MANIFESTATIONS OF HIGHER-ORDER ROUTINES: THE UNDERLYING MECHANISMS OF DELIBERATE LEARNING IN THE CONTEXT OF POSTACQUISITION INTEGRATION

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Building on the codification and dynamic capabilities literatures, we pursue deeper insight into the underlying mechanisms of deliberate learning in the context of post-acquisition integration. We argue that experience codification gives rise to inertial forces that hamper the customization of routines to any given acquisition. We theorize, therefore, that successful acquirers develop higher-order routines—as manifested in two complementary sets of concrete organizational practices—that prevent the generalization of inapplicable ("zero-order") codified routines. After drawing on in-depth qualitative data to help build our theoretical argument, we test it formally with unique survey data on 85 active acquirers.

Over the past two decades or so, a broad consensus has emerged among academics and practitioners alike that the postacquisition integration pro-

cess represents a crucial, if not the single most important (Larsson & Finkelstein, 1999), determinant of acquisition performance (see Fubini, Price, & Zollo, 2007; Haspeslagh & Jemison, 1991; Hitt, Harrison, & Ireland, 2001; Marks & Mirvis, 1998). Indeed, a handful of highly praised firms, including Cisco Systems and General Electric, have built strong reputations as master acquirers based primarily on their excellence at integrating acquisitions (Ashkenas, DeMonaco, & Francis, 1998; Paulson, 2001). Such firms, however, still appear to represent a decided minority, since at least "three out of every five M&A deals result in ineffective. . . . integration" (Sherman & Hart, 2006: 234).

The integration process consists of numerous interdependent subactivities that span a variety of functional areas and often several geographic or industrial settings as well. Given that the execution of these subactivities usually needs to be customized to the specific deal at hand (Haspeslagh & Jemison, 1991), no two acquisitions are ever quite the same. As a result of this heterogeneity along multiple dimensions (Zollo & Singh, 2004), an acquirer tends to face high levels of causal ambiguity during integration (Cording, Christmann, & King, 2008). This implies that it is difficult to disentangle "causal relationships between the decisions or actions taken and the performance outcomes obtained" (Zollo & Winter, 2002: 348; also see Lippman & Rumelt, 1982).

In light of the above, a rapidly growing stream of research has started to examine acquisitions from a learning perspective, forwarding the argument that prior experience is likely to be crucial in dealing with the complexity that firms encounter during the acquisition integration process. Regarding the mechanisms through which such learning occurs (for a review see Barkema and Schijven [2008a]), most scholars have anchored their work in the traditional perspective (see Levitt & March, 1988) that learning takes place semiautomatically as routines are developed on the basis of experience accumulated over time (e.g., Haleblian & Finkelstein, 1999; Hayward, 2002). More recent work, however, has provided evidence that mere experience accumulation tends not to suffice. Instead, developing a capability for acquisition integration seems to require that a firm engage in more deliberate efforts to learn by codifying its experience in manuals, checklists, and the like (Heimeriks, Gates, & Zollo, 2008; Zollo & Singh, 2004)—an insight that has been applied in the alliance literature as well (e.g., Heimeriks & Duysters, 2007; Kale & Singh, 2007). Thus, received wisdom suggests that codification of experience helps firms "see through the fog" of causal ambiguity that surrounds complex activities by facilitating the identification of the cause-and-effect relationships that govern their performance outcomes (see Zollo & Winter, 2002).

Quite arguably, this seminal work on routine codification has revolutionized the literature on organizational learning by directly addressing the black box in the experience-performance relationship that had been firmly in place since early work on learning curves (see Arrow, 1962; Yelle, 1979). However, by revealing that organizational learning is not a semiautomatic, largely exogenous process but one often under management's active control, it has become clear that this stream of work has so far merely scratched the surface of the intricate mechanisms underlying deliberate forms of learning. Indeed, the aforementioned black box looms larger than ever now that the field of management scholarship has had a peek at the complexity of what is inside. As such, the most valuable contribution of existing research on routine codification might lie not so much in the answers it has thus far provided but, above all, in the myriad novel questions it forces one to ask.

Key among these questions, we believe, is that of how firms can strike a balance between the pros and cons of codification in an attempt to optimize their learning. After all, notwithstanding the *beneficial* effects that have been virtually the sole focus of attention in recent work, a long line of research dating back as far as the early 20th century (see

Weber, 1930) suggests that codification *also* gives rise to inertial forces that may render a firm insufficiently flexible to effectively customize its routines to the specific situation at hand. Hence, if codification is not a panacea, but rather a double-edged sword, what does it take for firms to use it productively? In the present article, we seek to answer this question in the context of postacquisition integration by synthesizing and building on the codification (e.g., Schulz, 1998; Zollo & Winter, 2002) and dynamic capabilities (e.g., Helfat et al., 2007; Teece, Pisano, & Shuen, 1997) literatures.

Our core argument is that the rigidity that codification entails needs to be counteracted by *higher-order routines* (see Collis, 1994). Specifically, these higher-order routines manifest themselves in an array of concrete organizational practices (Helfat et al., 2007) that are aimed at preventing misapplication of "zero-order," codified routines by fostering ad hoc problem solving. Whereas zero-order routines are "ordinary" or operational routines, higher-order routines operate to modify ordinary routines (Winter, 2003). We follow Zollo and Winter (2002) and define "dynamic capability" as a learned and stable pattern of collective activity through which an organization systematically generates and modifies its operating routines in pursuit of improved effectiveness. We first theorize that, as a direct result of implementing the integration routines contained in their codified tools, successful active acquirers recognize the inherent limitation of codification and adopt what we label "risk management practices" (see Schreyögg & Kliesch-Eberl, 2007). These serve to help identify a deal's unique features and thus, trigger the first, or variation, stage of ad hoc problem solving: generating various potential courses of action that are customized to those idiosyncrasies. Refining the argument, we then examine salient instances of such deal-specific features that likely have a key bearing on the efficacy of risk management practices because they impact the extent to which effective integration requires customization of codified routines.

Subsequently, we argue that acquirers can adopt a distinct but complementary set of practices, which we label "tacit knowledge transfer practices," that reduce causal ambiguity regarding acquisition integration among front-line actors directly involved in a postacquisition integration and thus, enhance the effectiveness with which those actors use risk management practices to customize the acquirer's codified integration routines to the specific deal at hand. In other words, these practices assist in the second, or selection, stage of ad hoc problem solving: choosing the optimal course of action from the various potential options gener-

ated in the first stage. Analyses of unique survey data on a sample of 85 active acquirers provide considerable support for our hypotheses.

THEORY AND HYPOTHESES

In an attempt to enhance the richness of our theorizing, we have relied on an approach that fosters "close interplay between theory and reality" (Van de Ven, 2007: 100; see also Edmondson & McManus, 2007) by combining established arguments from prior research with in-depth qualitative data from extensive fieldwork.[1] Specifically, we draw on insights from 37 interviews with 30 executives responsible for acquisition integration at a variety of experienced acquirers that have had the opportunity to develop relatively sophisticated integration practices yet have exhibited substantial variation in the success of their integration efforts (for more detail, please see Methods). As such, the arguments developed below should be interpreted within the context of *active* acquirers, which tend to focus "primarily on smaller . . . bolt-on [i.e., related] acquisitions . . . that can be immediately integrated" (Pettit, 2007: 92; see also Barkema & Schijven, 2008b; Fuller, Netter, & Stegemoller, 2002; Haspeslagh & Jemison, 1991).[2]

To foreshadow our hypotheses, Figure 1 graphically summarizes our conceptual model.

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[1] Some refer to this as an "abductive" approach to theory building, meaning that a researcher goes "back and forth between induction and deduction" (Zahra & Newey, 2009: 1061; see also Gulati, 2007; Van de Ven, 2007).

[2] Accordingly, the survey data used for our statistical tests also pertain exclusively to such highly acquisitive firms.

Unraveling the Effects of Routine Codification

In their work on routine codification in the context of postacquisition integration, Zollo and Singh argued, building on Zollo and Winter's (2002) seminal piece, that "as a group produces tools and systems to execute a given task, it will have to evaluate how and why its past decisions and actions for similar situations have influenced performance. This effort will likely improve the quality of the group's understanding of the causes of successes and failures in the task at hand" (2004: 1238). On a similar note, although focusing on alliances, Kale and Singh proposed that "by involving themselves in the effort to codify alliance management knowledge, managers emerge with a crisper understanding of what works, or what does not work and why. . . . Hence codification not only helps firms replicate and transfer . . . best practices, but also identify or select what those best practices are" (2007: 985). In short, therefore, received wisdom holds that codification reduces causal ambiguity surrounding strategic tasks, thus fostering learning.

