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2010, Vol. 53, No. 5, 989–1008.

THE DOUBLE-EDGED SWORDS OF AUTONOMY AND EXTERNAL KNOWLEDGE: ANALYZING TEAM EFFECTIVENESS IN A MULTINATIONAL ORGANIZATION

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Extending the differentiation-integration view of organizational design to teams, I propose that self-managing teams engaged in knowledge-intensive work can perform more effectively by combining autonomy and external knowledge to capture the benefits of each while offsetting their risks. The complementarity between having autonomy and using external knowledge is contingent, however, on characteristics of the knowledge and the task involved. To test the hypotheses, I examined the strategic and operational effectiveness of 96 teams in a large multinational organization. Findings provide support for the theoretical model and offer implications for research on team ambidexterity and multinational management as well as team effectiveness.

In many organizations, self-managing teams conduct knowledge-intensive work such as designing new products, developing innovative technologies, and delivering professional services to clients (e.g., Hackman, 2002; Manz & Sims, 1993; Mohrman, Cohen, & Mohrman, 1995). The extensive research on team effectiveness offers two seemingly unrelated perspectives with useful but controversial insights for such teams. Research on team self-management has presented the argument that autonomy, in the form of collective control over critical task-related decisions, can enable teams to perform more effectively (e.g., Cohen & Ledford, 1994; Langfred, 2000; Wellins, Byham, & Wilson, 1991). However, the empirical evidence for this view has been mixed: autonomy appears to be advantageous for stable, full-time work teams but is not necessarily so for temporary project teams, which are common in knowledge-intensive work settings (Cohen & Bailey, 1997). In parallel, research on team "boundary spanning" has drawn attention to the importance of teams' external rather than internal interactions (e.g., Gladstein, 1984). Such studies have suggested that teams can perform more effectively if they obtain and use external knowledge, in the form of task-related information, know-how, and feedback from sources outside the teams (e.g., Ancona & Caldwell, 1992; Hansen, 1999; Reagans, Zuckerman, & McEvily, 2004). Yet external knowledge does not always help teams to perform more effectively, even in knowledge-intensive work settings, and it sometimes hurts (e.g., Cummings, 2004; Haas & Hansen, 2005). These twin tensions in the team effectiveness literature suggest that although having autonomy and gaining external knowledge both have possible benefits for teams, both also expose teams to risks that can prevent realization of their full potential. For self-managing teams engaged in knowledge-intensive work, the question that arises is, When do the benefits of these potentially favorable conditions outweigh the risks?

To address this question, I integrate the separate perspectives on team effectiveness offered in the research on team self-management and team boundary spanning by applying the differentiation-integration view of organizational design to teams. At the organization level, differentiation refers to the extent to which business units adapt their activities to their own environments; integration refers to the extent to which they coordinate their activities with each other (Lawrence & Lorsch, 1967). Empirically, business units are often viewed as more differentiated if they have more decision-making autonomy (e.g., Birkinshaw, Hood, & Jonsson, 1998; Garnier, 1982), and as more integrated if they obtain and use more knowledge from other units (e.g., Gupta & Govindarajan, 2000; Tsai, 2001). A fundamental principle of organizational design is that differentiation and integration are complementary, so that firms perform more suc-

I gratefully acknowledge the valuable contributions of Associate Editor Wenpin Tsai and the anonymous reviewers for this article. I also thank the managers and team members who participated in this study, and Julian Birkinshaw, Stuart Bunderson, Chris Collins, Amy Edmondson, Mauro Guillén, Richard Hackman, Morten Hansen, Dave Harrison, Witold Henisz, Tatiana Kostova, Jay Lorsch, Beta Mannix, Mitchell Orenstein, Madan Pillutla, Phanish Puranam, Nancy Rothbard, and Freek Vermeulen for their helpful inputs on earlier versions.

cessfully if highly differentiated business units are also highly integrated (Lawrence & Lorsch, 1967; Nohria & Ghoshal, 1997). Applying this complementarity principle to teams, and in keeping with my earlier work (Haas, 2006), I propose that combining the two conditions of autonomy and external knowledge use can increase team effectiveness more than either alone, because the benefits of each offset the other's risks.

A second fundamental principle of organizational design, however, is that the optimal conditions for business unit performance are contingent on situation (Lawrence & Lorsch, 1967). A similar contingency principle can be expected to apply at the team level. To identify when the complementarity between autonomy and external knowledge is advantageous for self-managing teams engaged in knowledge-intensive work—and when it is not—I draw on organization design research to identify two sets of contingencies with particular relevance for such teams: knowledge-based contingencies (e.g., Birkinshaw, Nobel, & Ridderstrale, 2002) and task-based contingencies (e.g., Galbraith, 1973; Tushman, 1979).[1] By focusing attention on the contingent complementarity of autonomy and external knowledge use, applying organizational design principles to teams helps resolve the tensions in prior research on team effectiveness.

The setting in which I tested hypotheses is a multinational organization whose teams operate worldwide. Examining teams in multinational organizations is useful for extending research on team effectiveness because the complexity of such settings highlights the importance of both differentiation and integration at the team level (cf. Roth & Kostova, 2003). A multinational organization can create value by combining autonomous subsidiaries with cross-subsidiary flows of knowledge to form a "differentiated network" (Nohria & Ghoshal, 1997). Similarly, its teams may perform more effectively if they combine autonomy with use of external knowledge. Additionally, many multinationals rely on teams to carry out much of their work, making team effectiveness an important issue for multinational management research (e.g., Earley & Gibson, 2002). I examine two dimensions of team effectiveness that were viewed as critical in the organization studied here, as they are in many multinationals (cf. Gibson, Zellmer-Bruhn, & Schwab, 2003): *strategic effectiveness*, which refers to the extent to which a team delivered project outputs that furthered the organization's strategic goals, and *operational effectiveness*, which refers to how appropriately a team utilized available resources in delivering project outputs.

[1] Other contingencies commonly studied in organizational design research include firm technology and environmental dynamism (Lawrence, 1993), but these are less relevant at the level of teams.

DIFFERENTIATION AND INTEGRATION IN TEAMS

The Double-Edged Sword of Team Autonomy: Independence and Isolation

Theories of team self-management suggest that autonomy motivates teams to make independent decisions that serve the best interests of their tasks, by giving them a greater sense of responsibility and accountability for their work (e.g., Cohen & Ledford, 1994; Cordery, Mueller, & Smith, 1991; Janz, Colquitt, & Noe, 1997) and signalling management endorsement (Langfred, 2000). Team autonomy also allows those closest to tasks to make critical task decisions (Hackman, 2002) without having to compromise to secure support from parties with their own agendas, such as senior managers or powerful clients (cf. Ancona & Caldwell, 1992).

Nevertheless, empirical studies have not provided compelling evidence that autonomy improves the performance of teams that work on project-based tasks (Cohen & Bailey, 1997). A possible explanation that has been underexplored in studies of team self-management is that autonomous teams may become isolated from their environments, to the detriment of their performance on such tasks. Organizational design theorists have long recognized that delegating autonomy to business units is risky because units that are able to make decisions without external input may overlook or resist courses of action that are preferable to their organization as a whole (Galbraith, 1973; Lawrence & Lorsch, 1967). Research on "groupthink" has suggested that a similar dynamic may impede the effectiveness of small groups of decision makers with high autonomy (Janis, 1982). For autonomous teams in contemporary organizations, moreover, project-based tasks can create a sense of "time famine" that leads them to believe that time spent soliciting input from outsiders is wasted (Perlow, 1999). The status conveyed to a team by the endorsement of autonomy also encourages the "not-invented-here" syndrome, characterized by unwillingness to adopt ideas from outside the team (Katz & Allen, 1982).

The resulting isolation has implications for both strategic and operational effectiveness: teams may miss opportunities to learn about options for serving their organization's strategic goals, or they may waste time replicating solutions that could have been more efficiently imported from outside. The consequences for new-product development tasks, for example, may be less creativity (Hargadon & Sutton, 1997) or slower time-to-market (Hansen, 1999). Because such risks of isolation reduce the benefits of independence, more autonomy does not necessarily result in better team performance.

