more likely to encourage ties to novel

suppliers, but that formally powerful teammates, informally powerful initiators, and informally powerful teammates all tend to limit the tendency toward risky novel ties. Finally, our evidence confirms that these decisions are materially consequential: utilization of more novel suppliers improved project performance at a level comparable to the benefit of using a new technology or the immediate cost of working with a new client. In sum, the composition of more and less powerful people in teams shapes external relationship development in a manner that impacts organizational performance.

Like all research, the present work is not without limitations. The reliance on a single firm's data limits the study's generalizability; however, given the prevalence of partnership structures in knowledge-intensive industries such as engineering, law, management consulting, architecture, and accounting, the setting we have studied is relevant to many organizations that must address the choice between novel and familiar external partners. Future research should seek to replicate these results in other contexts. For example, other studies may consider formal structures that offer a deeper hierarchy in the distribution of power. Our measure of formal power captures a coarse distinction between partners and nonpartners, which may obscure more fine-grained distinctions in formal power, even within the firm we study. And our measure of informal power is based on position within the evolving collaboration network; though this choice was necessitated by the need for longitudinally granular data to test our theory, survey data might be a more direct, complementary indicator of informal power. Additionally, we examine a particular type of interorganizational relationship: a relationship based on commercial interaction. Others interested in interorganizational ties have focused on partnerships, alliances, or board interlocks, and it would be helpful to replicate these results with other types of decisions where firms face this trade-off between novelty and familiarity. Finally, although our theorizing builds upon a two-stage process of initiation and acceptance, as documented in prior research and our own field observations, our data prevent us from empirically disentangling these two stages. Although the interaction terms in our model do capture an interpersonal dynamic between initiators and teammates, future research should seek to collect data that separately measure the proposals of teammates and the final outcomes of team decision processes.

We examine the formal and informal power of initiators and their teammates, but we do not consider how the effects of the two types of power interact within the same person. As noted earlier, we find no statistically significant correlation between formal and informal power across our full sample. Our models also suggest that the two sources of power operate simultaneously and do not fully crowd each other out, and we find no evidence that the two types of power influence each other's impact within the same team member. At the same time, we do find that the distributions of informal power are distinct among partners compared with nonpartners. This lends evidence to the plausible idea that formal and informal power are linked and may influence each other. One can imagine that different organizational structures, production tasks, or industry settings may shape the degree to which formal and informal power co-occur or impact each other's presence within an individual. That formal and informal power are not directly correlated but are nevertheless nonindependent is a feature of our empirical setting and, therefore, a boundary condition of our study. That we find distinct effects of formal and informal power may be a result, in part, of their partial independence. Future research might seek to examine whether our findings are replicated in settings where formal and informal power are more closely linked, or whether the effects are amplified when they are more disconnected. Future research might also investigate the interesting cases in which formal and informal power are mismatched—for example, the proverbial administrative assistant to the senior executive, who has little formal authority but significant informal influence. A final and significant limitation of our study is that, given the administrative records available, we could not observe proposals that were initiated but not adopted. Our theory development was true to the phenomenon that we observed in the field, and our results support the theory, but the dialectical interaction during the process of ratifying proposals—and the power dynamics that affect it—remains a black box in our quantitative analysis. We hope future research can identify settings in which the process of proposal, debate, and ratification can be more explicitly observed.

In sum, we see this paper offering contributions to the literature. One central contribution is to research at the intersection of the literature on teams and on power. A growing body of research examines how power structures shape team behavior, focusing on the dispersion of team member power, the absolute level of power held by team members, or differences in power sources (for review, see Greer 2014). Yet, these dimensions of team power structures co-occur, and extant research has not offered insights about how they might influence each other. We bring several of these dimensions together, examining the levels of multiple types of power among team members and showing how the effects of power levels depend on the type of power in question. In fact, our results show that teams composed of formally powerful actors are likely to behave quite differently from those composed of informally powerful actors.

Our paper also offers a view of power types that is more deeply embedded in a macrostructural perspective. Some studies have pointed to the benefits of variety in power sources (Greer et al. 2011, Groysberg et al. 2011), whereas others have suggested the importance of more formalized or socialized sources of power (Bunderson and Boumgarden 2010, Bunderson and Reagans 2011). Yet, to date, prior studies have not articulated the most common types of power occurring within teams or theorized how the structural bases of these power types shape the behavior of those who hold them (for exception, see Young-Hyman 2017). Our paper identifies fundamental organizational sources of power—the formal and informal structures that are common to all organizations—and demonstrates their distinct consequences for team member behavior.

