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UNPACKING FIRM EXIT AT THE FIRM AND INDUSTRY LEVELS: THE ADAPTATION AND SELECTION OF FIRM CAPABILITIES

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Evolutionary theory of business activity studies how firms are selected out of environments in which they do not fit, but most existing work underemphasizes the distinction between acquisition and dissolution as selection processes. We address this gap with a multilevel analysis that investigates how managerial and functional organizational capabilities affect whether struggling firms exit by acquisition or dissolution. We demonstrate that managerial and functional capabilities have heterogeneous effects on selection processes, with managerial capabilities having particularly strong influence on acquisition exits by struggling firms. The work provides a bridge between adaptation and selection views on organizational change; exit by dissolution represents selection of both firms and capabilities, while exit by acquisition represents firm selection but capability adaptation. Copyright © 2011 John Wiley & Sons, Ltd.

INTRODUCTION

One of the fundamental tensions in strategic management theories of business evolution concerns the distinction between adaptation and selection when firms encounter problems. Early strategic management research typically assumed that business change primarily occurs by adaptation, in which executives of struggling firms actively lead strategic change of their underlying business capabilities (e.g., Cyert and March, 1963; Andrews, 1971). The evolutionary theory revolution of the 1970s and 1980s then highlighted the presence of strong firm-level inertia, which leads to population-level change in which many struggling firms fail to adapt and, as a result, exit from an industry (Hannan and Freeman 1977, 1989; Gort and Klepper, 1982; Nelson and Winter, 1982, 2002). Follow on studies have typically sought to demonstrate whether and when adaptation or selection tends to be the most pronounced force. What this debate has underemphasized, though, is that different forms of exit—particularly, the contrast between shutting down and being acquired—have different implications for adaptation and selection. This paper argues that selection and adaption can occur concurrently at the firm and capability levels of analysis when one considers different forms of exit.

We focus on the difference between business dissolution and business acquisition of struggling firms, emphasizing how different forms of exit reflect the evolutionary influence and fate of business capabilities. In particular, we argue that business dissolution entails a selection process that removes both a corporate entity and its underlying capabilities from the landscape, while acquisition represents a selection process that removes the corporate entity but preserves some of its

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organizational capabilities within the economic environment. We then argue that the extent of firm-specific managerial and functional capabilities influence whether a struggling firm exhibiting lackluster financial performance exits by acquisition or by dissolution. Hence, the paper studies mechanisms that shape micro-level adaptation and selection of business capabilities that, in turn, underpin the more macro-level phenomena of firm and industry evolution.

The foundation for this study integrates theories of industry evolution with those that emphasize the importance of firm-specific capabilities in business strategy and outcomes. The core literatures include evolutionary economics (Nelson and Winter, 1982; Gort and Klepper, 1982), population ecology (Hannan and Freeman 1977, 1989), and the resource-based view of the firm (Penrose, 1959; Wernerfelt, 1984). The resource-based logic is important because it highlights the importance of idiosyncratic firm-level resources and capabilities as contributors to firm performance and competitive advantage (Barney, 1991; Peteraf, 1993). Resources are stocks of available factors that a firm owns or controls, including both physical and human assets, while capabilities are the processes by which firms manipulate resources when attempting to achieve desired results (Amit and Schoemaker, 1993). Recent resource-based studies have begun to integrate industry- and population-level aspects of evolutionary theory to consider how differences in firm capabilities might affect selection pressures (e.g., Mata and Portugal, 2002; Huyghebaert and Van de Gucht, 2004; Sarkar *et al*., 2006; Zuniga-Vicente and Vicente-Lorente, 2006), but these studies have not unpacked the selection forces that result in different forms of firm exit. In particular, existing work on firm exit does not address the evolutionary difference between exit by acquisition and exit by dissolution, even though dissolution and acquisition represent distinctly different selection processes that have strikingly different implications for industry dynamics.

Following precedent in resource-based theory and related work (e.g., Collis, 1994; Teece, Pisano, and Shuen, 1997; Zollo and Winter, 2002), we focus on two types of capabilities—managerial and functional—that reflect different types of activities that reside in different levels within the firm. In turn, we argue that these two types of capabilities have differential impact on selection forces for struggling firms, with managerial capabilities increasing the likelihood of acquisition and functional capabilities increasing the likelihood of dissolution. This work advances conceptual and empirical understanding of selection processes by distinguishing between exit by acquisition and exit by dissolution, which helps identify the interplay between selection and adaptation in industry evolution.

The remainder of the paper is organized as follows. First, we discuss our conceptual foundation with a review of how evolutionary theories construe acquisition and dissolution at different levels of analysis. This section addresses how market failure and the transfer or replication of organizational capabilities influence selection processes. Second, we develop hypotheses addressing the role of managerial and functional capabilities in determining whether a struggling firm exits by acquisition or by dissolution. Third, we discuss our sample and methodology. We pay particular attention to empirical and conceptual support for our approach of measuring managerial and functional capabilities. This approach uses the quantity and nature of executive positions of the firms as a way of assessing firm capabilities, thereby providing a generalizable measure of capabilities that emphasizes the degree of managerial and functional processes within firms. We then present our results and discuss how they contribute to an understanding of selection processes and industry evolution, as well as their more general implications and extensions for studies of business dynamics.