The Double-Edged Sword of External Knowledge: Information and Influence

In contrast to research on team self-management, which has emphasized the benefits of autonomy without directly addressing teams' interactions with their environments, research on team boundary spanning has tended to take an external perspective, highlighting the benefits of knowledge from the teams' environment, including expert networks and document repositories both inside and outside their organization (e.g., Ancona & Caldwell, 1992; Collins & Clark, 2003; Reagans et al., 2004). According to this research, obtaining and using external knowledge can improve task outcomes by helping teams make more informed decisions. For example, soliciting advice from experts to help win competitive bids for new client contracts can enhance strategic effectiveness (Haas & Hansen, 2005), and transferring codified "best practices" developed elsewhere to help teams benchmark and improve their work processes can increase operational effectiveness (Szulanski, 1996).

Such studies have paid little attention, however, to the reality that external knowledge is often a source of influence as well as information (Pfeffer, 1981; Spekman, 1979). Many organizations are contested terrain (Edwards, 1979), characterized by competing coalitions (Cyert & March, 1963), "turf wars" (Brown, Lawrence, & Robinson, 2005), and entrenched commitments to particular ideological perspectives (Carlile, 2002). In such environments, actors often hold conflicting views about what inputs are appropriate and important for a task and how they should be used (Pettigrew, 1973). Consequently, knowledge providers may attempt to influence teams that seek inputs from them, through direct demands for support of their agendas, selective presentation of information, or subtle emphasis on favored solutions (Feldman, 1988).

Although influence attempts do not always accompany external knowledge and sometimes sensitize teams to important concerns, problems often arise. For example, teams may expend valuable time and energy managing organizational politics (cf. Ancona & Caldwell, 1992); damaging conflicts may arise between team members who advocate competing views as a result of pressures from outsiders (cf. Jehn, 1995); or outsiders may co-opt a project to forward their own agendas (cf. Selznick, 1949). Because external knowledge poses influence risks as well as offering information benefits, obtaining more such knowledge does not necessarily improve team performance.

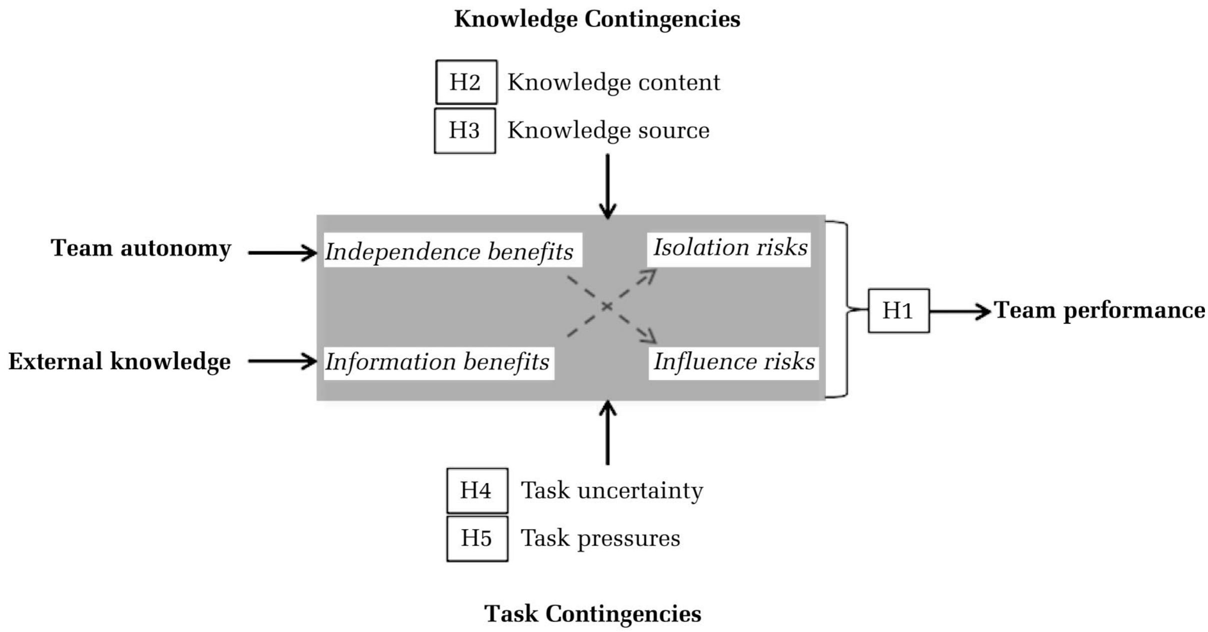
Complementarity and Contingencies

If autonomy and external knowledge each conveys risks as well as benefits to teams, how can the risks be minimized? Recognizing that the differentiation-integration view of organizational design has addressed a parallel question at the business unit level, in the hypotheses that follow I apply its principles of complementarity and contingency to teams. The full theoretical model is shown in Figure 1.

According to research on organizational design, business units require substantial decision-making autonomy if they are to develop and deliver locally differentiated products or services; in multinational organizations, for example, national subsidiaries need autonomy to ensure local responsiveness (e.g., Bartlett & Ghoshal, 1989; Birkinshaw et al., 1998; Garnier, 1982). The risk of delegating authority to a business unit, however, is that it may become cut off from the rest of an organization (Lawrence & Lorsch, 1967; Nohria & Ghoshal, 1997). To mitigate this risk, cross-unit integration mechanisms are necessary to facilitate coordination and promote learning (e.g., Martinez & Jarillo, 1989). In particular, researchers have emphasized that cross-unit flows of knowledge serve as a critical integration mechanism (e.g., Gupta & Govindarajan, 2000; Kogut & Zander, 1993; Tsai, 2001). By enabling business units to combine differentiation with integration, autonomy and external knowledge use thus can serve as complementary conditions for effective performance.

Classic organizational design research focuses on business units as the loci of differentiation and integration, but the work of many contemporary organizations is carried out by project teams that operate within or across business units. For these teams, balancing differentiation and integration is a team-level challenge, rather than one that is resolved for them at the business-unit level. Applying the complementarity principle to such teams suggests that they can perform more effectively by combining autonomy with use of external knowledge. These conditions are complementary because the benefits of each condition offset the risks of the other. The information benefits provided by external knowledge reduce the isolation risks created by autonomy: autonomous teams are less isolated if they obtain more external knowledge. The inde-

FIGURE 1
Theoretical Model[a]



[a] The shaded area shows causal mechanisms. These were not observed.

pendence benefits of autonomy reduce the influence risks created by external knowledge: teams that obtain external knowledge are less vulnerable to influence if they are more autonomous. Consequently, teams with high levels of both autonomy and external knowledge can make decisions that are both independent and well-informed. In contrast, teams that have high levels of autonomy but lack external knowledge can suffer from insufficient information, while teams that use high levels of external knowledge but lack autonomy can suffer from insufficient independence. Stated formally, autonomy and the use of external knowledge moderate each others' effects on team performance, in such a way that the effect of either condition is more positive if the other is also present. Hence:

Hypothesis 1. The effects of autonomy and external knowledge on team performance interact positively.

Although the complementarity principle highlights the mutual advantages of autonomy and external knowledge, the contingency principle of organizational design is a recognition that high levels of differentiation and integration may not be optimal in all situations (Lawrence & Lorsch, 1967). For example, the characteristics of a business unit's knowledge can affect the level of autonomy it needs to carry out R&D activities (Birkinshaw et al., 2002). Additionally, the characteristics of its tasks can influence its external knowledge needs, because of the associated information-processing demands (Galbraith, 1973; Tushman, 1979). Such knowledge and task contingencies at the business unit level suggest that the needs for autonomy and external knowledge may be similarly contingent at the team level.

For self-managing teams engaged in knowledge-intensive work, the complementarity between autonomy and external knowledge depends on whether using external knowledge creates influence risks and having autonomy creates isolation risks. If external knowledge does not create influence risks, autonomy is not needed; if autonomy does not create isolation risks, external knowledge is not needed. When these risks are high, in contrast, the potential for complementarity exists. In the four hypotheses that follow, I identify knowledge and task contingencies that increase the risks of influence or isolation for teams, resulting in a stronger positive interaction between autonomy and external knowledge. Hypotheses 2 and 3 address situations in which the risks of influence are greater because of characteristics of the content or source of knowledge. Hypotheses 4 and 5 address situations in which the risks of isolation are greater because of characteristics of a team's task.