Implementation on the front lines. The received wisdom outlined above is based on the implicit assumption that any enhanced causal insight gained through routine codification is, in fact, put to use during the integration of acquisitions. However, whereas these codified tools are typically *created* at corporate headquarters (HQ)—in some cases by a dedicated mergers and acquisitions (M&A) or corporate development department (Fubini et al., 2007; Zollo & Singh, 2004)—they tend to be *implemented* by others. After all, "integration is usually owned almost exclusively by the line management team" within the specific subunit undertaking a given acquisition (see also Ashkenas et al., 1998;

FIGURE 1
Conceptual Model
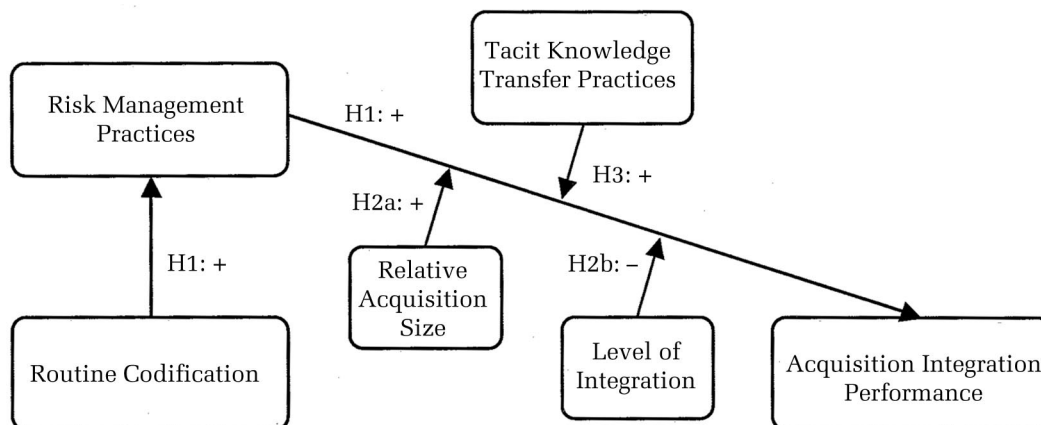
Frankel, 2007: 74; Haspeslagh & Jemison, 1991; Palter & Srinivasan, 2006; Schijven & Martin, 2009).[3] As one of the senior executives we interviewed put it:

> The [M&A department] is very active all the way to closing, and after closing most of the work gets done within the functions.

Similarly, an integration manager in a firm's corporate HQ told us the following:

> I was involved in the planning up to closure, and about a month afterwards. . . . The general manager [of the business] . . . drove the subsequent integration.

Given this divide between the creators and implementers of codified tools, it seems unlikely that any superior understanding gained through the codification process by the former will transfer to the latter simply by being provided with these codified tools (Szulanski, 1996). Such insights will largely be tacit, and tacit knowledge is notoriously difficult, if not impossible, to codify (see also Martin & Salomon, 2003; Polanyi, 1966; Simonin, 1999). Indeed, Zollo and Singh themselves acknowledged that "the superior understanding of the action-performance linkages derived from the creation of those tools will not diffuse with the tools" (2004: 1238).

Extending this line of reasoning, we argue that from the perspective of those who actually integrate a firm's acquisitions, codified tools are essentially a form of behavioral control (e.g., Hoskisson & Hitt, 1988; Snell, 1992) specifying how they are to act in a given situation. As such, we expect that, in practice, these tools may not so much offer deeper insight into the causal relationships underlying integration but, above all, amplify the firm's prior experience—its "organizational memory" (Cyert & March, 1963)—ensuring that everyone complies with established routines. Indeed, codified rules "are functional precisely because they can be produced centrally and applied decentrally" (Schulz, 1998: 848). Or, in the words of a senior M&A department member, who clearly thinks of codified tools as behavioral controls:

> In terms of implementing procedures . . . you are not given much of a choice. The business doesn't have much of a choice when we are engaged. . . . We are

a company of rules and processes, like many other companies, and they are expected to follow them. . . . Example: recently we put together our divestiture strategic guidance document. This is basically the Bible on how to manage divestitures.

Hence, although the codification process may indeed be an engine of profound cognitive activity for those at corporate HQ who are directly involved, we argue that the resulting tools are unlikely to spark such learning on the part of those on the front lines who "merely" implement them as part of the nuts and bolts of acquisition integration. In fact, when viewed from the implementers' perspective, potential downsides of codification become difficult to overlook, and these are downsides that recent work has left largely unexplored, yet that took center stage in earlier research on the topic, as we will discuss next.

Routine codification as a double-edged sword. Despite its recent origins in the strategy field, research on codification has a long and rich history in organization theory. In fact, over the past century, at least three interrelated research streams in this literature have been predicated on the notion of codification, though often under different labels. The first of these, to which the entire theme can arguably be traced back, is the study of bureaucracy, pioneered by Max Weber in the early 20th century. Weber (1930) and authors who built on his work, such as Crozier (1964), Gouldner (1964), and Merton (1957), argued that the growing prevalence of formal rules in society resulted from the superior efficiency of bureaucracy. Yet, they emphasized that "the momentum of bureaucratization was irreversible" and thus, that codified rules would ultimately turn into an "iron cage in which humanity was . . . imprisoned" (DiMaggio & Powell, 1983: 147).

Largely as an offshoot of the above literature, a second stream of research emerged in the early 1960s, focusing on firms rather than society as a whole and conceptualizing codification, now labeled "formalization," as a key dimension of organizational structure (see Pugh, Hickson, Hinings, & Turner, 1968; Pugh, Hickson, Hinings, Macdonald, Turner, & Lupton, 1963). Initially, scholars found that formalization is often a critical determinant of firm success (e.g., Ghoshal & Nohria, 1989; Miller, 1987; Reimann, 1974). Used excessively, however, it can give rise to rigidity, as more recent work has revealed (e.g., Baum & Wally, 2003; Miller, 1993).

Finally, a third stream of work that emerged in the early 1990s has specifically pursued deeper insight into the dynamics of codification within firms (e.g., Mills & Murgatroyd, 1991; Pinchot &

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[3] Of course, small, single-business firms engage in acquisitions as well. However, they are unlikely to do so frequently enough to justify the costs of formalizing their experience in codified tools (Haspeslagh & Jemison, 1991), let alone of establishing a dedicated staff department to do so (see Kale et al., 2002).

Pinchot, 1993; Schulz, 1998; Zhou, 1993). Most notably for our purposes, Schulz uncovered that organizational rules, defined as "written organizational document[(s) that specify] who should do what, when, and under which conditions" (1998: 847), enable a firm to efficiently address well-known, recurring problems. He also found, however, that by making firms respond to problems in a preprogrammed way, codification often "causes organizational inertia" (1998: 873), a negative side effect he referred to as the "codification trap" (1998: 853).

In sum, nearly a century of research unequivocally suggests that codification has both beneficial and harmful effects (for some more recent work see Davis, Eisenhardt, and Bingham [2009], Farjoun [2010], and Sine, Mitsuhashi, and Kirsch [2006]). Although the efficiencies it fosters are desirable, the inertia it causes may well outweigh these gains. Given this established notion of codification as a double-edged sword, then, it is surprising that recent work in strategy has focused almost exclusively on its benefits. To be sure, this research does mention the direct costs of creating codified tools as well as the potential costs of reducing "the ability of firms to protect their rents from imitation" and the cost of "phenomena of superstitious learning" (Zollo & Singh, 2004: 1238). Yet it largely overlooks the central weakness of codification—the rigidity it breeds—stressed by the long line of work discussed above and saliently pointed out in the specific context of our study. As a senior human resource manager we interviewed said:

> I think too often it [i.e., codified methods for integrating a target's human resource management systems] can stifle creativity. . . . I think I have too many people who think if we have a set of guidelines, we have to follow those guidelines.

In essence, therefore, codified tools tend to give rise to inertial forces that constrain the ability of those directly involved in acquisition integration to step back and engage in ad hoc problem solving—that is, to purposefully generate and choose from a set of potentially effective courses of action that are customized to the specific case at hand (Cyert & March, 1963; Winter, 2003). Crucially, however, such ad hoc problem solving is often key to effective integration because, owing to the heterogeneity across acquisitions, the integration process rarely goes exactly as planned (Barkema & Schijven, 2008b) and thus, defies full routinization (Cording et al., 2008).[4] Indeed, one of our interviewees, a top-level executive in a highly acquisitive firm,

aptly used the term "white spaces" to refer to those aspects of the integration process in which routinization tends not to work and ad hoc problem solving is called for:

> We constantly try to manage the white spaces to enable the project to move forward, because no two acquisitions . . . are exactly the same. So there is a lot of interfacing to do, new details, new things to manage.

A capability for acquisition integration is, therefore, as much about knowing when *not* to rely on established routines as it is about generalizing those routines from one acquisition to the next. Notwithstanding their invaluable role whenever such generalization is appropriate (see Zhou, 1997), however, codified "rules," by taking on lives of their own, form the very backbone of bureaucratization, causing "habitual application of old rules to new problems . . . even if [these new problems] do not match the premises of the old rules" (Schulz, 1998: 853). In other words, if codified tools do not provide deeper insight into the cause-and-effect relationships underlying acquisition integration to those who actually implement the tools, but rather serve primarily as behavioral controls as we argued earlier, then the rigidity that they cause should make the misapplication of routines (the so-called "negative experience transfer" [see Ellis, 1965; Gick & Holyoak, 1987]) *more* likely, not *less* likely, as extant work has suggested (e.g., Zollo & Singh, 2004). Hence, we argue that an essential part of an acquisition integration capability is a mechanism that helps to avoid such negative experience transfer—one that counteracts the inertial forces that codified routines give rise to by rendering them more flexible or "dynamic."

The Countervailing Effect of Higher-Order Routines

Tying into the burgeoning literature on dynamic capabilities (e.g., Helfat et al., 2007; Teece et al., 1997), the mechanism alluded to above captures the very essence of *higher-order routines* (see Collis, 1994), which "constitute the firm's systematic methods for modifying operating [i.e., zero-order] routines" (Zollo & Winter, 2002: 340). To elaborate, recent advances have led to a broad consensus that, "as opposed to the idea of a dynamic capability [as a single, monolithic construct], the strengths of pat-

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[4] In line with this, it was recently argued that "follow-

ing best practice does not guarantee M&A success." Instead, in "M&A integrations . . . variation and . . . uncertainties need to be managed" (Swaminathan & Tomlin, 2006: 1).

terned problem-solving [i.e., zero-order routines] and dynamization [i.e., higher-order routines] cannot be merged into one conception" (Schreyögg & Kliesch-Eberl, 2007: 925) without sacrificing theoretical coherence. Instead, to solve "the rigidity issue," they should be "conceived as two separate *countervailing processes*" (Schreyögg & Kliesch-Eberl, 2007: 925; emphasis in original; see also Danneels, 2011; Katkalo, Pitelis, & Teece, 2010; Shamsie, Martin, & Miller, 2009).