BACKGROUND

Evolutionary theories of business activity note that some firms struggle to meet the demands of their environments and reside at the margins of survival. In turn, selection processes remove struggling firms that fail to improve from the business landscape (Nelson and Winter, 1982; Hannan and Freeman, 1989; Aldrich, 1999). We focus on how the selection processes of acquisition and dissolution result in different evolutionary outcomes for struggling firms and their organizational capabilities. At the firm level, acquisition and dissolution represent selection processes that remove a firm from the business landscape. By contrast, at the level of organizational capabilities, the implications of acquisition and dissolution diverge as

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acquisition yields an adaptive dimension that provides for preservation at the capability level.

The potential preservation of the organizational capabilities of a struggling firm through acquisition is relevant as an adaptive mechanism, given the role of organizational capabilities as a contributor to firm performance and competitive advantage. Arguments that consider firm capabilities focus on the importance of organizational capabilities as sources of firm performance (Richardson, 1972; Helfat *et al*., 2007; Teece *et al*., 1997). The roots of the capabilities perspective trace back to Penrose's (1959) seminal resource-based arguments, which highlighted the importance of resource manipulation—as opposed to mere resource possession—as a key driver of firm performance. The assumptions of capabilities-based arguments, rooted within resource-based thinking, include firm heterogeneity and resource immobility (Barney, 1991; Peteraf, 1993). Integrating these ideas within a discussion of industry evolution and firm exit highlights the adaptive implications of a selection process that fosters preservation of valuable organizational capabilities.

We focus on the degree to which organizational capabilities are difficult to transfer and therefore face market failures that inhibit discrete exchange. From an evolutionary perspective, these capabilities will be most sensitive to selective outcomes. Specifically, variance in the degree to which organizational capabilities can be decoupled from a firm-specific context while preserving their value enables us to contrast the selective implications of exit by acquisition versus exit by dissolution, as well as highlight the adaptive potential of acquisitions. We later distinguish between managerial and functional capabilities, based on variation in their degree of susceptibility to market failure in discrete exchange.

The evolutionary perspective: selection of firms and capabilities

To argue that acquisition and dissolution create different evolutionary outcomes for firms and their capabilities requires that one distinguish firms from their capabilities. Firms are legal entities that operate in a business environment. In that environment, firms are decision-making entities that convert inputs into outputs via a production function (Sher and Pinola, 1981). As we noted earlier, capabilities are the processes that firms employ to use stocks of resources within the production function (Amit and Schoemaker, 1993).

Given the characteristics of organizational capabilities most likely to foster an advantage, exit by dissolution and exit by acquisition denote different selection events for firms and their capabilities. At the firm level, both dissolution and acquisition are forms of selection out of a population: a firm ceases to exist as an independent entity. At the level of organizational capabilities, however, the two types of exit contrast with each other, the first being a selective outcome and the second being an adaptive outcome. As we noted earlier, *selection* means the elimination of entities that do not suit an environment. In parallel, we use the term *adaptation* to mean changes to an entity that create the potential for the entity to survive in a given environment (Levinthal, 1994).

Dissolution is a form of capability selection, because dissolution removes a firm's organization-specific capabilities from the economic and social landscape (Aldrich, 1979). Typically, dissolution means that the organizational units of the closing firm disband, which eliminates firm-specific organizational capabilities. Thus, dissolution results in the firm, as well as its capabilities, being selected out of the landscape.

By contrast, acquisition, although it is a form of firm-level selection, represents adaptation at the level of organizational capabilities. An acquisition has the potential to preserve some of the organizationally embedded capabilities and resource configurations that existed in the acquired firm, although they may be altered within the acquiring firm's legal and organizational entity (Wernerfelt, 1984; Karim and Mitchell, 2000). Post-acquisition adaptation typically involves some combination of selective retention, elimination, and reconfiguration of elements of the target's organizational capabilities (Amburgey and Miner, 1992; Baum and Korn, 1999; McIvor, 2007). The process of retention, elimination, and reconfiguration results in substantial changes to the original organizational capabilities, but not in the wholesale immediate dispersal that takes place in the case of dissolution (Mitchell, 1994).

Hence, acquisitions and dissolutions have substantially different impact on the fates of organizational capabilities and on the overall evolution of the markets in which firms use capabilities. Acquisitions retain organizational capabilities within markets, albeit commonly in changed form. By

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contrast, dissolution breaks up organizational capabilities and releases them from a market.

Capability transfer, replication, and market failure

Some firm capabilities are relatively general and, in turn, are easy to imitate or transfer. For instance, imitation and transfer occur more readily when capabilities are easy to codify, easy to teach, and/or reflect parallel development in multiple firms (Zander and Kogut, 1995). However, studies suggest that a firm's most desired knowledge is often complex and ambiguous (Ranft and Lord, 2002). Firm capabilities and routines embody this knowledge because the knowledge-based resources of a firm are difficult to separate from the unique set of relationships that emerge over time in a firm (Nelson and Winter, 1982). The resulting organizational embeddedness of knowledge-based capabilities hinders the replication or imitation of these firm capabilities.