Knowledge contingencies. The risks of influence associated with external knowledge are greater when the content of that knowledge is scarce than they are when it is common, because teams are more dependent on the providers of scarce knowledge content (Pfeffer & Salancik, 1978). They cannot as easily avoid influence attempts by switching to another provider (cf. Haunschild & Beckman, 1998), nor can they as readily judge the accuracy or trustworthiness of the content since little basis for comparison exists (cf. Szulanski, Cappetta, & Jensen, 2004). Since the providers of scarce knowledge thus have more power to push their own agendas, strategic effectiveness is more vulnerable to the risks of external influence. Operational effectiveness is also endangered as these knowledge providers have more power to demand that teams spend time addressing their demands. Autonomy enables teams to act more independently in the face of such pressures, however, since they can resist efforts by knowledge providers to impose inappropriate agendas on the teams' projects and avoid extensive debate over every decision. Because the independence benefits of autonomy are more critical when the influence risks of external knowledge are higher:

Hypothesis 2. The effects of autonomy and external knowledge on team performance interact more positively when the knowledge content is scarce rather than common.

The influence risks associated with external knowledge are also greater when the knowledge sources are nonorganizational (i.e., based outside the organization in which a team works) rather than organizational (i.e., based inside the organization), because the agendas of organizational outsiders are less likely to be aligned with the goals of the team than those of insiders (Barnard, 1938). Although agendas often diverge within organizations (Cyert & March, 1963), the superordinate identity, shared interests, and social norms created by organization membership typically increase cooperation among members (Schein, 1992). Consequently, efforts to push projects in directions that are suboptimal for the team's strategic effectiveness, or to impose time-consuming demands that impede its operational effectiveness, are less likely to occur when the providers of external knowledge are organizational insiders rather than outsiders. Also, team members tend to value knowledge from outsiders more than that from insiders (Menon & Pfeffer, 2003), increasing their vulnerability to outsiders' agendas. Since knowledge from nonorganizational sources carries greater influence risks, the independence benefits of autonomy are more valuable when teams obtain such knowledge:

Hypothesis 3. The effects of autonomy and external knowledge on team performance interact more positively when the knowledge sources are nonorganizational rather than organizational.

Task contingencies. The isolation risks created by autonomy are greater for more uncertain tasks, which are characterized by higher novelty or complexity (Galbraith, 1973; Tushman, 1979). The more novel a task for the team members involved in it, the more isolation endangers their strategic effectiveness, because they have little experience with similar tasks to exploit as they develop, select, and pursue strategic options. Isolation also poses a greater threat to a team's operational effectiveness when the task is more novel, because the team's members must rely on inefficient trial-and-error processes that often involve making and rectifying mistakes (cf. Levitt & March, 1988). The more complex the task, similarly, the more teams endanger their strategic effectiveness by not soliciting inputs that can help them to anticipate, identify, and address potential problems or unexpected consequences of their decisions (Tushman, 1978). Isolation also impedes operational effectiveness more for complex tasks because it takes longer to develop solutions for such tasks, whereas importing existing solutions can reduce the opportunity costs of reinventing them (Hobday, 2000). Because external knowledge offers information benefits that can offset the heightened isolation risks associated with autonomy in situations of high task novelty or complexity, the complementarity between autonomy and external knowledge will be greater in such situations:

Hypothesis 4. The effects of autonomy and external knowledge on team performance interact more positively when task uncertainty is high rather than low.

Finally, the extent of this complementarity also depends on task pressures. For self-managing teams engaged in knowledge-intensive work, task pressures commonly take two forms: time pressure and client pressure. Time pressure tends to be greater when teams work on tasks of shorter duration, owing to tight deadlines (Perlow, 1999). Shorter task duration increases the risks of isolation because autonomous teams face more temptation to make critical task decisions swiftly and avoid spending valuable time consulting with outsiders. Client pressure tends to be greater when teams work on tasks for larger clients, as these are often very powerful stakeholders in a project (Mintzberg, 1983). Because autonomous teams may disappoint or alienate these powerful stakeholders if they make decisions without sufficient external consultation, the risks of isolation are higher. Ultimately, both strategic and operational effectiveness can suffer in situations characterized by high task pressure, if autonomous teams fail to take advantage of external knowledge that could improve the quality of their work or save them time (Haas & Hansen, 2007). Since the information benefits of external knowledge are more critical when the isolation risks of autonomy are higher:

Hypothesis 5. The effects of autonomy and external knowledge on team performance interact more positively when task pressures are high rather than low.

DATA AND METHODS

Research Setting

I tested the hypotheses using quantitative data collected in a field study at a multinational organization with more than 10,000 employees and 100 offices worldwide. To develop an understanding of the research setting prior to collecting these data, I conducted semistructured interviews lasting one to three hours each with 50 team members involved in projects around the world, as well as with 20 managers and staff responsible for project evaluation, strategy and change management, knowledge management, and human resources. I systematically reviewed my interview notes as well as internal memos and project documents to gain insight into the nature of the work in this organization, and to prepare and refine the survey instrument.

The organization is a prominent international development agency whose clients are national and regional governments in developing countries. I studied financial teams that designed large-scale investment programs and technical teams that provided high-level research and analysis on development issues for these clients. The main outputs for both types of teams were detailed reports documenting their recommendations. The teams typically included economists and technical specialists in fields such as public finance, infrastructure, and engineering. In the study sample described below, the average team included 8.5 members, each of whom spent from one month to four years with that team while also working on two to ten projects with other teams. Their average age was 44 years, and 66 percent were men. The teams in the sample conducted projects in Africa, Central Asia, East Asia, Europe, Latin America, the Middle East, and South Asia.

Although all the teams were self-managing to some extent, their levels of decision-making autonomy varied according to factors that included the distribution of informal as well as formal authority in the organization, the status of the team members, and the style of the senior managers to whom a team was accountable. Because the work was knowledge-intensive, requiring high levels of expertise and experience, the organization had invested in expert directories, help desks, and document databases to help teams access knowledge for their projects. Many team members recognized that taking advantage of such resources both inside and outside the organization could be useful, yet teams varied in the extent to which they obtained and used external knowledge in their work.

Quantitative Data

I collected quantitative data from three independent sources: the organization's project evaluation unit, a team member survey, and archival project records. To evaluate projects, the organization had established a unit of 20 full-time staff who drew a random sample of financial and technical projects from the full population of projects completed each year. This project evaluation unit then assembled a customized panel of experts to assess each selected project. Each panel included at least two respected experts in the project's area with no prior connections to the project.

The panels reviewed the project documents, interviewed the team leader, and completed a detailed evaluation protocol. Although a different expert panel evaluated each project, the project evaluation unit took care to ensure that the ratings based on these inputs were robust across panels: in addition to providing detailed guidance to the panels during evaluations, the unit regularly tested the interpanel reliability of the ratings to confirm that different panels were highly likely to rate the same project similarly.[2] The project evaluation unit provided the ratings for the 120 teams sampled in the year of this study (60 financial and 60 technical teams).

I obtained official team rosters from the firm's databases and asked the team leaders to distinguish between those they defined as core members and those they defined as noncore members. After pretesting the survey questions with 52 members of teams that were not part of the evaluated sample, I sent surveys to all 1,021 core and noncore members of the 120 teams (including the leaders, who were core members) as soon as possible after their projects were selected for evaluation. The respondents were directed to focus on the project under evaluation, as identified on the front page of the sur-

[2] Interrater reliability within panels was not a concern because the panelists evaluated their projects jointly.

vey, but they were anonymous within teams except for one question that identified them as core or noncore members. Only 18 of the team members surveyed appeared on more than one team roster, indicating that respondents who participated in more than one team were unlikely to bias the data. I received survey responses from 550 team members (54%). After excluding teams for which fewer than 50 percent of the respondents were core members (Hackman, 2002: 47), 96 teams qualified for the study (80 percent; 50 financial and 46 technical teams, with 485 member respondents). Tests for selection bias showed no significant differences in the effectiveness ratings, project types, regions, or divisions of the 24 teams that did not qualify.