By establishing that zero-order routines tend to crowd out ad hoc problem solving and thus, cannot *inherently* be made dynamic, this "dual-process" logic implies that the inertia they cause, especially when reinforced by codification, can be broken only by purposely organizing ad hoc problem solving as a *stand-alone* process. Higher-order routines, therefore, serve to reveal the "blind spots" in codified tools by promoting "reflection" (Schreyögg & Kliesch-Eberl, 2007: 927), "self-conscious inquiry" (Danneels, 2011: 21), and "conscious . . . action" (Katkalo et al., 2010: 1179). Put differently, they compensate for the "risk [of applying] traditional patterns to new tasks" (Schreyögg & Kliesch-Eberl, 2007: 926)—that is, negative experience transfer—by enabling a firm to rigorously monitor and question the applicability of its (zero-order) codified routines and, if necessary, to deviate from and customize those routines to the situation at hand.

Building on the above, a truly "dynamic" capability for acquisition integration must encompass two related elements that operate (quasi-)separately because of their countervailing effects: (1) zero-order routines codified in integration tools that allow those directly involved to efficiently apply lessons learned from a firm's prior experience, and (2) higher-order routines that mitigate the risk of negative experience transfer by helping these individuals identify and effectively address those features of a deal that deviate from the norm and thus, call for ad hoc integration solutions. Given our purposes, however, we need to be more precise on the form that higher-order routines take in the context of acquisition integration. After all, "when we observe [higher-order routines] in use, we are observing the organizational processes that serve . . . to put [them] into action" (Coen & Maritan, 2011: 101; see also Helfat et al., 2007: 31). Hence, much as zero-order routines are often codified by acquirers in integration tools (Zollo & Singh, 2004), higher-order routines should also manifest themselves in concrete organizational practices.

Prior research has established that higher-order routines operate through the classic evolutionary mechanisms of variation and selection (see also Boisot, 1998; Miner, 1994; Zollo & Winter, 2002;

Zott, 2003). That is, in the face of a specific instance of a task that departs sufficiently from standard practice, higher-order routines serve to generate sets of modified or customized versions of the zero-order routines involved (i.e., variation) and single out the optimal versions for subsequent implementation (i.e., selection). Indeed, while conducting our field research with active acquirers, we regularly came across organizational practices that were clear manifestations of these key underlying mechanisms of higher-order routines; below, we refer to these as risk management practices and tacit knowledge transfer practices.

Risk management practices as triggers of variation. First and foremost, our fieldwork made us aware of organizational practices that, although they varied across firms in their details, were invariably aimed at detecting idiosyncrasies of a focal deal that required special attention during its integration. In keeping with the original vocabulary of several of the acquirers we interviewed, we label these "risk management practices,"[5] explicitly referring to the risk of negative experience transfer, which has come to play an increasingly prominent role in the dynamic capabilities literature, as discussed earlier (compare Schreyögg and Kliesch-Eberl's [2007] "risk compensation"). For example, consider what two senior executives, both responsible for developing and maintaining their firms' codified integration methodologies, told us:

> Yes, we have an overall [codified integration] process, we have a framework, but you should never let a work process get in the way of some good thinking because every deal is different and . . . you need to go in and really understand the transaction and what you're trying to achieve. . . . *Risk management* makes you a lot more sensitized to really keep your eyes open for new risks.

> There are many risks in each deal. . . . *To manage integration risks*, we always use a risk matrix to make sure we remain aware of unique characteristics of the deal.

To elaborate, the specific practices that some of the acquirers we interviewed had adopted to help manage the risk of ineffective integration based on their codified tools included sessions for identifying and prioritizing such risks for a focal acquisition (e.g., using a risk matrix), quantifying them, and developing responses to them, among others. For instance, in one of these firms, those involved

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[5] Please note that the risk management practices we examine here are fundamentally different from those referred to in the corporate finance literature, which serve to hedge various financial risks (e.g., Tufano, 1996).

in integration, in consultation with the creators of the firm's codified tools, had adopted a policy aimed at scrutinizing the applicability of codified routines on how to integrate target firms' accounting systems. After collectively identifying the unique risks posed by the deal at hand (e.g., loss of critical target-specific data and imposition of the acquirer's inferior payroll system), they developed responses to these risks through scenario planning sessions, which in turn helped them customize codified integration routines to the idiosyncrasies of the deal:

> Really, the point of this [policy] is "Guys, do not underestimate the challenges that we'll have to face in these areas" to highlight these things.

Other acquirers we investigated had established similar policies regarding the integration of target firms' human resource management and information technology systems, among others.

Moreover, our fieldwork strongly suggested that these risk management practices are typically adopted in direct reaction to the rigidity caused by codified routines and the negative experience transfer that this implies. In line with this, an argument in some of the aforementioned recent work on dynamic capabilities is that the inertial forces bred by zero-order routines "bring about a focus by themselves when they literally become felt in terms of a crisis" (Schreyögg & Kliesch-Eberl, 2007: 928). Indeed, several of our interviewees told us that, over time, the implementation of codified integration tools had pushed them (albeit with substantial variation across firms) to adopt risk management practices. For instance, two corporate executives shared the following:

> Once we did that [i.e., create the codified integration tools], we then had the opportunity to sit back and say "Are we missing something?" What we found is that there was a wealth of information but once we assembled and implemented it, that there were some gaps. . . . So that is when we said, you know what, we need to develop some [risk management] practices to try to address those gaps . . . Once we understood the lessons learned [as a result of implementing codified tools], we knew where the pitfalls may be.

> If you don't have it [i.e., codified integration methodology], it's difficult to think about the modifications and the options. . . . It's always a beginning point which triggers you asking questions. I mean, I think anyone who is trying to learn something new, starting with a template . . . helps them ask the right questions, helps them uncover things under rocks and stones, and certainly helps point them in the right direction.

Similarly, in the words of a business unit manager discussing risk management practices with us:

> For . . . years, we tended to implement every deal the same way. . . . Moving forward, we will do more adjusting [of the codified tools] on acquisitions . . . to get more flexible.

These quotes suggest that although routine codification may be a necessary condition for effective development of acquisition integration capability, it is certainly not a sufficient one. We theorize that the risk management practices adopted by these and other acquirers we interviewed essentially constitute a mechanism of variation, as discussed earlier (see Zollo & Winter, 2002). In other words, these practices induce the first stage of ad hoc problem solving, triggering those on the front lines who are directly involved in the integration of an acquisition, whenever necessary, to deviate from their firm's codified integration routines and to purposefully consider a variety of potential, ad hoc courses of action that are customized to a deal's unique features.

In summary, given the above, we hypothesize that the codification of (zero-order) integration routines tends to trigger the adoption of risk management practices. These practices, in turn, serve as higher-order routines by guarding against overly rigid reliance on codified tools and thus, against negative transfer effects on the performance of a focal deal's integration:

Hypothesis 1. The effect of routine codification on the performance of acquisition integration is mediated by risk management practices.[6]

As prior research suggests, the efficacy of higher-order routines depends, in large part, on the heterogeneity among instances of a given task, since "at higher degrees of task heterogeneity . . . the hazards of inappropriate generalization [i.e., negative experience transfer] can only be attenuated via explicit cognitive effort" (Zollo & Winter, 2002: 348; see also Kale & Singh, 2007;). Thus, in light of the well-documented heterogeneity of acquisitions (e.g., Barkema & Schijven, 2008b; Cording et al., 2008), the higher-order routines that risk management practices bring to bear should, in line with Hypothesis 1, play a vital role in the development of acquisition integration capability. However, since some deals are more nonroutine than others, a given acquirer is likely to encounter considerable

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[6] Indeed, "mediators represent properties . . . that transform the input variables in some way" (Baron & Kenny, 1986: 1178), which closely corresponds to our conceptualization of higher-order routines.

variation in the degree to which integration calls for risk management practices to help deviate from and customize its codified routines to the unique features of its acquisitions. In an effort to refine the theoretical argument developed thus far, therefore, we now turn our attention to salient instances of such deal-specific features.

As mentioned at the outset, our theorizing pertains specifically to *active* acquirers, which predominantly engage in so-called "bolt-on" acquisitions: related deals that are undertaken by individual subunits and that, as a result, tend to be "*smaller* and . . . immediately *integrated*" (Pettit, 2007: 92; see also Palter & Srinivasan, 2006). Typically, then, these firms develop integration routines that are relatively conducive to this type of acquisition. In contrast, effective integration of less common deals—most notably, bolt-on acquisitions that (1) are comparatively large or (2) call for some level of autonomy—would, we argue, require considerably more conscious effort to customize established routines by means of risk management practices. Inevitably, these two factors represent a mere subset of a broader class of potentially relevant deal-specific features. Yet, given the above outline of what is most distinctive of active acquirers' acquisitions, we believe they are among the most salient ones for our purposes.