Consequently, the embeddedness of key capabilities and the knowledge that they embody often motivates firms to acquire an entire entity to obtain these capabilities, as opposed to simply licensing specific goods or hiring employees (Capron, Dussauge, and Mitchell, 1998). For instance, the retention of key personnel of an acquired firm is important to the extent that the desired tacit knowledge resides in these individuals (Ranft and Lord, 2000). Specifically, the retention of top managers increases the transfer of knowledge to an acquirer and enhances post-acquisition performance (Cannella and Hambrick, 1993). Unlike acquisition, however, dissolution restricts access to the private knowledge and routines of a dissolved firm, which, in turn, limits the transfer and replication of knowledge through mobility of individual employees because the firm's template is no longer accessible (Hoetker and Agarwal, 2007). Given the difficulty of imitating the valuable organizational capabilities of a struggling firm without the organizational template for the original routine and its tacit knowledge, acquisition is a means of preserving some of the value by maintaining the key relationships and the integrity of the target firm (Wernerfelt, 1984).

Capabilities that are organizationally embedded or otherwise difficult to imitate or transfer are often the basis of a competitive advantage. At the same time, though, these capabilities are the most vulnerable to the mode of exit because they face substantial market failures in discrete exchanges between firms (Penrose, 1959). Market failure arises when it is difficult to negotiate and accomplish an arm's-length exchange for an asset. Some market failures arise because one party knows more about the value of an asset than another party (i.e., information is asymmetric), while other market failures arise because neither party can accurately specify the value of an exchange (i.e., information is bilaterally lacking). Several studies suggest that firms sometimes use business acquisitions to obtain organizational capabilities resident in other firms (Nelson and Winter, 1982; Capron *et al*., 1998). As we discuss below, the more extensive the organizational capabilities of a struggling firm, the more likely it is that it will exit via acquisition rather than dissolution.

The acquisition history of Cisco Systems and the continued success of the company demonstrate how a focus on valuable organizational capabilities that are subject to market failure provides insight to the adaptive implications of acquisition as a selection process. From 1996 through December 2009, according to the SDC Platinum database, Cisco Systems acquired 158 U.S. firms and 34 international firms in their entirety. Discussions with Cisco personnel suggest that the company used these acquisitions to overcome market failure in the discrete exchange of organizational capabilities as it sought to change its technical and market resources. Hence, these acquisitions represented selection events that removed 192 firms from the business landscape while also representing adaptation from the perspective of the targets' embedded capabilities that Cisco preserved post-acquisition.

Conceptual model: independently viable firms versus exiting struggling firms

The conceptual frame of this work involves two questions: first, whether a firm is viable as an independent entity; second, if a firm is not independently viable, whether it will exit by dissolution or by acquisition. The lower portion of Figure 1 depicts our core question, concerning how organizational capabilities influence exit mode (dissolution versus acquisition) for struggling firms that currently exhibit poor financial performance. The upper portion of the figure, which is beyond the

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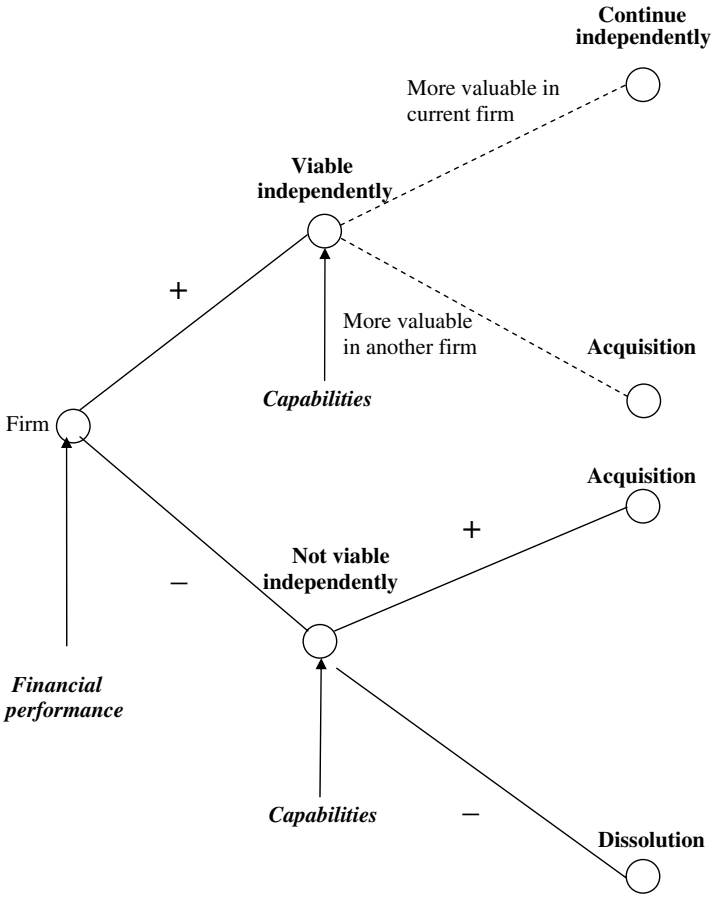

Figure 1. Conceptual model

scope of the study, depicts a similar research question concerning firms that are independently viable as a result of good current financial performance.

Figure 1 highlights the need to distinguish between independently viable and struggling firms because many acquisition targets are profitable businesses with strong capabilities (Ravenscraft and Scherer, 1989). Including financially successful firms as well as struggling firms in the study would overstate the capability endowments of firms that exit via acquisition relative to the endowments of those that shut down. In turn, this overstatement would confound the effects of profitability and organizational capability in shaping business fates. To avoid this bias, we will limit the argument to struggling firms that currently demonstrate poor performance. Furthermore, struggling firms that currently exhibit poor financial performance are at a greater risk of experiencing a selection event.