Dependent variables. The dependent variables in this study were (1) the strategic effectiveness of a team and (2) the operational effectiveness of a team, as rated by its independent expert panel. These two dimensions of team effectiveness were viewed as key indicators of performance in this organization, as their inclusion in the project evaluation process attested. Both variables used ordinal scales on which 3 was "highly satisfactory," 2 was "satisfactory," and 1 was "marginal or unsatisfactory." These scales were based on criteria developed by the project evaluation unit through a multiyear process of consultation and refinement. To evaluate *strategic effectiveness*, each expert panel used a set of ten questions.[3] To evaluate *operational effectiveness*, each expert panel assessed the appropriateness of the time taken for the project, its budget, and the other resources used, particularly skill mix, in light of the nature and context of the project. To arrive at overall effectiveness ratings, the panels took into account their full understanding of projects and their distinctive challenges as well as the scores on these questions. Of the 96 teams in the data set, 41 percent received a rating of 3, 51 percent received a 2, and 8 percent received a 1 on strategic effectiveness; and 27 percent received a rating of 3, 57 percent received a 2, and 16 percent received a 1 on operational effectiveness.[4]

Team autonomy. Hackman (1987, 2002) developed an authority matrix that identifies four levels of team self-management based on the extent to which teams have control over the critical decisions related to their tasks. Working from this matrix, I examined four categories of critical task-related decisions that contribute to team autonomy: (1) managing work processes, (2) managing the design of the task or team, (3) managing resources, and (4) managing the objectives of the task or team. Within each of these four categories, I drew on my interview data to identify 5 specific decisions that were critical in this organization. The resulting 20 decisions focused on (1) setting up and managing site visits, interactions with clients and management, handling conflict; (2) project pacing, feedback solicitation, quality standards, staffing requirements, selection of team members; (3) budget size, additional funding, information inputs, team training, team rewards; and (4) project initiation, overall priority, boundaries/scope, specific compo-

[3] For financial projects, the ten questions were: "To what extent does the project . . . Address key development objectives? Clearly link to achieving strategic benchmarks? Demonstrate clarity and realism of objectives? Establish appropriateness of approach? Adequately reflect lessons of experience? Show adequacy of knowledge and strategy underpinning the program? Involve strong client country ownership? Provide appropriate and realistic program conditions? Establish appropriate partnership with other key partners? Provide appropriate and realistic measures for achieving reforms?"

For technical projects, the ten questions were: "To what extent does the project . . . Clearly define appropriate objectives? Clearly identify issues to be addressed? Enable objectives and issues to be adjusted in light of changing circumstances, if necessary? Support achieving one or more specific strategic objectives? Make a likely contribution to the organization's stock of knowledge? Fit with the organization's comparative advantage? Fit with other work being done by the organization? Have prospects for actions on the issues addressed? Clearly define appropriate audiences? Clearly define expected impact and how to achieve it?"

[4] In supplementary analyses, I examined whether my findings were sensitive to alternative specifications of the dependent variables, since relatively small numbers of projects received the lowest ratings. First, I created alternative dichotomous measures coded 1 if a project was rated "highly satisfactory" or 0 if the project was rated "satisfactory" or "marginal/unsatisfactory"; the results were substantively the same. Second, because the relatively small number of projects that received the lowest rating was a particular concern for the strategic effectiveness measure, I created an alternative continuous measure by summing a project's scores on the ten questions that the expert panels used to inform their overall ratings of strategic effectiveness (α = .89 for financial projects, α = .82 for technical projects). This continuous measure was highly correlated with but not identical to the categorical measure (r = .88); the results were the same. I also examined whether excluding specific items from this continuous measure changed the results, but it did not. Having established the robustness of my findings, I report the results using the original categorical measures because the project evaluation unit viewed these as best capturing meaningful differences between projects.

nents, level of innovation. In the survey, each team member was asked about his or her team's level of autonomy over all 20 decisions, as follows: "How was influence over [decision] distributed between the team itself (including the leader) and others outside the team (including managers, the client country, and the development community)?" (rated on a scale from 1, "The team had very little influence," to 5, "The team had almost all the influence"). To construct the *team autonomy* variable, I averaged the responses to these 20 items for each team member and then within teams (α = .90, ICC =.05, $p < .10$, r_{wg} = .85).

External knowledge. My interviews indicated that team members in this organization typically classified the sources from which they obtained external knowledge into four categories. Two of these sources were inside the organization's boundaries: (1) the country office and (2) the rest of the organization. The country office referred to the organization's local office in the client country; the rest of the organization referred to its other global offices. Two of the sources were outside the organization's boundaries: (3) the client country and (4) the global community. The client country referred to the national or regional government and other local stakeholders such as nongovernmental agencies (NGOs) and businesses; the global community referred to international NGOs, think tanks, academics, and others working on development issues globally.

For each of these four sources, I asked the team members, "During the course of this project, how much relevant (a) technical knowledge (b) country knowledge did you gather from [this source]?" (1, "very little"; 5, "a lot").[5] Technical knowledge was defined as "knowledge about the technical aspects of the work—the professional skills, competencies, and expertise relevant to the project." Country knowledge was defined as "knowledge about the local environment—the country-specific conditions relevant to the project." Both types of knowledge were required for every project in this organization: for example, an infrastructure project in Russia required technical expertise in engineering as well as information about the workings of local government ministries; a social services project in Argentina required knowledge about best practices in service provision and also about the particular needs of the target population. To construct the *external knowledge* variable, I averaged the responses to the eight survey items for each team member and then within teams (α = .85, ICC = .06, $p < .05$, r_{wg} = .69). To test for the interaction effect stated in Hypothesis 1, I multiplied each team's autonomy score by its external knowledge score, after standardizing to avoid high multicollinearity (Neter, Wasserman, & Kutner, 1985).

Knowledge characteristics. To distinguish between knowledge content that was relatively scarce versus relatively common, I constructed separate measures of *external country knowledge* (α = .70, ICC = .08, $p < .01$, r_{wg} = .66) and *external technical knowledge* (α = .72, ICC = .06, $p < .05$, r_{wg} = .65). My interview data indicated that teams in this organization typically found country knowledge to be scarcer than technical knowledge, for three reasons. First, team members were usually chosen for technical expertise rather than client country familiarity.[6]

Second, country knowledge in the form of reliable information on economic and social conditions is often very limited in developing countries, whereas technical knowledge usually builds on formal education or experience in other countries and so is more abundant. Third, team members could not always identify and access country knowledge as easily as technical knowledge because they were mostly based at the U.S. headquarters rather than in the client countries, and accordingly they tended to be more deeply entrenched in professional than national knowledge-sharing networks. I established the convergent and discriminant validity of the two four-item measures using two approaches (Venkatraman & Grant, 1986): a multitrait-multimethod matrix analysis indicated that the average within-scale correlations of the group-level measures (r = .48, r = .46) exceeded their average between-scale correlation (r = .27), and a group-level confirmatory factor analysis on the eight items using maximum-likelihood estimates indicated that the two-factor structure was superior to a one-factor structure ($\Delta\chi^2_1 = 6.10$, $p < .05$). I tested Hypothesis 2 by comparing the interaction effects between autonomy and country knowledge (relatively scarce) with those between autonomy and technical knowledge (relatively common).

Task characteristics. To examine the effects of task uncertainty, I measured both task novelty and

[5] These questions could not establish with certainty whether teams actually used the knowledge they obtained, but the emphasis on relevant knowledge encouraged them to recall knowledge that they had found useful.

[6] In keeping with this, the survey respondents reported possessing less country than technical knowledge prior to their projects (means = 3.43 and 3.81, respectively; t = 4.50, $p < .001$).

task complexity. Items for both were rated from 1, "very little," to 5, "a lot." To capture *task novelty*, I used two survey items: "Prior to the start of this project, how much relevant (a) technical knowledge (b) country knowledge did you personally have?" After reverse-coding, the higher the average team member score on this variable ($\alpha = .44$, ICC = .12, $p < .01$, $r_{wg} = .55$), the higher the novelty of the task for a team.[7] To capture *task complexity*, I used three survey items (cf. Tushman, 1978): "To what extent did the project require complex approaches and solutions?"; "To what extent did the work depart from the usual work of a routine financial/technical project?"; "To what extent did the techniques or skills or information needed for the project change during the course of the project?" The higher the average team member score on this variable ($\alpha = .77$, ICC = .17, $p < .01$, $r_{wg} = .74$), the higher the complexity of the task.