Regarding the size of a bolt-on acquisition, we expect that the larger it is relative to the acquirer, the less likely it is that this acquirer's codified integration routines will be directly applicable. Compared to the typical smaller deals, large ones can often not be readily absorbed (Haspeslagh & Jemison, 1991). More specifically, since large targets themselves tend to consist of multiple interdependent subunits, they usually call for more complex approaches that involve careful planning and coordination of distinct integration efforts to ensure that existing synergistic linkages among these constituent parts are not disrupted (e.g., Lajoux, 2006; Schweizer, 2005). For instance, the acquirer may have to cross-integrate the target firm into several of its subunits (Schijven & Martin, 2009), divest and redeploy parts of it (Capron, Dussauge, & Mitchell, 1998), or reconfigure some of its own subunits prior to integrating the target (Barkema & Schijven, 2008b; Karim, 2006). Indeed, as Haspeslagh and Jemison observed: "It may be the acquired units' relative size . . . that presents the greatest challenge to integration" (1991: 151).

Since the codified integration routines of active acquirers primarily derive from experience with smaller acquisitions, we argue that they are unlikely to enable those involved to integrate large deals effectively, given the nonroutine organiza-

tional complexities that such large bolt-on acquisitions present. Substantial customization of these codified routines will, therefore, often be necessary. In support of this, an integration manager told us the following:

> Obviously, when we're doing a little transaction, we don't have such robust [risk management] processes. . . . They are more important the larger the deal.

Hence, we argue that the larger the acquisition it is attempting to integrate, the more an acquirer stands to gain from the close scrutiny of codified routines that risk management practices foster:

Hypothesis 2a. The positive effect of risk management practices on the performance of acquisition integration is amplified by the relative size of the acquisition.

Almost by definition, the bolt-on acquisitions typical of large, active acquirers (given some form of "relatedness" and the synergistic potential that this implies) tend to be relatively tightly integrated into their respective subunits. As Haspeslagh and Jemison noted with respect to highly acquisitive firms, "absorption [is] the most prevalent form of integration" (1991: 189). Nevertheless, this overall tendency toward tight integration does not mean, of course, that all these deals are integrated to the same extent; much as some of them will stand out in terms of their size, some will deviate from the norm in terms of their requisite level of integration.

Most notably, some acquisitions might call for a "symbiotic" approach to integration (see Haspeslagh & Jemison, 1991). That is, if an acquirer seeks to gain access to valuable capabilities of a target, such as its innovation prowess, it may need to grant that firm considerable autonomy, at least temporarily, to ensure that these capabilities are not disrupted or lost altogether before they have been properly assimilated and shared throughout the organization (Puranam, Singh, & Zollo, 2006; Ranft & Lord, 2002). Since deals such as these require lower levels of integration, an acquirer cannot readily draw on codified routines designed for the typical case, in which the acquisition is to be more fully absorbed. For example, relying on codified tools developed to help install established incentive systems in a target may be counterproductive for a subunit in need of high-powered, entrepreneurial incentives to retain its innovative edge (Schweizer, 2005).

As with the above reasoning regarding acquisition size, therefore, we predict that the lower the level of integration through which active acquirers implement a given bolt-on deal, the more vital the

role that risk management practices are likely to play. Within the specific context of our study, as we have argued, these practices are key manifestations of higher-order routines that customize an acquirer's (zero-order) codified integration routines to the particular case at hand. As such, if a given deal deviates from the norm in that it requires a relatively low level of integration, those implementing it need to deviate from standard practice accordingly by devising ad hoc, nonroutine courses of action. A senior executive responsible for integrating her firm's many acquisitions spoke to the need for risk management practices:

> Our DNA and that of most other companies is to integrate fully. You have to really, really drive a big truck to have that DNA switch to something else. . . . We never begin with a blank piece of paper—we've got examples. But we have to modify them.

On the basis of the above discussion, we formulate the following hypothesis:

> *Hypothesis 2b. The positive effect of risk management practices on the performance of acquisition integration is dampened by the level of integration of the acquisition.*

Tacit knowledge transfer practices as optimizers of selection. Despite their critical role in countering the inertia caused by routine codification, risk management practices do not capture the full story of higher-order routines in the context of acquisition integration. These practices, in effect, jump-start the first, or variation, stage of ad hoc problem solving, inducing deviation from codified integration routines and active exploration of a set of potential customized solutions whenever necessary. However, in and of themselves, they do not ensure that the course of action ultimately arrived at in the selection stage is, in fact, the optimal one.

Hearkening back to our earlier discussion of the knowledge gap between the creators and implementers of a firm's codified tools, the key reason for the above, as became clear during our fieldwork, is that those directly involved in a deal's integration tend to have a limited understanding of the cause-and-effect relationships that underpin acquisition integration (see also Fubini et al., 2007; Lajoux, 2006). As a result, their ability to select the optimal ad hoc course of action in the face of nonroutine integration issues is often impaired. To alleviate this problem, an acquirer needs to adopt practices that provide "an improved level of understanding of the causal mechanisms intervening between the actions required to execute [the] task and the performance outcomes produced [thus] "making sure that the . . . discussion in the selection stage . . . is

correctly informed" (Zollo & Winter, 2002: 342, 349).

In line with this, most of the acquirers we interviewed had indeed adopted practices aimed specifically at reducing causal ambiguity by transferring tacit knowledge on acquisition integration to those within subunits currently integrating bolt-on deals. These "tacit knowledge transfer practices" (see Cepeda & Vera, 2007) are based on extensive personal contact, including training by integration experts (experienced corporate executives or external consultants), sessions between managers from different subunits currently involved in acquisitions, systematic evaluation of the progress toward integration of the firm's recent deals, and joint planning of integration efforts with managers from acquired firms (see Haspeslagh & Jemison, 1991; Lajoux, 2006; Marks & Mirvis, 1998). For instance, one of the corporate executives we quoted earlier described a "boot camp" geared entirely toward sharing tacit knowledge on acquisition integration:

> We have a boot camp—a two-day workshop, very intensive. We start off with the generic plans that we have, the [codified] templates we have defined over time, by function, et cetera. Then, around the key members, we customize it dependent on a given deal [as an example]. . . . If you just gave it to a team to do, a bunch of people who've never experienced this . . . it becomes more a check in the box, but the implementation is not solid. . . . So the boot camp is to help them understand and execute the [risk management] methodology—help them bridge the *white spaces.*

Furthermore, consider what another executive told us regarding her firm's use of web meetings:

> I don't think anything replaces dialogue in this space . . . I have to encourage people to modify the rules to make things happen appropriately. For instance, we have these web meetings. We talk about processes and methodology, give them different examples so they can see it's not one-size-fits-all. . . . Essentially [these are part of an] ongoing dialogue, and I'm supporting and coaching along the way, solving ad hoc problems.

By providing ample opportunity for in-depth discussion of specific issues that a given integration team is facing, tacit knowledge transfer practices go beyond what codified tools can offer (Nonaka & Takeuchi, 1995). They elevate understanding of acquisition integration from the "what" (declarative knowledge) and the "how" (procedural knowledge) to the "why" (causal knowledge) (see Cohen & Bacdayan, 1994), thus narrowing the knowledge gap between those in corporate HQ who create the codified tools and those on the front lines actually

applying them. Once the latter know *why* certain routines do not work in a given situation, they will be able to select more optimal courses of action customized to integrating the specific deal at hand.

In sum, whereas risk management practices trigger the variation stage of ad hoc problem solving, tacit knowledge transfer practices optimize the selection stage. As such, these practices represent a complementary mechanism through which higher-order routines manifest themselves, aimed at more fully unlocking the potential of risk management practices:

> *Hypothesis 3. The positive effect of risk management practices on the performance of acquisition integration is amplified by tacit knowledge transfer practices.*

DATA AND METHODS

Sample

Our study is based on a two-pronged research design aimed at studying postacquisition integration by active acquirers that have developed relatively sophisticated integration practices. In 2006, we engaged in a series of in-depth interviews with integration specialists at renowned acquirers as well as at experienced firms that have proven less successful at acquisition integration. Subsequently, with the help of The Conference Board, the third author sent out a detailed survey to a large number of highly acquisitive firms based, in part, on insights gained from the interviews.[7] Thus, as touched on earlier, we combine (1) fine-grained survey data with (2) in-depth qualitative study of integration practices in pursuit of richer insights than either of these two methodologies could yield independently (Van de Ven, 2007).

Interviews

We interviewed 30 executives (co)responsible for acquisition integration at a variety of large acquisitive firms, including BOC, Boeing, Cisco, Dow, Eastman Chemical, GE Commercial Finance, Home Depot, IBM, Stanley Works, and Xerox. In total, 37 interviews were completed, including 7 for follow-up questioning, providing us with detailed information on key factors underlying the vari-

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[7] Since we pursued a deeper understanding of how integration capability is developed, we felt it necessary to trade in some external validity (i.e., generalizability) for higher internal validity by focusing only on highly active acquirers.

ance across firms in acquisition integration performance.

The interviews lasted between 70 and 120 minutes and were semistructured, containing mostly open-ended questions on how firms learned to manage integration. We pretested the protocol with three acquisition specialists to check for question clarity and interpretation. The interviews were transcribed within 24 hours and verified by the interviewees to ensure that our interpretations were correct. Moreover, as part of a virtual tour, one of the firms provided access to its codified integration templates, allowing us to gain a better understanding of how such tools are created, adjusted, updated, and implemented. In particular, this helped us understand how specific codified tools, as well as risk management practices, influence integration outcomes.

Survey

From the interviews, an extensive literature search, and input from two academic and two industry experts, we distilled a list of 22 key integration practices. This enabled us to combine insights from prior research with state-of-the-art practices of experienced acquirers, which were elaborated on in discussions with several members of leading consulting firms. We then pretested and refined the survey in light of feedback from three acquisition specialists.