HYPOTHESES: CAPABILITIES AND BUSINESS EXITS

We distinguish between managerial and functional capabilities because these two distinct classes of firm capability may affect selection differently. The conceptualization of organizational capability often includes the routines of a firm in addition to the managerial activities that continually adjust these routines in an effort to improve the effectiveness of the firm (Collis, 1994). We use the terms *managerial* and *functional* to subsume the body of terminology within a categorization that highlights the underlying conceptual consistency present within the literature. Table 1 summarizes studies that highlight the point that functional capabilities are discrete processes within particular areas or departments in a firm, while managerial capabilities involve bodies of processes that

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Table 1. Managerial versus functional capabilities

	Managerial capabilities	Functional capabilities
Definition	Processes associated with the integration and coordination of firm resources and activities.	Processes associated with the day-to-day operational activities of the firm that are directed toward the production of products and services.
Relation to other firm capabilities	Pervasive, directive, and transcending	Segregated, but complementary
Examples	Strategy, HR/personnel, finance, legal	Production, marketing/sales, engineering, R&D
Precedents in the resource-based literature	Managerial systems	Technical systems *(Leonard-Barton, 1992)*
	Architectural competence	Component competence (*Henderson and Cockburn, 1994*)
	Dynamic capability	Organizational routines/competences *(Teece et al., 1997)*
	Integrative capability	Functional capability *(Verona, 1999)*
	Integrative capability	Component capability *(Yeoh and Roth, 1999)*
	Cooperative competencies	Technical competencies *(Tyler, 2001)*
	Dynamic capability	Operating routines *(Zollo and Winter, 2002)*

span multiple areas or departments to coordinate, integrate, and direct firm activities.

Managerial and functional capabilities

The value of resource manipulation is a foundation of the resource-based view (Penrose, 1959). Managerial capabilities transcend other organizational capabilities and unify organizational activity into a cohesive system (Day, 1994). Processes in this category comprise those that enable a firm to integrate, utilize, and reconfigure activities (Henderson and Cockburn, 1994), including capabilities related to changing its mission (Collis, 1994).

The notion of managerial capabilities has roots in several bodies of work. In addition to those listed in Table 1, related concepts include integrative capabilities (Helfat and Campo-Rembado, 2009; Lawrence and Lorsch, 1967), invisible assets (Itami, 1987), organizational architecture (Nelson, 1991), combinative capabilities (Kogut and Zander, 1993), collective knowledge (Spender, 1996), integrative knowledge (Helfat and Raubitschek, 2000) and dynamic capabilities (Teece *et al*., 1997). The common thread connecting these concepts is that each implies integrative and directive roles for managers that, in turn, allow managerial capabilities to be sources of sustained advantage.

Empirical work supports the value and importance of managerial capabilities as sources of competitive advantage. Studies show that managerial capabilities such as architectural competence (Henderson and Cockburn, 1994), integrative capability (Yeoh and Roth, 1999), integration capability (Zollo and Singh, 2004), and relational capability (Helfat *et al*., 2007) contribute to superior firm performance. Other work finds similar results when investigating more specific types of managerial processes, such as customer, internal, and technology integration activities (Iansiti and Clark, 1994), as well as change management, innovation management, and participative management (Hall, 1993). Similarly, research about franchises demonstrates the importance of managerial capability for successful organizational routines. Franchise scholars show that routines influence efficiency differences between firms more than do residual claims (Knott and McKelvey, 1999), while managerial effort enables the routines of a franchise to be a source of advantage (Knott, 2003).

Market failures motivate acquisition as the mode of exit for struggling firms that possess valuable managerial capabilities. Managerial capabilities face market failure because their embeddedness in organizations makes it difficult to isolate and value these capabilities discretely apart from a firm-specific context. Part of the value inherent

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in a set of managerial capabilities resides in their complexity, causal ambiguity, and embeddedness in a firm (Barney, 1991). While generic and industrywide skills of managers can be separated from a firm-specific context, managerial capabilities at the organizational level represent firm-specific skills that do not easily transcend organizational boundaries when individual managers move to new firms (Harris and Helfat, 1997). As firm-specific capabilities, managerial capabilities possess an element of path dependence (Teece *et al*., 1997) and involve given patterns of learning (Zollo and Winter, 2002), which inhibit the separation of managerial capabilities from the organizational context in which they are embedded.

As a result of the inability to identify and purchase managerial capabilities discretely, acquiring entire firms represents a means of preserving valuable managerial capabilities of a struggling firm. From the perspective of prospective acquirers, firms acquire entire firms as a means to obtain these capabilities, intending to undertake the process of extracting and revising the capabilities after the acquisition (Capron *et al*., 1998). Consequently, the more extensive the managerial capabilities that a struggling firm possesses, the more likely that firm is to exit via acquisition rather than dissolution.

Hypothesis 1: The more managerial capabilities that a struggling firm possesses, the more likely that the firm will exit via acquisition rather than dissolution.

An acquirer's interest in the managerial capabilities of a struggling firm may appear surprising. After all, the fact that the firm is struggling suggests that it has only limited managerial competence. However, struggling firms often possess capabilities that are not sufficient by themselves to engender success but can help another firm build an aggregate set of successful capabilities. Thus, even struggling firms may possess desirable capabilities that attract potential acquirers.