Finally, our paper advances an area of team power scholarship that others have recognized as meriting greater attention—namely, the "dynamic processes set into play by different types of team power structures" (Greer 2014, p. 103). Although prior studies have presented a static view of the effect of power on team dynamics, we know that many team decision processes are more complex, involving multiple stages of decision-making. Building on prior research in this area, our paper suggests a dynamic two-stage model of the way that power shapes decision processes within teams. In short, our paper offers a more complex, organizationally embedded view of team power dynamics.

This paper also introduces and tests a theory of the way that teams manage the formation of interorganizational ties. Extant research has explored how characteristics of individuals within firms shape the selection of external partners (Rogan and Mors 2014), but these individuals are unlikely to make decisions in isolation. Our results show that the effects of these individuals on external partner selection may be offset or amplified by the teammates with whom they are making decisions. Given that prior research on this topic has given little attention to teams, future scholars may consider the groups of individuals involved in interorganizational tie development. For example, this framework could also be applied to study how power dynamics affect the dialectical interactions among the members of top management teams or boards of directors. This paper also offers insights to scholars of project-based, less-hierarchical organizations (Lee and Edmondson 2017), regarding the processes with which they develop and manage interorganizational relationships. To date, network research has focused on either the structure of relations within the organization or, more broadly, the position of a firm within the interorganizational network, yet this paper shows how the internal group dynamics of an organization affect external relationship management. In doing so, we respond to recent calls for research that links intraorganizational processes with interorganizational networks (Hernandez et al. 2019) and documents the team-level meso-foundations of interorganizational networks.

In closing, the choice between familiar and novel suppliers is a critical decision for organizations. When such decisions are made by interdependent teams, power structures—and how they affect the propensity of team members to initiate risky proposals and to challenge the proposals of others—shed light on how these choices are made. Our findings suggest that scholars and practitioners should pay greater attention to the ways that intraorganizational dynamics structure interorganizational relationships.

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Endnotes

[1] We posit that scholars have not studied the role of teams in spanning the firm boundary *not* because they view this link as unimportant but because data are typically available on either within-firm interactions or interorganizational ties. Rarely have scholars had access to the rich data on both interpersonal networks within a firm and ties linking individual firm members to external partners that we examine here (Rogan and Mors 2014).

[2] Another attractive feature of the setting is that the organization is consistently profitable throughout the period we study, such that we can be less concerned about risk aversion resulting from poor performance that might shape both the allocation of workers to team roles and the selection of suppliers.

[3] Across the full data set, 42.31% of electricians are partners, 44.74% of engineers are partners, and 47.83% of machinists are partners. In paired t tests, we find that there is no statistically significant difference in partnership rates between electricians and engineers ($p = 0.821$), engineers and machinists ($p = 0.523$), or machinists and electricians ($p = 0.433$).

[4] A small number of variables have pairwise correlations above 0.3, raising the possibility of multicollinearity. To address those concerns, we calculated variance inflation factors for the variables in the main model, and all values are below 3.5, which is far below the generally accepted threshold of 10.

[5] Although beyond one standard deviation above and below the mean, we select this range because the variable is not normally distributed and the number of observations substantially decreases beyond this lower bound.

[6] In unreported analyses, we find no evidence of a significant interaction between the formal and informal power of initiators ($\beta = -1.01$, $p = 0.62$); these results suggest that formal and informal power are not substitutable in their effect on one's propensity to suggest novel

suppliers; rather, each seems to operate independently, underscoring the theoretical importance of considering both. For completeness, we also looked at the interaction between formal and informal power in teammates, with the caveat that examining the main effect of teammate power is not consistent with our proposed decision-making model, where teammate power operates in interaction with the power of the initiator. We find a positive interaction of formal and informal teammate power with likelihood of novel supplier selection ($\beta = 14.22$, $p < 0.05$). Because the main effects of teammate formal and informal power are also statistically significant but negative (formal: $\beta = -24.61$, $p < 0.01$; informal: $\beta = -16.01$, $p < 0.01$), this suggests that, for teammates, the negative effect of formal or informal power is partially attenuated by increases in the other type of power.