In total, 400 surveys were sent to Conference Board members active worldwide in the M&A, business development, and corporate strategy chapters. The Conference Board is a not-for-profit organization that conducts research and brings together executives to learn from one another. Members of these chapters are typically corporate executives of large multinationals, occupying such positions as CEO, vice president of strategy, vice president of business development, or director of an M&A department. Since these executives were usually involved in allocating integration staff and ultimately responsible for acquisition outcomes, they served as key respondents. As such, we made sure that those who actually oversaw the acquisition integration process at their firms filled out our survey (see Ray, Barney, & Muhanna, 2004).

Of the surveys sent out, 101 were received back, for a response rate slightly over 25 percent, which is relatively high for surveys targeted at senior executives in large firms (cf. Capron & Shen, 2007; Cycyota & Harrison, 2002). We dropped 16 surveys with incomplete responses, leaving a total of 85 to

be included in the analyses.[8] We tested for nonresponse bias by comparing early and late responses (Armstrong & Overton, 1977). Tests for three key variables ($\chi^2 = 7.05$, $p > .05$, for acquisition experience; $\chi^2 = 2.29$, $p > .05$ for sales; and $\chi^2 = 17.12$; $p > .05$ for integration performance) did not suggest the presence of such bias. In total, the respondent firms had completed 2,116 acquisitions over a ten-year period. Of these firms, 65 percent are headquartered in North America and 35 percent in Europe. The sample firms are relatively large: 59 percent had sales of over $5 billion. Also, they are widely distributed across industry sectors: 43 percent from manufacturing, 29 percent from services, 12 percent from financial services, and 11 percent from energy and utilities, among others.

Importantly, as is to be expected for active acquirers (e.g., Haspeslagh & Jemison, 1991; Pettit, 2007), the sample firms' acquisition experience over the preceding ten years consisted, in fact, entirely of bolt-on deals that were undertaken by subunits and that were typically *small* and *tightly integrated*—though varying substantially on those two dimensions, as we also expected. Specifically, whereas a number of these prior deals were quite large, with 9 percent having sales in excess of $1 billion, a clear majority of them (66 percent) were smaller than $100 million in sales. Moreover, although we lack direct information on the level of integration of these prior deals, our data did allow us to assess the degree to which they exploited a firm's existing resources (e.g., deals motivated by industry overcapacity) rather than explored new ones (e.g., R&D). Whereas 31 percent did have a *partial* exploratory purpose, thus likely calling for somewhat lower (initial) levels of integration (e.g., Haspeslagh & Jemison, 1991; Puranam et al., 2006), over half of them were *exclusively* aimed at exploitation, suggesting full absorption.

Although it is arguably a strength of the study that senior executives directly overseeing acquisition integration at their firms completed the surveys, employing such single respondents does imply potential common method bias. To mitigate such concerns, though realizing that limited sample size could impede our use of statistical remedies, we took a number of preventative steps in our research design. First, we guaranteed anonymity

and assured respondents that there were no "right" or "wrong" answers (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Second, the measurements of the dependent and the independent variables were completed under different conditions based on two forms of "proximal" or "methodological separation" (Podsakoff et al., 2003): (1) we relied on different types of scales for the dependent and independent variables, and (2) we measured them in different sections of the survey, thus helping to prevent respondents' perceiving items as being part of the same scale because of their placement in the survey (Wainer & Kiely, 1987: 187). Finally, we attempted to further alleviate common method bias by following Tourangeau, Rips, and Rasinski's (2000) recommendations for avoiding item ambiguity.

Subsequently, we took several steps to formally assess the presence of common method bias. First, Harman's one-factor test yielded two distinct factors with eigenvalues greater than 1, neither of which accounted for a majority of the covariance (37.9 and 27.7 percent) (Podsakoff & Organ, 1986). Second, following Podsakoff et al. (2003), we used a partial correlation procedure to partial out a general factor score and found qualitatively identical results regarding the hypotheses. Third, given that the mean of integration performance in our sample is highly similar to that of prior work (e.g., Datta, 1991), it does not appear that social desirability bias seriously inflated our findings (Ganster, Hennessey, & Luthans, 1983). On a related note, to the extent that there is common method bias in our data, its impact should render our tests of Hypotheses 2a, 2b, and 3 more conservative, since such bias has been demonstrated to make interaction effects more difficult to detect (Siemsen, Roth, & Oliveira, 2010).

Dependent and Independent Variables

Following a growing stream of research in strategy (e.g., Bruton, Oviatt, & White, 1994; Hayward, 2002; Heimeriks, Duysters, & Vanhaverbeke, 2007; Kale, Dyer, & Singh, 2002; Kale & Singh, 2007; Zollo, Reuer, & Singh, 2002), we used a perceptual measure as our dependent variable. Furthermore, we followed established research practice by focusing on firms' important recent deals (e.g., Hoetker & Mellewigt, 2009; Kale, Singh, & Perlmutter, 2000; Zollo & Singh, 2004). More concretely, on a five-point Likert-type scale, *acquisition integration performance*, measured the degree to which, according to a firm's own evaluation criteria, the integration of the focal acquisition was judged to have successfully realized the specific synergies projected for

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[8] Despite the sample's relatively small size, power analysis showed that, at conventional levels of alpha ($\alpha = .05$) and power ($1 − \beta = .80$), this sample should pick up medium-sized ($r \approx .30$) and larger effects with two-tailed tests (Ellis, 2010).

that acquisition. Please see Table 1 for more detail on measurement.

Although multi-item measures are generally argued to be preferable, Bergkvist and Rossiter (2007) showed that they do not necessarily capture more information than single-item measures do if the construct being measured is relatively specific. Since we isolate the performance of integration (thus excluding potential overpayment, inadequate due diligence, and other factors that would be reflected in a broader construct of acquisition performance), we believe a single-item measure is appropriate (see also Gardner, Cummings, Dunham, & Pierce, 1998; Rossiter, 2002).

Regarding *routine codification*, we adopted Zollo and Singh's (2004) established measure for purposes of construct validity, summing those codified tools (out of a total of 12) that each firm had developed by the time of the focal acquisition. Please see Table 1 for the 12 tools that the sample firms reported on.[9] Second, *risk management practices*

captures practices aimed at identifying and managing deal-specific integration risks. Specifically, it measures how many such practices (out of a total of five) an acquirer had developed by the time of the focal deal. To ensure construct validity, we drew on extant research on risk management (see Chapman & Ward, 2003; Swaminathan & Tomlin, 2006) as well as on input from our fieldwork in developing this scale (please see Table 1), given a lack of precedent in the strategy literature.

Third, *relative acquisition size* was measured through a five-point scale based on the size of a target relative to that of an acquirer in terms of sales (e.g., Capron & Shen, 2007). Fourth, we operationalized *level of integration* through a five-point scale capturing the extent to which the separate functions and activities of the acquirer and the target were physically consolidated into one (cf. Zollo & Singh, 2004). Finally, *tacit knowledge transfer*

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[9] Please note that, on the basis of practitioner input

received during survey pretesting, we added one item, "human resource integration manual," to the original scale developed by Zollo and Singh (2004).

TABLE 1
Measurement of Dependent and Independent Variables[a]

Construct	Items and Measurement
Acquisition integration performance	"According to your company's evaluation criteria, how successful was the integration of the focal acquisition?" In answering this question, the survey requested that respondents focus on the success with which the integration process ultimately realized the specific synergies projected for the focal acquisition (such as revenue increases, cost reductions, and market share increases, among others). The variable is measured on a five-point scale: 1, "not at all successful"; 2, "somewhat successful"; 3, "moderately successful"; 4, "very successful"; 5, "highly successful."
Routine codification	"Which of the following codified integration tools had your company developed by the time it engaged in the focal acquisition: (1) due diligence checklist, (2) due diligence manual, (3) systems conversion manual, (4) affiliation/integration manual, (5) systems training manual, (6) products training manual, (7) human resource integration manual (for "documents and manuals"); and (8) financial evaluation, (9) staffing models, (10) product mapping, (11) training/self-training packages, (12) project management (for "quantitative models")?" Sum ranging from 0 = "none of the items" to 12 = "all items in place" (Zollo & Singh, 2004).
Risk management practices	"Which of the following practices had your company developed by the time of the focal acquisition [in order to manage the deal-specific risks encountered during acquisition integration]: (1) risk assessment, (2) risk identification and prioritization, (3) risk quantification, (4) development of risk responses, and (5) development of procedures to control risks?" Sum ranging from 0 = "none of the items" to 5 = "all items in place."
Relative acquisition size	"What was the size of the target relative to that of your company in terms of sales volume?" (1) <25%, (2) 25–49%, (3) 50–74%, (4) 75–100%, (5) >100%.
Level of integration	"To what extent did your company physically integrate the separate functions and activities of the target with its own?" The variable is measured on a five-point scale: (1) "not at all," (2) "somewhat," (3) "moderately," (4) "to a large extent," (5) "fully."
Tacit knowledge transfer practices	"Which of the following practices had your company established by the time of the focal acquisition [in order to share non-codifiable (tacit) knowledge on acquisition integration derived from prior experience]: (1) formal training by M&A experts, (2) sessions between managers involved in acquisition integration, (3) joint planning with acquired firm managers, and (4) systematic acquisition integration evaluation?" Sum ranging from 0 = "none of the items" to 4 = "all items in place."

[a] A complete overview of the survey is available from the authors.

practices was measured by summing those practices aimed at transferring tacit knowledge on acquisition integration (out of a total of four) that a firm had established by the time of the focal deal. This variable was based on input that emerged from our fieldwork and from survey pretesting. For more detail on the measurement of all the above-mentioned variables, please see Table 1.