Now consider functional capabilities. Like many other organizational processes and activities, managerial and functional activities interact within the firm. Specifically, particular functional capabilities interact with the more extended managerial capabilities in a complementary yet subordinate manner since the roots of functional capability reside in the functional areas of firms (Amit and Schoemaker, 1993), typically within line and staff activities (Teece *et al*., 1997). Functional capabilities embody operational activities (Zollo and Winter, 2002) and relate to 'the [firm's] ability to do specific things' (Hall, 1993: 610). Hence, functional capabilities are more localized than managerial capabilities because functional capabilities embody the specific abilities and knowledge that relate to day-to-day firm activities (Henderson and Cockburn, 1994).

Functional capabilities include activities such as research and development (R&D), production, marketing, and distribution (Collis, 1994; Verona, 1999). Empirical evidence supports the importance of organizational processes that fall into the category of functional capability. For instance, measures of component capability, technological capability, technical capability, and research capability contribute to sustained advantage (Yeoh and Roth, 1999), improved performance (Lee, Lee, and Pennings, 2001), entrepreneurial wealth (Deeds, 2001), and initial public offering capital (Deeds, Decarolis, and Coombs, 1997).

Because functional capabilities typically evolve in a firm-specific context, they often lack substitutes and may be difficult to imitate, which implies that functional capabilities are potential sources of competitive advantage (Barney, 1991). As in the case of managerial capabilities, market failures can arise if historical context and learning processes influence the development of functional capabilities, which, in turn, may lead to organizational embeddedness. In turn, the embeddedness of functional capabilities hinders their replication and leads to reduced value upon termination of the firm-specific context that occurs with the dissolution of the firm.

Nonetheless, the localization of functional capabilities facilitates isolation and allows discrete valuation, which limits market failure. From an evolutionary perspective, the localization of functional capabilities tempers the need for acquisition to preserve the value inherent in a struggling firm's functional capabilities, given the potential to retain the value of the capabilities via a discrete purchase of specific assets or hiring of individual employees, rather than by the acquisition of the entire firm. Research investigating acquisitions within declining industries also highlights that the redeployment of resources within markets sometimes outperforms redeployment within

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the firm (Anand and Singh, 1997). Specifically, the redeployment of resources within markets is favorable when resources are fungible and stand to benefit from a separation from the given organizational context (Anand 2004), such as in the case of the functional capabilities of a struggling firm. Given a decrease in market failure and the potential preservation of value with discrete purchase, a struggling firm with extensive endowments of functional capabilities is more likely to exit by dissolution relative to acquisition.

Hypothesis 2: The more functional capabilities that a struggling firm possesses, the more likely that the firm will exit via dissolution rather than acquisition.

The question now arises of whether managerial or functional capabilities have greater influence on a struggling firm's mode of exit. We expect managerial capabilities to have more impact, because managerial capabilities commonly face greater market failures and more difficulties with replication and transfer as a result of their directive role and the involvement of people and processes that permeate multiple parts of an organization. This tacit and integrative role makes the discrete transfer or replication of managerial capabilities more difficult than the transfer or replication of functional capabilities, which relate more closely to people and processes in specific areas of a firm.

The franchise literature helps highlight the greater influence that managerial capabilities have on firm outcomes, relative to functional capabilities. Operational routines that are consistent with functional capabilities are important in the success of a franchise (Knott and McKelvey, 1999). Nonetheless, the directive influence of management provides an isolating mechanism that enables franchise routines to be a source of sustainable advantage (Knott, 2003).

We expect that the greater influence of managerial capabilities relative to functional capabilities extends to the context of business exit. As a consequence of the characteristics that create market failure and exacerbate transfer and replication, managerial capabilities will have more influence than functional capabilities in determining the mode of exit for a struggling firm.

Hypothesis 3: Managerial capabilities will be more influential than functional capabilities in determining whether a struggling firm will exit via acquisition or dissolution.

It is also useful to consider possible interactions among managerial and functional capabilities. Even as discrete categories, managerial and functional capabilities interact within the firm as managerial capabilities integrate and direct functional capabilities. The directive nature of managerial capabilities suggests that their presence is a key element in exploiting and maximizing the value within functional capabilities as supported by research on franchises (Knott, 2003). Consequently, increased managerial capabilities have the potential to enhance the value of functional capabilities. More specifically within the context of struggling firms facing exit outcomes, the directive and integrative role of managerial capabilities contributes to the embeddedness of functional capabilities. The increased embeddedness of functional capabilities in the presence of strong managerial capabilities, in turn, enables the presence of functional capabilities to enhance the likelihood of an acquisition outcome.

In contrast to strong managerial capabilities, lower levels of managerial capabilities are less able to enhance the value of functional capabilities and therefore less likely to contribute to the embeddedness of functional capabilities within the firm. Without the complement of strong managerial capabilities to integrate and coordinate activities within the firm, the more localized functional capabilities are less embedded within the firm context. Coupled with decreased embeddedness, the inherent localization of functional capabilities yields less susceptibility to market failure. Therefore, the combination of increased functional capabilities and decreased managerial capabilities yields a situation in which the value resident within the capabilities of a struggling firm becomes more readily isolated and decoupled from the firm-specific context. As the firm-specific value of capabilities decreases, the need for acquisition as a means of preserving firm-specific value also declines and interested firms may look to discretely purchase localized functional capabilities apart from the firm context. In the case of a struggling firm, the ability of an acquirer to obtain valuable firm capabilities without purchasing the entire firm increases the likelihood of dissolution. Consequently, increased endowments of functional capabilities relative to

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managerial capabilities increase the likelihood of exit by dissolution.