[7] These controls were included in the estimation of Model 6 in Table 3 but, for parsimony, were not shown.

[8] For brevity, these results are not presented in the paper. However, they are reported in Table A1 of the online appendix.

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Trevor Young-Hyman is an assistant professor at the Katz Graduate School of Business at the University of Pittsburgh. He received his doctorate from the Department of Sociology at the University of Wisconsin–Madison. His research examines knowledge-intensive work and organizational alternatives to formal hierarchy.

Adam M. Kleinbaum is an associate professor at the Tuck School of Business at Dartmouth College. He received his doctorate from the Harvard Business School. His research examines the origins and evolution of social networks using diverse theories and methods.

Appendix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	New Supplier	New Supplier	New Supplier	New Supplier	New Supplier	New Supplier	New Supplier	New Supplier	New Supplier
Informal Power Specifications	1 hr threshold 26 wk window	1 hr threshold 40 wk window	1 hr threshold 52 wk window	5 hr threshold 26 wk window	5 hr threshold 40 wk window	5 hr threshold 52 wk window	10 hr threshold 26 wk window	10 hr threshold 40 wk window	10 hr threshold 52 wk window
Initiator Formal Power	9.594	33.443*	36.775*	10.976+	25.819**	23.537*	9.461*	9.968*	12.122*
	(12.76)	(15.18)	(18.45)	(5.71)	(8.55)	(9.65)	(4.17)	(4.30)	(5.30)
Initiator Informal Power	5.92	-66.38	-135.89	-12.37+	-50.04**	-61.39**	-10.69*	-16.02*	-27.13*
	(19.48)	(72.59)	(108.68)	(6.72)	(16.53)	(17.03)	(4.61)	(6.35)	(12.48)
Teammates' Formal Power	-14.60*	-12.67	-57.46**	-0.31	-3.51	-16.95+	-1.94	-1.35	-7.09+
	(7.37)	(15.66)	(21.39)	(5.39)	(5.33)	(10.23)	(2.97)	(3.04)	(3.76)
Teammates' Informal Power	7.31	-54.15	-101.55	-9.16+	-41.70**	-50.16**	-6.14*	-10.61*	-18.77+
	(18.12)	(71.25)	(103.74)	(5.27)	(15.19)	(15.64)	(3.01)	(4.91)	(11.16)
Initiator Formal Power × Teammates' Formal Power	-5.90**	-5.87*	-6.67+	-6.25**	-7.70***	-7.99**	-7.39**	-8.70***	-7.91**
	(2.07)	(2.46)	(3.70)	(2.22)	(2.22)	(2.82)	(2.79)	(2.48)	(2.52)
Initiator Formal Power × Teammates' Informal Power	-3.55	-18.89*	-20.73+	-4.31	-12.85**	-11.35*	-3.16+	-2.83	-4.26
	(8.00)	(9.46)	(11.15)	(3.23)	(4.97)	(5.62)	(1.90)	(2.22)	(2.75)
Initiator Informal Power × Teammates' Formal Power	10.56*	9.49	38.52**	1.65	4.18	12.20+	3.49	3.36	7.05**
	(4.58)	(9.91)	(13.08)	(3.70)	(3.71)	(6.55)	(2.45)	(2.53)	(2.46)
Initiator Informal Power × Teammates' Informal Power	-9.07	37.98	71.89	6.28	29.01**	33.72**	4.69*	7.78*	13.53+
	(12.19)	(45.21)	(67.82)	(4.11)	(10.21)	(10.70)	(2.31)	(3.42)	(7.74)
Supplier Group FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Employee FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	7252	6749	6566	7252	6749	6566	7252	6749	6566
Log Likelihood	-329.4	-289.9	-246.4	-326.6	-269.0	-230.0	-320.4	-285.7	-240.5
Standard errors in parentheses; + p<0.10 * p<0.05 **p<0.01 ***p<0.001; all models use logit estimation technique; all models cluster standard errors by project and quarter year; all models control for project stage, purchase price, team size, orderer tenure, teammates' tenure, part novelty, change in project importance, total project revenue, teammates' formal power dispersion, teammates' informal power dispersion									

Table A1: Main Analysis With Alternative Specifications of Informal Power