To examine the effects of task pressure, I constructed measures of both time and client pressure. To capture time pressure, I used archival budget data to calculate the logged number of days from project initiation to completion, *task duration*. In my interviews, team members reported that time pressure was greater when task duration was shorter because it was more difficult to ensure that the standard components required of any project were adequately covered. For example, all financial projects, from narrowly focused student loan programs to large-scale housing sector investments, required full stakeholder, environmental, and implementation readiness assessments. These requirements could make it hard to satisfactorily complete even tasks that were relatively straightforward (i.e., low in novelty or complexity) in a short time. To capture client pressure, I used national economic data to construct a logged measure of client country size, *task client*, by calculating the country's gross national product (GNP) as a percentage of regional GNP (because the organization managed its projects by regions). The interviewees reported that larger countries' governments tended to be more powerful clients who tried to exert more sway over the direction and details of the work conducted for them; they also served as regional role models for projects that might be taken to other countries. Thus, client pressure was typically higher in projects conducted for China or Brazil, for example, than in projects for smaller countries in their regions.

To test Hypothesis 4, I used median splits to divide the sample into relatively high- versus low-novelty tasks and relatively high- versus low-complexity tasks and then compared the models for each paired set of tasks to establish whether the interaction effect between autonomy and external knowledge was stronger when task uncertainty was high rather than low. Similarly, to test Hypothesis 5, I used median splits to divide the sample into relatively short- versus long-duration tasks and into relatively large- versus small-client tasks and then compared the models for each paired set of tasks to establish whether the interaction effect was stronger when task pressures were high rather than low.[8]

Control variables. To account for other possible influences on strategic and operational effectiveness, the models included *team size* (number of team members) and *team location* (1, "headquarters"; 0, "country office"). I also constructed a measure of *team satisfaction* using four items with scales ranging from 1, "strongly disagree," to 5, "strongly agree" (Wageman, Hackman, & Lehman, 2005): "Working together energized and uplifted members of this team"; "There was a lot of unpleasantness among the members of this team" (reverse-coded); "Members of this team were getting better and better at working together"; "The longer we worked together as a team, the less well we did" (reverse-coded) ($\alpha = .81$, ICC = .18, $p < .01$, $r_{wg} = .82$). Assuming that better internal relations among the team members would be reflected in higher team satisfaction, I used this measure to control for how well the team members worked together, as well as for possible satisfaction-driven biases that might have affected their responses to the other survey items. To capture differences due to seniority or work experience, I included the team members' average *organizational tenure* in years at the start of the project, as well as their average *nonorganizational tenure*, as years spent in other organizations. I also included *late respondents*, the percentage of team members who returned their surveys after the results of their project evaluation had been announced, since the outcome of their evaluation might have influenced their responses. Because core members might have had different roles and views than noncore members, the models also included *core respondents*, the proportion of survey respondents in each team who were core members. Finally, I included *project type* (1, "fi-

[7] The main effect of this variable also serves as a control for the team's level of knowledge prior to the project.

[8] I conducted sensitivity checks to see whether reallocation of borderline tasks affected the results, but they did not. An alternative approach would be to examine three-way interactions between autonomy, external knowledge, and the task variables, but the number of observations in the data set made this infeasible.

nancial"; 0, "technical") to capture differences between the two types of projects.[9]

RESULTS

Table 1 reports descriptive statistics and correlations. As shown, the two dependent variables are significantly but not highly correlated ($r = .37$). Additionally, the correlation between autonomy and external knowledge is low and not significant ($r = .15$), indicating that the two constructs are orthogonal rather than necessarily related or alternative choices. The average within-scale correlations for these two survey constructs ($r = .76$, $r = .34$) exceeded the average between-scale correlation ($r = .06$), and a confirmatory factor analysis indicated that the two-factor model provided a better fit to the data than a one-factor model, verifying their convergent and discriminant validity ($\Delta\chi^2{}_1 = 181.2$, $p < .01$).

Because both dependent variables were categorical and ordered, I used ordinal logit analysis to test the hypotheses (Long, 1997).[10] Tables 2a, 3a, and 4a show the strategic effectiveness models; Tables 2b, 3b, and 4b show the operational effectiveness models. All models included the full set of control and task variables (not shown); the only consistently significant results on these were that teams scoring higher on strategic effectiveness had more members ($b = 0.16-0.18$, $p < .05$), and teams scoring higher on operational effectiveness tended to serve larger clients and work on financial projects ($b = 0.29-0.32$, $p < .05$; $b = 1.22$–1.99, $p < .05$).

In Tables 2a and 2b, models 1a and 1b show that the main effect of autonomy is positive and significant for strategic effectiveness but not for operational effectiveness, and models 2a and 2b show that the main effect of external knowledge is also positive and significant for strategic but not operational effectiveness. In additional analyses, I examined whether autonomy or external knowledge use showed curvilinear effects, but quadratic terms did not have a negative effect on either strategic or operational effectiveness. Models 3a and 3b replicate the main effect results when the autonomy and external knowledge variables are included together.

Models 4a and 4b report the results for Hypothesis 1, which proposes a positive interaction effect between autonomy and external knowledge. These models show that the interaction effect is positive and significant for both strategic and operational effectiveness, supporting Hypothesis 1. The results are plotted in Figure 2 to illustrate the magnitudes of the effects for teams with varying levels of autonomy and external knowledge. High and low levels of each are set at one standard deviation above and below their mean levels (Aiken & West, 1991). The vertical axes range from 1 to 3, giving a maximum difference of 2 points between high- and low-effectiveness projects. The plots show that teams with high autonomy and high external knowledge use delivered substantially more strategically and operationally effective projects on average than teams with low autonomy and high external knowledge use (difference of 0.74 points = 37% and 0.32 points = 16%) or high autonomy and low external knowledge use (difference of 0.42 points = 21% and 0.38 points = 19%).

Models 5a and 5b and models 6a and 6b present the results for Hypothesis 2, which proposes that the autonomy-knowledge interaction is more positive if knowledge content is scarce rather than common, and Hypothesis 3, stating that the autonomy-knowledge interaction is more positive if knowledge sources are nonorganizational rather than organizational. Model 5a shows that for strategic effectiveness, there is a significant, positive interaction between autonomy and country knowledge, which is relatively scarce, whereas there is a negative and less significant interaction between autonomy and technical knowledge, which is relatively common. Model 6a shows that autonomy has a significant, positive interaction with nonorganizational knowledge but not with organizational knowledge. These models also show positive main effects of country and nonorganizational knowledge. Comparing models with and without equality constraints on the effects of these variables, I found that the difference between the country knowledge and technical knowledge effects is significant ($\chi^2 = 8.59$, $p < .05$), as is the difference between the organizational and nonorganizational knowledge effects ($\chi^2 = 3.88$, $p < .05$). Models 5b and 6b show a similar pattern of results for operational effectiveness: the interaction with autonomy is marginally significant for country but not technical knowledge content, and significant for nonorganizational but not organizational knowledge sources. The difference between the country and technical knowledge effects is marginally significant ($\chi^2 = 2.96$, $p < .10$),

[9] I also ran models that included controls for project regions and divisions; these did not affect the results.

[10] Since interaction effects in nonlinear regression models can be problematic to interpret (Ai & Norton, 2003), I also generated the marginal effects for the interaction terms and ran the models using an ordinary least squares specification instead. These two alternative approaches both generated the same pattern of results for the variable coefficients and for the statistical tests of coefficient differences.