Hypothesis 4: The more functional capabilities that a struggling firm possesses relative to its managerial capabilities, the more likely that the firm will exit via dissolution rather than acquisition.

Firm age and size

Next, how firm age and size reflect organizational capabilities. At the firm level, studies of industry evolution demonstrate that the likelihood of exit declines with increased age and size. At the capability level, though, implications for capability development warrant further consideration of firm age and size within our discussion of selection modes. Age and size complement the investigation of managerial and functional capabilities because they provide insight with regard to the maturity and depth of capability development, as well as the embeddedness of organizational capabilities that result, even if they do not indicate the presence of specific categories of organizational capability.

Previous work demonstrates that younger and smaller firms have a higher failure rate than older and larger firms. Work in evolutionary economics finds that the increased age and size enhance firm survival rates (Dunne, Roberts, and Samuelson, 1988; Audretsch, 1991; Agarwal and Gort, 1996; Sutton, 1997; Agarwal, Sarkar, and Echambadi, 2002) as a result of successful path-dependent organizational learning, scale efficiencies, and market power. Moreover, recent work finds that firm size effects are independent of baseline profitability (Bercovitz and Mitchell, 2007). Population ecologists also show that failure rates decline with age and size (Carroll and Delacroix, 1982; Carroll, 1983; Freeman, Carroll, and Hannan, 1983; Singh, House, and Tucker, 1986), and argue that liabilities of newness and smallness result from a lack of resources, legitimacy, and stability. Similarly, institutional theory suggests a higher failure rate for new and small firms that lack connections with and the approval and support of their institutional environment (Meyer and Rowan, 1977; Baum and Oliver, 1991). The current work builds on such studies by exploring the capability-based rationale for the effects of age and size in determining which type of exit struggling firms will encounter within an emerging industry context.

Because capabilities develop over time, older firms tend to possess larger stocks of organizational capabilities than younger firms. Learning and storing the knowledge embodied in organizational capabilities necessitates the passage of time because the learning process requires repetition and experimentation (Teece *et al*., 1997). The historical paths that evolve within a firm contribute to the development of organizational capabilities that are embedded within a firm-specific context and represent a potential source of competitive advantage (Barney, 1991). As a result of this path dependency, older firms within an emerging industry sector are more likely than younger firms to possess valuable and embedded organizational capabilities that are susceptible to market failure; hence, older firms are more likely than younger firms to exit via acquisition.

Research exploring firm exit and knowledge diffusion argues and finds that the exit of older firms creates a more negative impact on post-exit knowledge diffusion relative to younger firms. The rationale supporting this finding argues that older firms possess more private knowledge relative to younger firms and this knowledge becomes harder to access from the routines of a firm when the firm template is no longer available after a firm dissolves operations within the industry. Hence, the dissolution of older firms creates a more negative impact relative to younger firms given the loss of firm-specific private knowledge embodied in the routines of the dissolved firm. The connection between learning, knowledge, and organizational routines and capabilities makes the findings of Hoetker and Agarwal (2007) particularly relevant to this discussion. Drawing from arguments of dynamic capabilities (Teece *et al*., 1997) and evolutionary economics (Nelson and Winter, 1982), we can conclude that experience fosters learning that begets the knowledge that organizations store in their routines. Contrasting acquisition and dissolution as modes of exit, these findings also suggest that the dissolution of older firms would be more detrimental to the embedded organizational capabilities that embody a firm's private knowledge relative to acquisition, which enables the preservation of organizational capabilities. Therefore, an older struggling firm is more likely than a younger one to possess valuable capabilities, which makes an older firm more likely than a younger firm to exit via acquisition.

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Hypothesis 5: The older a struggling firm, the more likely the firm will exit via acquisition rather than dissolution.

A capabilities perspective also suggests that larger firms tend to have greater stocks of valuable embedded organizational capabilities as a result of the social and interactive aspects of organizational learning (Teece *et al*., 1997). Increased firm size contributes to the development of organizational capabilities by providing the potential for more varied and complex sets of interactions and experiences. This condition contributes to the likelihood that organizational capabilities will foster a sustained advantage by increasing causal ambiguity, which hampers imitation and replication (Barney, 1991). Thus, larger size indicates the potential presence of well-developed organizational capabilities because size creates more opportunities for learning.

Larger size also indicates the potential presence of firm-specific learning mechanisms with value for the continued development and improvement of organizational capabilities. The quantity and complexity of interactions that occur with larger research teams lead to an increase in firm-specific private knowledge that resides within firm capabilities and resists transfer to other firm contexts even with the turnover of scientists upon dissolution (Hoetker and Agarwal, 2007). We expect similar advantages of larger size to accrue at the firm level and enhance the value of firm-specific organizational capabilities even in emerging contexts where firm size tends to be smaller in general relative to more mature industry contexts. Consequently, larger struggling firms are more likely than smaller ones to exit via acquisition rather than via dissolution.

Hypothesis 6: The larger a struggling firm, the more likely the firm will exit via acquisition rather than dissolution.