Importantly, our measures for routine codification, risk management practices, and tacit knowledge transfer practices are formative scales. Unlike in more conventional, reflective scales, in formative scales "the direction of causality flows from the indicators to the latent construct, and the indicators, as a group, jointly determine the conceptual and empirical meaning of the construct" (Jarvis, Mackenzie, & Podsakoff, 2003: 201). As such, the items of which formative scales are composed are *not* supposed to be (strongly) correlated and thus, the suitability of these scales cannot be assessed using the validity and reliability criteria used for reflective ones (Bollen & Lennox, 1991; Jarvis et al., 2003). Instead, we followed Diamantopoulos and Winklhofer's (2001) procedure. First, as touched on earlier, we attempted to ensure appropriate specifications of the overall scope ("content specification") and the specific items ("indicator specification") of the formative scales by (1) relying on detailed insights gained through our field research and survey pretesting, and (2) drawing directly on prior work that is informative about what the key items are. Second, we examined the correlations among each scale's items ("indicator collinearity") by means of variance inflation factors (VIFs). Since all these VIFs were far below the conventional cutoff value of 10 (Neter, Kutner, Nachtsheim, & Wasserman, 1996), excessive overlap between the items within each scale could be ruled out.

Control Variables

Our models include various controls. *Acquisition experience* reflects the total number of acquisitions by a given firm over the period 1997–2006 (see Barkema & Schijven, 2008a). Our respondents broke this number down into three categories of deal size (< $100M, $100M–$1B, and ≥ $1B), allowing us to check the robustness of our findings against these finer-grained experience measures (please see "Robustness Checks and Additional Analyses"). We used a dummy variable to capture whether or not an acquirer had a *dedicated M&A department* at the time of a focal acquisition (cf. Kale et al., 2002). *Target*

industry relatedness, which controlled for the degree of industry relatedness between acquirer and target (cf. Capron & Shen, 2007), was measured on a scale ranging from 1, "not at all," to 5, "completely." Furthermore, since the quality of the resources acquired might impact their integration (e.g., Capron et al., 1998), we included *target quality* as a control. Specifically, we asked respondents how the target was performing at the time of its acquisition, using scale anchors that indicate whether it was "bankrupt" (2), "poorly performing" (–1), "an average performer" (0), "a good performer" (1), or "an outstanding performer" (2) (Zollo & Singh, 2004). Following Zollo and Singh (2004), we also controlled for the *degree of top management team replacement* within the target following its acquisition, measuring it on the following scale: 1, "no substantial change"; 2, "minor changes"; 3, "moderate changes"; 4, "many changes"; and 5, "virtually all the top management team was changed." Finally, we controlled for both *resource redeployment from acquirer to target* and *from target to acquirer*. Based, in large part, on Capron et al. (1998), these constructs measure the extent to which resources (specifically, product innovation capabilities, marketing expertise, and general management expertise) were each transferred, from the acquirer to the target and vice versa. The anchors for both these reflective scales range from 1, "not at all," to 5, "fully," and their respective Cronbach's alpha reliability values are .79 and .81, thus demonstrating adequate levels of reliability (Nunally & Bernstein, 1994).

Analyses

We used ordinary least squares (OLS) regression analysis to test the hypotheses.[10] Multicollinearity due to the inclusion of interaction terms was mitigated by mean-centering the noncategorical independent variables (Aiken & West, 1991). Furthermore, we used robust standard errors clustered on acquirer's industry sector in all models to account for the hierarchical nature of the data and thus, to avoid overestimating the significance of the hypothesized effects. Also, to be conservative, we used only two-tailed signifi-

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[10] We treated the five-point Likert scale for integration performance as an interval scale, thus analyzing it with OLS (Furr & Bacharach, 2007). Nevertheless, ordered logit yielded identical conclusions. Moreover, following precedent with similar variables (e.g., Døving & Gooderham, 2008), we also analyzed risk management practices using OLS.

cance tests. Finally, to test for the moderated mediation implied by our conceptual framework, we relied on the steps outlined by Muller, Judd, and Yzerbyt (2005).

RESULTS

Hypothesis Tests

Table 2 provides descriptive statistics and bivariate correlations. Overall, the correlations suggest that multicollinearity should not pose any problems. The VIFs of our explanatory variables, all of which are well below 10 (Neter et al., 1996), confirmed this.

Table 3 reports the tests of our hypotheses.[11] Whereas model 1 includes only controls, models 2 through 4 test Hypothesis 1, which predicts that risk management practices mediate the effect of routine codification on integration performance (Baron & Kenny, 1986; Muller et al., 2005). In line with extant work (Zollo & Singh, 2004), model 2 shows that routine codification is positively related to integration performance ($b = .28$, $p < .05$). However, models 3 and 4 reveal that risk management practices mediate this effect, as (1) routine codification is positively associated with risk management practices in model 3 ($b = .33$, $p < .01$), (2) the coefficient of routine codification in model 4 decreases in magnitude and is rendered statistically insignificant by the inclusion of risk management practices, which itself has a positive and significant effect on integration performance ($b = .25$, $p < .05$), and (3) the explanatory power of model 4 is considerably higher than that of model 2 (Baron & Kenny, 1986). Moreover, a Sobel test for mediation (see MacKinnon, Warsi, & Dwyer, 1995) provided additional evidence of significant mediation by risk management practices ($p < .05$). Hence, our results support Hypothesis 1.

Model 5 tests Hypotheses 2a, 2b, and 3—that is, the moderating effects of, respectively, relative acquisition size, level of integration, and tacit knowledge transfer practices. We find support for Hypothesis 2a, as the interaction effect between relative acquisition size and risk management practices is positive and significant ($b = .21$, $p < .05$), suggesting that the larger the acquisition, the stronger the beneficial impact of risk management practices on integration performance. Furthermore, the significant, negative coefficient of the interaction with level of integration ($b = -.23$, $p < .05$) corroborates Hypothesis 2b, implying that an acquisi-

tion's level of integration dampens the positive effect of risk management practices.

Finally, model 5 also supports Hypothesis 3, because the coefficient of the interaction term between tacit knowledge transfer practices and risk management practices is positive and significant ($b = .17$, $p < .05$). As we expected, therefore, the transfer of tacit knowledge about acquisition integration tends to amplify the gains to be had from risk management practices.

To provide a better understanding of the moderating effects associated with Hypotheses 2a, 2b, and 3, we have plotted them in Figures 2 through 4.

Robustness Checks and Additional Analyses

We conducted a variety of tests to assess the robustness of our findings. First, we checked for self-selection bias (Hamilton & Nickerson, 2003), since firms may self-select into relying on codified tools and risk management practices. The Heckman (1979) procedure was used to ascertain the presence of such bias. However, the Heckman correction factor (i.e., the inverse Mills ratio) was not significant, and the findings were virtually identical to those reported.

Furthermore, given our relatively small sample size, we conducted three sets of additional analyses to determine whether outliers or overfitting affected our findings. First, we reran the models while excluding those observations for which the score on integration performance was 5 (the maximum on the five-point Likert scale), reducing the sample size to 74. This sample yielded highly similar findings, both in terms of effect sizes and their statistical significance. Second, we reestimated the models while excluding all control variables, thus decreasing the potential for overfitting. This procedure led to qualitatively identical conclusions as well. Third, we reestimated the models with each interaction effect separately, also decreasing the number of parameters per model, and again the results were qualitatively identical to those of model 5.

Finally, in an attempt to gain finer-grained insights, we reestimated the models for each of the items of our formative scales (i.e., routine codification, risk management practices, and tacit knowledge transfer practices). Although risk identification and prioritization, part of the risk management practices scale, appeared to be most prominent in mediating the effect of routine codification on integration performance, none of the individual items could replicate or alter our full set of hypothesized effects, thus further confirming the validity of these constructs.

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[11] To facilitate the assessment of effect sizes, we report standardized coefficients (see Combs, 2010).

TABLE 2
Descriptive Statistics and Correlations

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1. Acquisition integration performance	3.58	1.06												
2. Routine codification	7.54	3.91	.37*											
3. Risk management practices	3.24	1.04	.36*	.40*										
4. Relative acquisition size	1.79	1.23	.03	.09	−.06									
5. Level of integration	3.14	1.46	.38*	.34*	.23*	.07								
6. Tacit knowledge transfer practices	2.62	1.42	.18	.53*	.25*	.08	.27*							
7. Acquisition experience	24.23	30.04	−.05	.08	−.02	.16	.06	.07						
8. Dedicated M&A department	0.75	0.43	.01	.16	.11	.15	.07	.55*	.12					
9. Target industry relatedness	4.35	0.88	.16	.14	−.09	.09	.13	.19	−.15	.04				
10. Target quality	0.47	0.93	.26*	.07	.05	.02	−.02	.22*	.07	.12	.18			
11. Degree of TMT replacement	3.16	1.51	.16	.19	−.02	.15	.53*	.09	.18	.09	.12	−.08		
12. Resource redeployment, acquirer to target	3.08	1.16	.29*	.43*	.25*	.01	.54*	.32*	−.00	.18	.18	.04	.39*	
13. Resource redeployment, target to acquirer	2.19	1.14	.25*	.39*	.33*	.15	.34*	.41*	−.04	.22*	.13	.28*	.12	.57*

* $p < .05$

TABLE 3
Results of OLS Regression Analyses[a]

Variables	Hypothesis	Model 1 Integration Performance	Model 2 Integration Performance	Model 3 Risk Management	Model 4 Integration Performance	Model 5 Integration Performance
Controls						
Relative acquisition size		−0.26*	−0.26*	−0.03	−0.25*	−0.29**
Level of integration		0.38**	0.38**	0.17	0.34**	0.37**
Tacit knowledge transfer practices		0.01	−0.14	−0.03	−0.13	−0.19
Acquisition experience		−0.08	−0.03	0.05	−0.04	0.00
Dedicated M&A department		0.01	0.07	0.03	0.06	0.06
Target industry relatedness		−0.05	−0.03	−0.09	−0.01	−0.03
Target quality		0.16	0.18	0.02	0.18	0.16
Degree of TMT replacement		−0.04	−0.08	−0.18	−0.03	−0.07
Resource redeployment acquirer to target		−0.16	−0.19	0.04	−0.20	−0.22
Resource redeployment target to acquirer		0.10	0.06	0.16	0.02	0.01
Hypothesized variables						
Routine codification	1		0.28*	0.33**	0.18	0.22
Risk management practices	1				0.25*	0.22*
Risk management practices × relative acquisition size	2a					0.21*
Risk management practices × level of integration	2b					−0.23*
Risk management practices × tacit knowledge transfer practices	3					0.17*
R^2		0.21	0.26	0.24	0.30	0.37
Adjusted R^2		0.11	0.14	0.13	0.19	0.24
Model F		2.00*	2.29**	2.09*	2.62**	2.72**
n		85	85	85	85	85

[a] Reported coefficients have been standardized; thus, no intercept coefficients are shown.
  * $p < .05$
  ** $p < .01$
  All conservative two-tailed tests.