TABLE 1
Descriptive Statistics and Bivariate Correlations[a]

Variable	Mean	s.d.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Strategic effectiveness	1.68	0.62	1	3																			
2. Operational effectiveness	1.90	0.67	1	3	.37																		
3. Team autonomy[b]	3.62	0.31	2.75	4.32	.24	.06																	
4. External knowledge[b]	3.00	0.43	1.91	3.98	.13	.01	.15																
5. External country knowledge[b]	3.08	0.47	1.88	4.17	.16	.06	.15	.94															
6. External technical knowledge[b]	2.91	0.44	1.75	3.92	.05	−.02	.12	.95	.80														
7. External organizational knowledge[b]	2.83	0.44	1.81	3.75	.02	−.03	.03	.84	.77	.82													
8. External nonorganizational knowledge[b]	3.15	0.54	1.67	4.30	.19	.03	.23	.90	.86	.83	.52												
9. Task novelty	1.38	0.54	0.40	3.00	.01	.02	−.11	−.19	−.19	−.19	−.21	−.12											
10. Task complexity	3.55	0.48	1.67	4.67	.07	.10	.14	.22	.26	.15	.17	.20	−.17										
11. Task duration[c]	354.49	258.51	43	1,442	−.02	−.06	.03	−.02	.01	−.05	−.00	−.03	−.03	.08									
12. Task client[c]	0.14	0.21	0.01	0.76	.10	.18	.02	−.01	−.04	.04	.03	−.03	−.16	.07	.02								
13. Team size	8.48	4.15	2	23	.30	.10	.02	.06	.08	.04	.09	.03	.04	.23	.00	−.08							
14. Team location	0.80	0.40	0	1	.05	.08	−.04	−.08	.00	−.14	−.07	−.07	.14	.19	−.02	−.15	.21						
15. Team satisfaction	4.04	0.37	2.75	4.75	−.01	.20	.26	.26	.27	.25	.16	.28	−.14	.05	−.16	−.08	−.19	.06					
16. Organizational tenure	8.46	4.40	1.00	25.50	−.06	.14	.05	−.02	−.04	.00	.04	−.06	−.00	.22	−.14	−.02	−.13	.02	.02				
17. Nonorganizational tenure	16.93	7.05	2.50	36.50	.02	.03	.14	.05	.14	−.02	.03	.06	−.31	.22	−.03	.14	.20	.13	.01	−.05			
18. Late respondents	0.56	0.41	0.00	1.00	−.06	.00	−.15	−.04	−.02	−.08	.03	−.11	.14	−.09	.11	.05	−.07	.02	−.10	.09	.13		
19. Core respondents	0.76	0.22	0.17	1.00	.03	.17	.03	.05	.01	.08	.07	.02	−.02	.16	−.10	−.09	−.10	−.05	.38	.14	−.03	.03	
20. Task type	0.52	0.50	0	1	−.00	.20	.04	.00	.09	−.06	.06	−.05	.10	.16	−.16	−.08	.28	.31	.07	.12	.35	.40	.14

[a] $n = 96$. If $r > .16$, $p < .10$; if $r > .20$, $p < .05$; if $r > .26$, $p < .01$.
[b] Variable was standardized in analyses by subtracting the mean and dividing by the standard deviation.
[c] Summary statistics are from the unlogged variable; correlations are from the logged variable.

TABLE 2A
Results of Ordinal Logit Analysis for Strategic Effectiveness[a]

Variables	Model 1a	Model 2a	Model 3a	Model 4a	Model 5a	Model 6a
Team autonomy[b]	0.72* (0.29)		0.73* (0.30)	0.80* (0.32)	0.95** (0.35)	0.74* (0.32)
External knowledge[b]		0.43† (0.25)	0.44† (0.26)	0.55† (0.30)		
External country knowledge[b]					0.95† (0.53)	
External technical knowledge[b]					−0.05 (0.50)	
External organizational knowledge[b]						−0.25 (0.31)
External nonorganizational knowledge[b]						0.82* (0.35)
Team autonomy × external knowledge				0.77* (0.34)		
Team autonomy × external country knowledge					2.28** (0.72)	
Team autonomy × external technical knowledge					−1.05† (0.55)	
Team autonomy × external organizational knowledge						0.34 (0.37)
Team autonomy × external nonorganizational knowledge						0.66* (0.34)
df[c]	13	13	14	15	17	17
Log-likelihood	−59.65	−61.47	−58.19	−55.21	−50.48	−52.10
Log-likelihood χ^2 ratio test[d]	6.42*	2.78†	9.34**	15.30**	24.70**	21.52**
Pseudo-R^2	0.13	0.11	0.15	0.20	0.27	0.24

[a] $n = 96$. Standard errors are in parentheses.
[b] Variable was standardized by subtracting the mean and dividing by the standard deviation.
[c] Models include all control and task variables.
[d] Compared to baseline model with control variables only.
† $p < .10$
* $p < .05$
** $p < .01$
Two-tailed test for variable coefficients.

but the difference between the organizational and nonorganizational knowledge interaction effects is not ($\chi^2 = 1.95$, n.s.). The findings for Hypotheses 2 and 3 thus indicate strong support for strategic effectiveness and a weaker but similar pattern of support for operational effectiveness.

The four sets of paired models presented in Tables 3a and 3b report the results for Hypothesis 4, which proposes that the autonomy-knowledge interaction effect is more positive when task uncertainty (i.e., novelty or complexity) is high rather than low. The models show that for both strategic and operational effectiveness, the interaction is positive and significant for high-novelty tasks (7a[ii] and 7b[ii]) but not for low-novelty tasks (7a[i] and 7b[i]). For strategic effectiveness, the interaction effect is also positive and marginally significant for high-complexity tasks (8a[ii]) but not for low-complexity tasks (8a[i]). For operational effectiveness, however, the interaction is not significant for either high- or low-complexity tasks (8b[ii] and 8b[i]). Since testing the hypothesis required comparing coefficients across models, I tested for the statistical significance of these differences using the seemingly unrelated estimation algorithm in Stata 10. The tests indicated that the paired novelty models are significantly different from each other for operational but not strategic effectiveness ($\chi^2 = 22.00$, $p < .05$; $\chi^2 = 12.70$, n.s); in contrast, the paired complexity models are significantly different from each other for strategic but not operational effectiveness ($\chi^2 = 26.06$, $p < .05$; $\chi^2 = 16.80$, n.s.). These results provide partial support for Hypothesis 4: the complementarity between autonomy and external knowledge is greater for operational effectiveness under conditions of high task novelty, and greater for strategic effectiveness under conditions of high task complexity.

Finally, the results for Hypothesis 5, which proposes that the autonomy-knowledge interaction effect is more positive when task pressure is high rather than low, are shown in Tables 4a and 4b. The four paired sets of models comparing relatively high-pressure tasks (i.e., those with shorter dura-

TABLE 2B
Results of Ordinal Logit Analysis for Operational Effectiveness[a]

Variables	Model 1b	Model 2b	Model 3b	Model 4b	Model 5b	Model 6b
Team autonomy[b]	−0.24 (0.28)		−0.24 (0.28)	−0.24 (0.28)	−0.29 (0.29)	−0.26 (0.29)
External knowledge[b]		0.03 (0.25)	0.04 (0.25)	0.09 (0.26)		
External country knowledge[b]					0.74 (0.49)	
External technical knowledge[b]					−0.51 (0.48)	
External organizational knowledge[b]						−0.15 (0.29)
External nonorganizational knowledge[b]						0.27 (0.31)
Team autonomy × external knowledge				1.00** (0.32)		
Team autonomy × external country knowledge					1.05† (0.60)	
Team autonomy × external technical knowledge					0.12 (0.52)	
Team autonomy × external organizational knowledge						0.23 (0.32)
Team autonomy × external nonorganizational knowledge						0.87** (0.33)
df[c]	13	13	14	15	17	17
Log-likelihood	−70.53	−70.90	−70.51	−64.81	−63.21	−64.00
Log-likelihood χ^2 ratio test[d]	0.76	0.02	0.80	12.2**	15.4**	13.82**
Pseudo-R^2	0.10	0.10	0.10	0.17	0.19	0.18

[a] $n = 96$. Standard errors are in parentheses.
[b] Variable was standardized by subtracting the mean and dividing by the standard deviation.
[c] Models include all control and task variables.
[d] Compared to baseline model with control variables only.
† $p < .10$
** $p < .01$
Two-tailed test for variable coefficients.

tions or larger clients) with relatively low-pressure tasks show a similar pattern for the two dependent variables: the interaction effects are positive and significant for tasks with shorter durations (9a[i] and 9b[i]), but not for tasks with longer durations (9a[ii] and 9b[ii]). The interaction effects are also larger and more significant for tasks with larger clients (10a[ii] and 10b[ii]) than for tasks with smaller clients (10a[i] and 10b[i]). Using the seemingly unrelated estimation algorithm to test for the statistical significance of these differences indicated, however, that the paired task duration models are marginally significantly different from each other for operational but not strategic effectiveness ($\chi^2 = 20.16$, $p < .10$; $\chi^2 = 9.21$, n.s.), whereas the paired task client models are significantly different from each other for strategic but not operational effectiveness ($\chi^2 = 23.78$, $p < .05$; $\chi^2 = 12.65$, n.s.). Thus, in partial support of Hypothesis 5, the complementarity between autonomy and external knowledge is greater for operational effectiveness when task durations are shorter, and greater for strategic effectiveness when task clients are larger.