Although we argue that the embeddedness and causal ambiguity of valuable organizational capabilities within struggling firms increase the likelihood of an exit by acquisition, a possible counter-argument arises concerning the impact of post-acquisition integration challenges. This counterargument suggests that deeply embedded organizational capabilities would precipitate exit by dissolution owing to the difficulties of target integration with the capabilities of the acquiring firm. An integration of resource-based and evolutionary perspectives contests this counterargument, however, because the organizational capabilities embedded within the firm-specific context of a struggling firm hold value for potential acquirers. The use of acquisition for the redeployment of resources is a focal incentive for firms across the globe. From the perspective of potential acquirers, the persistence of high levels of acquisition activity indicates that the challenge of post-acquisition integration does not appear to represent a deterrent to acquisition.

The acquisition of eMation, Inc. by Ravisent in 2001 provides an example of our argument. eMation, Inc. was a private firm headquartered in Massachusetts that developed device relationship management software for use in automated computing monitoring and control in the software and programming industry (Standard Industrial Classification [SIC] code 7372). Founded in Israel in 1986 as PC Soft, by 2001 eMation employed about 165 workers, garnered $12 million in annual sales, and had developed a relatively extensive set of managerial capabilities. The firm's executive team encompassed a wide range of business processes and included 11 distinct executive positions ranging from senior scientist to chief officer. Senior executives acting in positions such as chief executive officer (CEO), chief financial officer (CFO), president, senior vice president, and general managers of geographic regions were responsible for an extensive set of integrative managerial processes within the company. However, eMation realized a net loss of about $14 million for the fiscal year 2001. The software firm Ravisent acquired eMation for about $27 million and then in 2002 combined the two businesses to create an enterprise software and services company called Axeda Systems, Inc. When it announced the acquisition, Ravisent stated that it wanted to obtain eMation's skills in the 'pervasive computing' market, particularly eMation's technology for user access to remote computers. Ravisent stated that the executive team of the target company would play a critical role in helping Ravisent develop the acquired technology. eMation's CEO joined Ravisent's board and later became Axeda's president (*Business Wire*, 2001; OneSource Information Services, Inc., 2002; Webmergers, Inc., 2001).

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The importance to individual acquirers of preserving the template of valuable organizational capabilities as a means of accessing the firm-specific private knowledge of a firm that is lost in dissolution (Hoetker and Agarwal, 2007) supports the adaptive potential of acquisition at the intrafirm level and, in turn, provides a mechanism that contributes to market-level evolution (Fortune, 2005). While the post-acquisition integration of a target's organizational capabilities would play a role in the preservation of value, we argue that this challenge would not preclude the use of acquisition to preserve the value resident in the embedded organizational capabilities of struggling firms.

METHODS

Data and methods

We tested the hypotheses by examining the exits of struggling firms in the Internet sector during 2001 following the market collapse commonly referred to as the burst of the Internet bubble. The uncertainty created by the 'boom to bust' conditions in 2000 and into 2001 led to a cautious approach to acquisition in the sector, in which both potential acquirers and targets focused on improving operations as opposed to driving growth (Frick and Torres, 2002). The focus on improving operations during 2001 aligns well with a focus on firm-level capabilities. This context is also appropriate for the research questions of this study because of the varied capability bases of the companies (Whinston *et al*., 2001), as well as the high incidence of acquisition and dissolution activity in this sector. During calendar year 2001, about 537 U.S.-based Internet companies shut down (Webmergers, Inc., 2002b) and another 1,289 Internet companies were acquired (Webmergers, Inc., 2002a).

Several sources identified the population and established the sample, which included public and private firms in multiple industries in the Internet sector. The OneSource and Lexis-Nexis databases were the primary sources for company information. Publications from Webmergers, Inc., the *Industry Standard*, and the Securities and Exchange Commission provided additional information and tracked company status. Given the lapse of time that sometimes occurs between the halt of a firm's operations and acquisition, we continued the data collection during 2002 to confirm that none of the dissolutions later became acquisitions. We obtained detailed information that we could use to construct capability profiles for 177 exits.

We assessed differences between firms that reported detailed information (which the sample included) and those that did not, in order to ensure that the sample did not reflect differences that would bias the results. Firms reporting enough information to construct capability profiles were older ($t = 4.25$, $p < 0.001$), had more employees ($t = 3.80$, $p < 0.001$), and had higher annual revenues ($t = 3.18$, $p = 0.002$). The differences were similar when we considered firms in the acquisition and dissolution exit groups separately. Acquisition exits with capability profiles were older ($t = 2.91$, $p = 0.004$), had more employees ($t = 3.84$, $p < 0.001$), and had higher annual revenues ($t = 2.73$, $p = 0.008$). Dissolution exits with capability profiles were older ($t = 4.35$, $p < 0.001$) and had more employees ($t = 2.06$, $p = 0.04$), but they had no significant difference in annual revenues ($t = 1.53$, $p = 0.13$). Hence, the sample has a slight tendency toward older and larger firms. Nonetheless, the sample includes many young and small firms: the median age is three years, the median number of employees is 100, and the median annual sales revenue is $10 million. Thus, our data represent a sample of small- to medium-sized adolescent firms. Moreover, any presence of older and larger firms within the sector is consistent over both acquisition and dissolution exits, which alleviates possible bias.