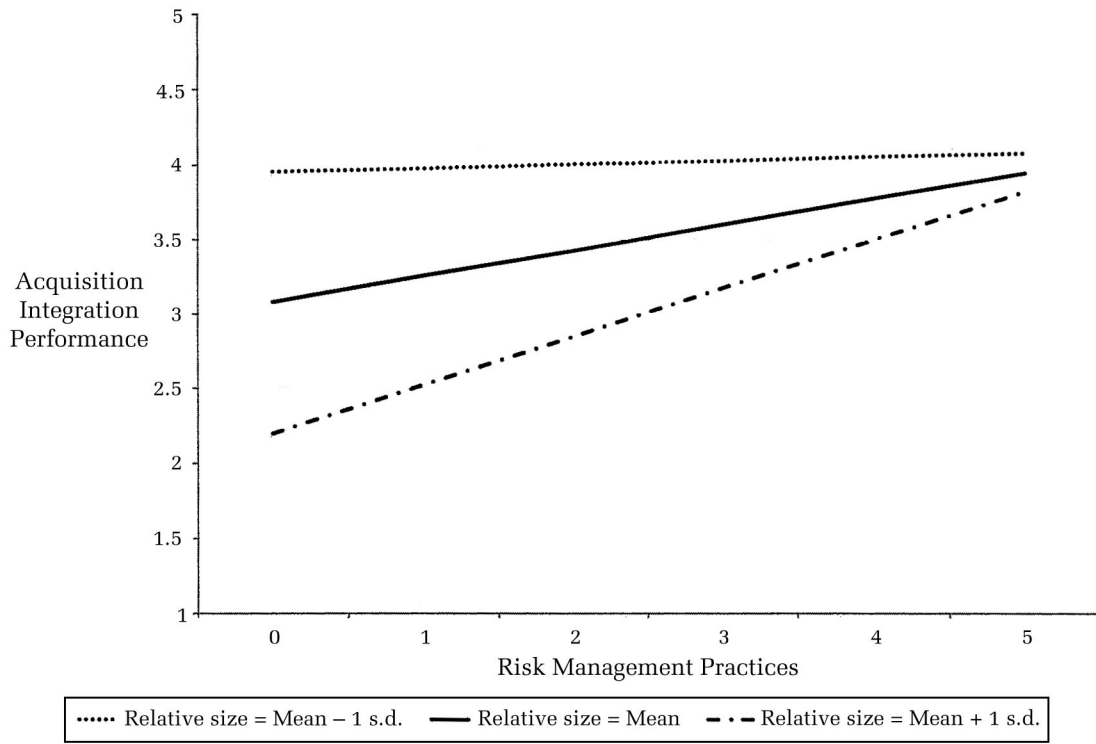**FIGURE 2**
Estimated Relationship for Hypothesis 2a

..... Relative size = Mean − 1 s.d.   ⎯ Relative size = Mean   ▬ · ▬ Relative size = Mean + 1 s.d.

FIGURE 3
Estimated Relationship for Hypothesis 2b

..... Level of integration = Mean − 1 s.d.   ⎯ Level of integration = Mean   ▬ · ▬ Level of integration = Mean + 1 s.d.
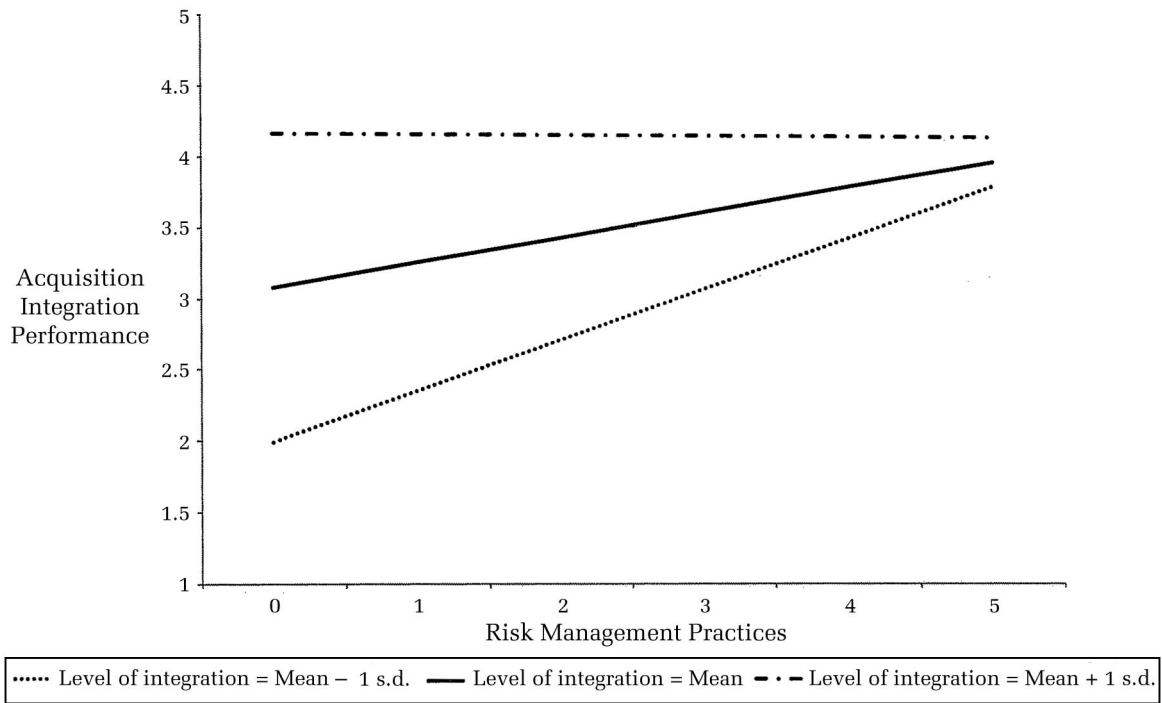
FIGURE 4
Estimated Relationship for Hypothesis 3
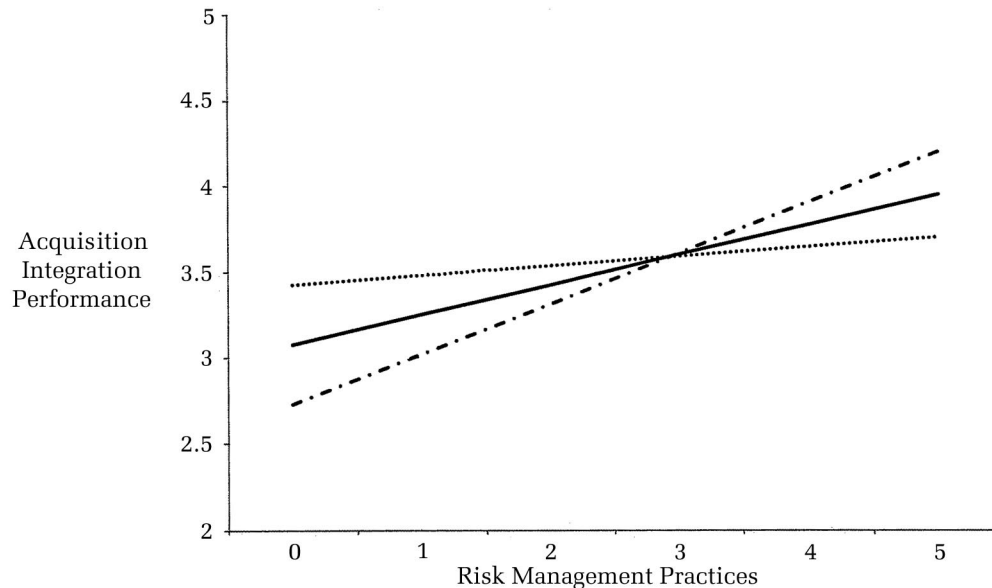
DISCUSSION

In this study, we have synthesized and built on key insights from the codification and dynamic capabilities literatures in pursuit of a deeper understanding of firms' deliberate learning efforts in a context characterized by high levels of causal ambiguity: postacquisition integration (see Barkema & Schijven, 2008b; Cording et al., 2008). Conceptualizing routine codification as a double-edged sword, we have attempted to shed light on some of the core mechanisms through which active acquirers can develop effective integration capabilities by capitalizing on the efficiency that codification affords while simultaneously avoiding the rigidity it breeds. Based on qualitative data from extensive fieldwork as well as quantitative data from an indepth survey, our theory and findings suggest that successful active acquirers develop higher-order routines—as manifested in complementary sets of concrete organizational practices—that foster ad hoc problem solving whenever the specific acquisition at hand deviates sufficiently from the norm, thus counteracting the inertial forces brought forth by (zero-order) codified integration routines.