DISCUSSION

Extending organizational design principles to self-managing teams engaged in knowledge-intensive work, this study has shown that teams' autonomy and use of external knowledge provide complementary conditions for team effectiveness. In the multinational organization studied here, teams with high levels of both autonomy and external knowledge delivered more strategically and operationally effective projects than teams with high autonomy but low external knowledge or high external knowledge but low autonomy. The complementarity between autonomy and external knowledge use depended, however, on characteristics of the knowledge and the task. The combination improved both strategic and operational effectiveness when the content of knowledge was scarce (country knowledge) but not when it was common (technical knowledge), and it improved both types of effectiveness when the knowledge sources were nonorganizational but not when they were organizational. The combination of autonomy and external knowl-

TABLE 3A
Results of Ordinal Logit Analysis for Strategic Effectiveness in Less versus More Uncertain Tasks[a]

	Task Novelty		Task Complexity	
Variables	Low: Model 7a[i]	High: Model 7a[ii]	Low: Model 8a[i]	High: Model 8a[ii]
Team autonomy[b]	1.71† (0.40)	1.85** (0.62)	1.99** (0.74)	2.70** (0.77)
External knowledge[b]	0.19 (0.39)	0.91* (0.46)	0.38 (0.38)	0.47 (0.52)
Team autonomy × external knowledge	0.19 (0.53)	1.01* (0.48)	0.84 (0.57)	1.04† (0.61)
n	48	47	48	47
df[c]	13	13	13	133
Log-likelihood	−32.68	−29.03	−25.13	−26.12
Log-likelihood χ^2 ratio test[d]	7.48†	19.32**	14.22**	24.98**
Pseudo-R^2	0.29	0.35	0.36	0.42

[a] Standard errors are in parentheses.
[b] Variable was standardized by subtracting the mean and dividing by the standard deviation.
[c] Models include all the control variables and task variables.
[d] Compared to the same models including control variables only.
† $p < .10$
* $p < .05$
** $p < .01$
Two-tailed test for variable coefficients.

edge use also improved strategic effectiveness more for tasks with higher complexity or client pressure, but it improved operational effectiveness more for tasks with higher novelty or time pressure. Thus, the complementarity between autonomy and external knowledge use was contingent on situation.

Further Evidence

The findings of this study indicate substantial support for the theoretical model, but some of the empirical results may have alternative explanations that require consideration. One possibility is that exogenous factors could account for the observed relationships between autonomy, external knowledge, and team performance. For example, perhaps some teams were given more autonomy, obtained more knowledge, and also performed better because their members were more expert. However, this explanation would suggest that team member expertise should be strongly correlated with both autonomy and external knowledge, but the correlations with three measures of expertise utilized in this study—prior knowledge (which was higher when task novelty was lower),

TABLE 3B
Results of Ordinal Logit Analysis for Operational Effectiveness in Less versus More Uncertain Tasks[a]

	Task Novelty		Task Complexity	
Variables	Low: Model 7b[i]	High: Model 7b[ii]	Low: Model 8b[i]	High: Model 8b[ii]
Team autonomy[b]	−0.70† (0.42)	0.31 (0.33)	−0.47 (0.41)	0.37 (0.39)
External knowledge[b]	0.06 (0.38)	0.26 (0.38)	0.13 (0.35)	−0.68† (0.42)
Team autonomy × external knowledge	0.43 (0.47)	0.58† (0.34)	0.76 (0.48)	0.62 (0.40)
n	47	46	47	46
df[c]	13	13	13	13
Log-likelihood	−41.72	−41.72	−39.35	−35.21
Log-likelihood χ^2 ratio test[d]	3.34	5.26	5.90	6.98†
Pseudo-R^2	0.18	0.24	0.19	0.21

[a] Standard errors are in parentheses.
[b] Variable was standardized by subtracting the mean and dividing by the standard deviation.
[c] Models include all the control variables and task variables.
[d] Compared to the same models including control variables only.
† $p < .10$
Two-tailed test for variable coefficients.

TABLE 4A
Results of Ordinal Logit Analysis for Strategic Effectiveness in Less versus More Pressured Tasks[a]

Variables	Task Duration		Task Client	
	Short: Model 9a[i]	Long: Model 9a[ii]	Small: Model 10a[i]	Large: Model 10a[ii]
Team autonomy[b]	0.79† (0.48)	0.82 (0.58)	1.61† (0.84)	0.53** (0.49)
External knowledge[b]	0.22 (0.43)	0.81† (0.47)	1.92* (0.79)	−0.03 (0.39)
Team autonomy × external knowledge	0.77† (0.42)	0.36 (0.68)	1.04 (0.82)	1.31* (0.53)
n	43	37	40	40
df[c]	13	13	13	13
Log-likelihood	−29.35	−25.56	−19.30	−25.24
Log-likelihood χ^2 ratio test[d]	8.86*	6.10	7.68†	9.54*
Pseudo-R^2	0.22	0.17	0.26	0.43

[a] Standard errors are in parentheses.
[b] Variable was standardized by subtracting the mean and dividing by the standard deviation.
[c] Models include all the control variables and task variables.
[d] Compared to the same models including control variables only.
† $p < .10$
* $p < .05$
** $p < .01$

organizational tenure, and nonorganizational tenure—were low. Another possibility is that more novel or complex tasks that required more knowledge were staffed with better teams that were given more autonomy, but the correlations between autonomy and task novelty or complexity were also low. Similarly, perhaps tasks with shorter durations or larger clients were assigned to better teams with more autonomy, but again, the correlations between autonomy and task duration or client size were low.

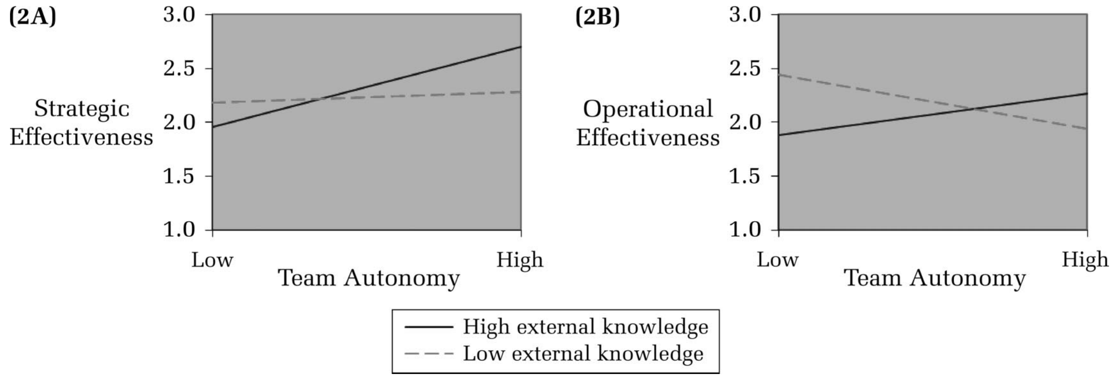
A different possibility is that the findings of the study might be a result of postevaluation attribution bias. Some teams had undergone the full project evaluation process before the surveys were distributed, raising the possibility that the members of these teams knew the outcome of their evaluations and made self-serving attributions in their responses to the survey (Miller & Ross, 1975). The research design allowed me to test for such biases by comparing 19 teams whose members all returned their surveys before their project evaluations were completed with 37 teams whose members all returned their surveys at least seven days after their evaluations were completed, by which time the results would have been

TABLE 4B
Results of Ordinal Logit Analysis for Operational Effectiveness in Less versus More Pressured Tasks[a]

Variables	Task Duration		Task Client	
	Short: Model 9b[i]	Long: Model 9b[ii]	Small: Model 10b[i]	Large: Model 10b[ii]
Team autonomy[b]	−0.30 (0.43)	−0.13 (0.55)	−0.09 (0.63)	−0.05 (0.41)
External knowledge[b]	0.11 (0.41)	0.23 (0.43)	0.23 (0.52)	0.13 (0.33)
Team autonomy × external knowledge	1.57** (0.50)	0.10 (0.66)	1.09† (0.68)	1.57** (0.43)
n	42	37	39	40
df[c]	13	13	13	13
Log-likelihood	−29.33	−28.03	−27.57	−31.78
Log-likelihood χ^2 ratio test[d]	13.78**	0.34	7.62†	8.24*
Pseudo-R^2	0.34	0.15	0.21	0.22

[a] Standard errors are in parentheses.
[b] Variable was standardized by subtracting the mean and dividing by the standard deviation.
[c] Models include all the control variables and task variables.
[d] Compared to the same models including control variables only.
† $p < .10$
* $p < .05$
** $p < .01$

FIGURE 2
Interaction Effects of Team Autonomy and External Knowledge[a]



[a] To illustrate the direction and magnitude of effects, low values were set at one standard deviation below the mean, high values were set at one standard deviation above the mean, and the plots were constructed using OLS regression.

announced. The tests showed no significant differences in the main variables, including autonomy and external knowledge, or in their correlations with strategic or operational effectiveness. There were also no significant differences in the effectiveness ratings for the two sets of teams. Attribution bias thus is not a convincing alternative explanation for the results of this study.