Specifically, we find that first and foremost, a set of organizational practices that we have labeled "risk management practices" triggers the initial, or variation, stage of ad hoc problem solving (cf. Zollo & Winter, 2002). That is, by helping to identify unique features of a focal deal that render the ac-

quirer's codified routines inapplicable (including the salient features of unusually large size and low levels of integration that we have examined), these practices push the organization members involved to take a step back and consider a variety of customized courses of action. Furthermore, we uncover a distinct set of practices, labeled "tacit knowledge transfer practices," that can be considered a complementary manifestation of higher-order routines. Intended to transfer tacit knowledge about acquisition integration to those directly involved in the focal deal's integration, these practices enable selection of the optimal course of action—the course of action that will optimize the final, or selection, stage of ad hoc problem solving.

Theoretical Contributions

The present research, we believe, offers several theoretical contributions. First, it refines and partly reorients the rapidly growing body of work on deliberate forms of organizational learning (e.g., Heimeriks & Duysters, 2007; Kale & Singh, 2007; Zollo & Singh, 2004). Having recently emerged in response to the plethora of inconsistent findings that mark the broader literature on learning in strategic settings (see Barkema & Schijven, 2008a), this stream of research has firmly and duly established routine codification as an important enabler of capability development. As a result, however, re-

ceived wisdom today seems to portray codification as a panacea, largely disregarding the inertia it entails, as stressed by a long line of prior work (see Weber, 1930). Our research redirects this received wisdom by acknowledging codification's pros as well as its cons and arguing that it represents merely one element in a broader framework of mechanisms that jointly constitute a firm's overall deliberate learning endeavor. Indeed, our theory and results suggest that the rigidity spawned by codified routines needs to be actively counterbalanced by higher-order routines if firms are to be able to engage in fruitful capability development.

Second, this study furthers our field's understanding of dynamic capabilities. Building on recent work (Schreyögg & Kliesch-Eberl, 2007; Zollo & Winter, 2002), we conceptualize higher-order routines as multidimensional, consisting of two distinct mechanisms that complement each other: one that pertains to the variation stage of ad hoc problem solving and another that pertains to the selection stage. In addition to partly unpacking the *internal* workings of higher-order routines, these key underlying mechanisms have helped us identify concrete practices—risk management practices and tacit knowledge transfer practices—through which they actually *manifest* themselves in a specific empirical setting. Thus, we feel that, as a response to recent calls for more attention to the microfoundations of dynamic capabilities (Barreto, 2010; Felin & Foss, 2005; Helfat et al., 2007), our research represents a step toward demystifying a concept that has been criticized for being "abstract and intractable" (Danneels, 2008: 536), and "vague and elusive" (Kraatz & Zajac, 2001: 653).

Third, we feel the study adds important nuances to the increasingly prevalent application of transfer theory from cognitive psychology (see Ellis, 1965; Gick & Holyoak, 1987) to strategy topics. Although the theory itself has not figured prominently here, we do draw on one of its core concepts, "negative experience transfer." Transfer-theoretic work in strategy has thus far posited that negative transfer effects ultimately diminish as a firm gains experience (e.g., Haleblian & Finkelstein, 1999). Our study suggests, however, that this depends crucially on how the firm manages its experience. For instance, the more it is formalized in codified tools, the more likely that negative transfer will actually *worsen*, unless higher-order routines are adopted.

Finally, we contribute to the literature on postacquisition integration (see Ranft, Butler, & Sexton, 2010). In light of our study, the many generic integration models in this field (e.g., Haspeslagh & Jemison, 1991; Nahavandi & Malekzadeh, 1988) can be regarded as simplified examples of codified integration tools. By establishing that such tools need to be augmented by practices that foster ad hoc problem solving to enable firms to integrate their acquisitions successfully, our theory and findings point directly to the limitations of these generic models and thus, to the need for scholars to focus on more customizable approaches.

Managerial Implications

Building on the above, our study also carries important implications for practitioners, particularly in firms that rely heavily on acquisitive growth. Given that the integration process has been shown to be the single most important determinant of acquisition performance (Larsson & Finkelstein, 1999), yet repeated success in integration has remained elusive to many (Sherman & Hart, 2006), guidance is needed on how to build effective integration capabilities. To this end, we show that fruitful integration is, in essence, as much about knowing when *not* to rely on prior experience as it is about generalizing that experience from one deal to the next. In the words of two integration managers we interviewed in two firms renowned for their integration expertise:

> Nothing is ever completely applicable from one deal to another. . . . So I think in all cases we always end up taking and customizing to the deal at hand.

> No two deals are the same. They are unique. There are key lessons you learn but . . . flexibility is really important in this area.

More specifically, we provide evidence that concrete, actionable practices of risk management (e.g., sessions aimed at identifying and prioritizing integration risks, quantifying these risks, and developing responses to them) and of tacit knowledge transfer (e.g., training by integration experts, discussion among managers from different subunits currently involved in deals, and joint planning of integration efforts with managers from acquired firms) can markedly increase a firm's chances of success by enabling it to capitalize on the efficiency that codified integration tools afford and at the same time avoid the inflexibility that such tools tend to cause.

Limitations and Suggestions for Future Research

Despite the novel insights that we believe our study offers, it has several clear limitations. First of all, our dependent variable, being a single-item measure, can be argued to be overly simplistic (see Boyd, Gove, & Hitt, 2005). As such, future research is needed to develop more sophisticated, multi-

item scales of acquisition integration performance and to examine whether the findings from this study can be replicated and built upon with such measures. Second, our reliance on a single respondent per firm, and, more importantly, the common method bias that this may imply, suggest that future work could offer more robust evidence. Third, although we have augmented our quantitative survey data with detailed qualitative interview material, the relatively small sample on which our models are based inevitably represents a limitation.

Fourth, in light of the cross-sectional nature of our survey data, we cannot formally test for causality. Although the fine-grained insights from our fieldwork may have helped to mitigate this limitation, we believe our field's understanding of the temporal processes behind capability development could benefit greatly from longitudinal work that either uses quantitative panel data or is based on an inductive, theory-building approach (or, perhaps, both). We see great promise for such research, partly because it could clarify important boundary conditions of the theory presented here, most notably (1) those that influence when routine codification indeed triggers the adoption of higher-order routines and when, perhaps, the rigidity it creates actually overrules such intervention indefinitely, and (2) those that determine whether a firm opts to codify routines in the first place or, instead, decides to stick to less deliberate forms of learning.

On a related note, although the final mechanism in the classic evolutionary framework—retention—was not central to our theorizing here, it seems hardly debatable that it plays a key role in organizational learning phenomena. As such, we feel that future research, especially qualitative, process-oriented work, may be able to shed valuable light on such questions as how these retention mechanisms unfold over time and how exactly they impact the development of both zero- and higher-order routines in the context of firms' deliberate learning efforts.

Fifth, one of our key arguments, based in part on the interview data from our fieldwork, is that the creation and the implementation of a firm's codified tools occur at different hierarchical levels. Building on this argument, future research could pursue a deeper understanding of the specific actors involved in the phenomena we have described, including routine codification, risk management practices, and tacit knowledge transfer practices. That is, exactly what roles do the corporate and business levels play in capability development, and how do those roles evolve over time? Moreover, since formalization is merely one of the dimensions of structure (Pugh et al., 1968), what, if any, is the interplay between codification and other dimensions (e.g., centralization)?

Finally, the distinction between routinization and ad hoc problem solving as the two key forms of decision making is axiomatic to the field of management (Cyert & March, 1963). To date, however, research has been relatively silent on the interplay between the two. By explicitly tying routinization to (zero-order) codified routines and ad hoc problem solving to higher-order routines, our theory and results suggest that any reinforcement of routinization (e.g., through codification) requires some counterreinforcement of ad hoc problem solving (e.g., through risk management practices), and vice versa, to maintain an overall equilibrium between efficiency and flexibility. By bridging two literatures that have, at least to a degree, advanced in relative isolation—that is, the sociology- and psychology-driven field of organizational learning and the more economics-driven realm of dynamic capabilities—we believe future work can gain considerably deeper insight into the interplay between routinization and ad hoc problem solving. As one example, our results regarding practices of risk management and tacit knowledge transfer suggest, in line with prior work (e.g., Gavetti, 2005), that human cognition is crucial for effective capability building. Given this, however, to what degree can such human agency compensate for the absence of zero- and higher-order routines in young firms that have not yet developed them?

Conclusions

Since the millennium, scholars have made great strides in advancing understanding of organizational learning through an increased focus on firms' deliberate efforts to develop effective capabilities under high levels of causal ambiguity. Having established the codification of experience as the quintessential form of such deliberate learning efforts, however, this rapidly growing stream of research faces an interesting conundrum: Since investments in deliberate learning enhance capability building, to what extent can codification alone reach its objective, given that it reinforces routinization? Synthesizing the literatures on codification and dynamic capabilities, we argue and show that for firms to be able to reap the fruits of codification, they must adopt practices that act as higher-order routines by counteracting the inertia it breeds. In so doing, our hope is that the present article will contribute to our field's enduring quest for a fuller-fledged and finer-grained theory of organizational learning.

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