Beyond these empirical checks, the study provides some evidence for the robustness of the theoretical model across performance metrics as well as project types. The combination of autonomy and external knowledge was found here to be positively associated with two substantively different measures of team performance, strategic and operational effectiveness, which were significantly but not highly correlated. Prior research has also shown a similar, positive association with a third measure of team performance—project quality—that is different from strategic and operational effectiveness ($r = .65$, $p < .01$; $r = .45$, $p < .01$) (Haas, 2006a). Additionally, examining financial and technical projects separately indicated that the interaction between autonomy and external knowledge was positively and significantly associated with strategic effectiveness for both project types ($b = 1.61$, $p < .05$; $b = 1.25$, $p < .05$), and with operational effectiveness for technical projects though not for financial projects ($b = 1.52$, $p < .01$; $b = 0.59$, $p = .16$).

Theoretical and Practical Implications

Team effectiveness. For self-managing teams, the mixed evidence of prior research on the effects of autonomy is concerning as well as perplexing. Previous studies have typically examined why self-managing teams may not perform well by focusing on their internal interactions, which may suffer from, for example, insufficient interdependence (Langfred, 2005), negative feelings toward collaboration (Kirkman & Shapiro, 2001), or rigid rule enforcement (Barker, 1993). Only a few studies have explicitly considered the importance of teams' external interactions, for example by examining the role of outside coaches (Manz & Sims, 1993), reward systems (Wageman, 1995), and corporate strategic priorities (Zellmer-Bruhn & Gibson, 2006). With the present study I contribute to this effort by arguing that autonomy is a double-edged sword that offers independence but can lead teams to become isolated from their environments. Supporting this argument, I found that teams benefited more from autonomy if they avoided isolation by seeking external knowledge. Recognizing the importance of such external interactions for knowledge-intensive work thus offers a promising way to increase the robustness of theories of team self-management. Further, managers who implement work practices based on team self-management are likely to be better able to realize their potential if they recognize that autonomy carries risks of isolation that these teams should try to avoid.

By drawing attention to the influence risks of external knowledge, this study also addresses the mixed findings of prior research on team boundary spanning. Previous studies have focused mostly on the technical, social, and cognitive barriers to knowledge sharing, such as search and transfer problems (Hansen, 1999), arduous relationships (Szulanski, 1996), and team members' cosmopolitan versus local orientations (Haas, 2006b). The value of knowledge sharing may also be reduced by political problems, however, since knowledge is a double-edged sword that can be used to influence as well as to inform (e.g., Pfeffer, 1981). For research on teams conducting knowledge-intensive work, as well as the broader literatures on knowledge sharing (e.g., Argote, McEvily, & Reagans, 2003) and the knowledge-based view of multinational enterprises (e.g., Kogut & Zander, 1993), the implication is that teams may not benefit from external knowledge unless they can make independent decisions based on this knowledge. For managers, recognizing that knowledge sharing carries influence risks suggests that investing in knowledge management infrastructure such as document databases and "communities of practice" may yield lower than expected returns because the knowledge that is shared through these initiatives may be biased, misleading, or intended to persuade rather than assist users.

Multinational management. In focusing on the performance of teams in a multinational organization, this study also provides a team-level analogue to existing theories of organizational design that helps to explain variation neglected by these theories, especially as they apply to multinational management. Research built on the differentiation-integration view has typically focused on large business units, yet the critical tasks of many organizations today are carried out by relatively small teams located in one or several units, such as cross-functional teams. Multinational management research, in particular, has usually focused on subsidiary autonomy and cross-subsidiary knowledge flows (e.g., Birkinshaw et al., 1998; Kogut & Zander, 1993; Nohria & Ghoshal, 1997) rather than on smaller units that operate in or across national subsidiaries. In contrast, this study identifies team autonomy as a critical locus of differentiation in organizations and highlights knowledge flows to teams as a critical integrating mechanism. By demonstrating the contingent complementarity between autonomy and external knowledge at the team level, this study extends the principles of the differentiation-integration view to explain performance variation within and among national subsidiaries, as well as business units more generally. Additionally, focusing on teams enables practitioners to address the central macrolevel strategic challenge of multinational management—to "think global, act local" (Prahalad & Doz, 1987)—at the micro level where this mandate is implemented.

Team ambidexterity. Finally, this study offers a view of conditions for team effectiveness that is relevant to the growing literature on organizational ambidexterity. Research in this area has highlighted the potential value of structures and processes that enable organizations to engage in exploration and exploitation simultaneously, rather than separately or sequentially (e.g., Gibson & Birkinshaw, 2004; Tushman & O'Reilly, 1996). This research has typically offered a macro perspective on how ambidexterity can be achieved: for example, by focusing some business units on exploitation and others on exploration, then integrating these in a firm's senior team (Smith & Tushman, 2005). Yet, increasingly, ambidexterity is important at lower levels of organizations. For example, new-product development, technological innovation, and professional service delivery all require teams to simultaneously exploit their existing capabilities and explore new approaches and opportunities. The concept of "team ambidexterity" may prove valuable, therefore, for understanding how ambidexterity can be achieved in organizations. Since autonomy allows teams to exploit their capabilities, and external knowledge allows them to explore new approaches and opportunities, the combination of these conditions can be viewed as facilitating ambidexterity. Further, the contingent value of these complementary conditions shows that team ambidexterity, like organizational ambidexterity, may not always be necessary, and provides insight for researchers and managers into the boundary conditions under which it is (or is not) advantageous.

Directions for Future Research

Alongside further exploration of the theoretical and practical implications of this study, investigation of the extent to which its findings hold in other settings could also usefully be pursued, since the present research was conducted in one organization. For example, the benefits and risks of obtaining external knowledge may depend on an organization's culture, since identifying and securing useful knowledge may be more costly in cultures that encourage hoarding rather than sharing (Boisot, 1998). The findings could also benefit from detailed cross-national comparisons, since, for example, the level of independence experienced by autonomous teams may vary with national context even in the same multinational organization (cf. Gibson et al., 2003). Future research might also explore whether the current theoretical model applies beyond the domain of self-managing teams engaged in knowledge-intensive work. For example, much prior research on team autonomy has focused on blue-collar work groups that conduct labor-intensive work, which may be less vulnerable to the risks of isolation or influence (cf. Janz et al., 1997).

Other questions raised by this study arise from limitations of the data, which did not allow for examination of internal team relations that could increase or decrease the advantages of autonomy and external knowledge, such as "transactive memory systems" (e.g., Lewis, 2004) or subgroup conflict (e.g., Gibson & Vermeulen, 2003). Further unpacking the concepts of autonomy and external knowledge could also be worthwhile: for example, future research could examine autonomy relative to different stakeholders to establish whether the benefits of independence and risks of isolation depend on who else is involved in decision making, and external knowledge providers could be examined via network methods to see whether different configurations of providers affect the information benefits and influence risks of obtaining external knowledge.

Conclusion

In an influential political sociology theory of nation states, Evans (1995) coined the phrase "embedded autonomy" to argue that well-functioning nation states are those whose institutions solicit and consider the opinions and concerns of their constituents but are able to resist excessive pressures from those constituents. The combination of autonomy and external knowledge that this study has shown to be valuable invokes a similar vision of the conditions that promote effective performance for self-managing teams engaged in knowledge-intensive work. As such teams strive to perform effectively, embedded autonomy—in the form of external knowledge use combined with control over critical task decisions—can enable them to avoid the dangers of excessive isolation or influence and to make decisions that are both informed and independent.

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