We used two sample selection techniques to eliminate successful firms from the sample of target businesses. First, we excluded firms that reported positive net income. Second, when we lacked profitability information (as was the case for about two-thirds of the sample), we excluded firms if their productivity efficiency ratio (sales per employee) exceeded 0.30. We determined the productivity efficiency cutoff through analysis of productivity levels and company exits at the end of 2001 for a random sample of 300 firms taken from a population of 17,262 firms within the high technology product classification codes of the OneSource database. Beyond productivity efficiency levels of 0.30, the incidence of dissolution decreased noticeably: at sales per employee below 0.30 (inefficient firms), the incidence of dissolution was 41 percent; at productivity efficiency levels

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above 0.30 (efficient firms), the incidence of dissolution was only 19 percent. The profitability and productivity benchmarks for successful operations led us to eliminate five acquisitions and reduced our original sample from 177 to 172 firms, each of which we could identify as a struggling firm.

Each of the 172 firms included in our sample was either acquired or dissolved: 90 exited by dissolution and 82 exited by acquisition during 2001. A sample selection method that excluded survivors was more appropriate than a statistical selection method to address endogeneity because our central research questions addressed the determination of firm exit (acquisition versus dissolution). Moreover, the use of a statistical selection method with a sample that included survivors and a step to address the endogeneity would not alter the underlying correlations among the variables that yield our results.

Several characteristics of the firms stand out. Fifty-nine percent of the firms were in SIC major group 73, which covers sellers of business services such as prepackaged software and information retrieval services. The remaining firms were distributed among nine other SIC major groups. Parent companies accounted for 89 percent of the sample. Private firms accounted for 70 percent of the sample. As we noted earlier, the firms were often small and young: about 50 percent had annual sales of $11 million or less, about 50 percent had 100 or fewer employees, and about 70 percent were five years old or younger (90 percent were less than 10 years old).

We used logistic regression to explore the impact of organizational capabilities on the mode of exit (acquisition versus dissolution) of these struggling Internet sector businesses. Logistic regression was an appropriate technique given the dichotomous dependent variable.

Variables

Managerial and functional capabilities

We developed capability profiles for the firms by assessing the number and nature of their executive positions. Table 2 depicts the classification of executive positions as managerial and functional. We classified all C-level positions (e.g., CEO, chief operations officer [COO], CFO) as managerial. We also classified other executive positions with general management duties as managerial. By contrast, we classified executive positions with specific operational duties as functional. The analysis grouped the measures of managerial and functional capability within similar levels. We combined all C-level positions into one group. The second group included executive vice presidents, senior vice presidents, and vice presidents (EVP, SVP, VP). The third group, 'below VP,' included directors and lower-level executive positions.

Our motivation for developing capability measures based on executive positions was our intent to employ process-oriented measures that are generalizable and amenable to large sample studies. Both practical accounts and academic research

Table 2. Classification of executive positions

Positions	Designation	Capability	Measure
C-level (e.g. CEO, COO, CFO)	All		
	Undesignated	Managerial	No. of C-level positions
	Business unit, or Division	capability	No. of managerial positions EVP, SVP, VP
	Strategy		No. of managerial positions below VP
	Finance/Legal		
Executive vice president (EVP)	Human resources/Personnel		
Senior vice president (SVP)	Administration/Communication		
Vice president (VP)			
Director	Marketing/Sales		
Manager	Development/R&D	Functional	No. of functional positions EVP, SVP, VP
Other	Operations	capability	No. of functional positions below VP
	Engineering		
	Customer relations		
	Technology/E-biz/E-commerce		

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within organizational studies, organizational structure, social stratification, and the government support the idea that executive positions reflect salient underlying capabilities of an organization.

Prior organizational research established the foundation for the relationship between organizational positions and underlying processes, which suggests that executive positions offer an appropriate measure of organizational capabilities. Inkson, Pugh, and Hickson (1970) showed that counts of organizational positions were valid measures of functional specialization. Kazanjian and Rao (1999) drew on the Inkson study to support using a count of job positions as a measure of engineering and technology-based capabilities. Moreover, a seminal paper in the sociological stratification literature by Baron and Bielby (1986) showed that proliferation of job titles and positions reflected technical and administrative imperatives aimed at increasing the efficiency of firm activities; the study rejected the alternative argument that a proliferation of job titles simply indicated political and institutional processes, as opposed to economic value.

Job titles also represent an integral element in the study of organizational structure (Strang and Baron, 1990). Empirically, Romanelli and Tushman (1994) operationalized organizational structure using measures drawn from the executive lists of firms in their sample. Given that a firm can be construed as a nexus of routines (Nelson and Winter, 1982), the structure of an organization embodies the configuration of processes within it. Thus, the relationship between executive titles and organizational structure provides additional support for the idea that job titles reflect underlying organizational processes.

Accounts in the business press highlight that the proliferation of new organizational processes related to online activities are the driving force for the creation of new tasks and new titles for employees (Shoesmith, 2001; Leonard, 2000; Wah, 1998) and that job titles commonly reflect job functions (Conlin, 2000). Furthermore, the results of compensation and salary surveys indicate the emergence of standardization and uniformity among online-related job titles (Leonard, 2000). For instance, the 2000 InfoWorld Compensation Survey found uniformity within the organizational activities of individuals holding the titles of chief technology officer, chief information officer, VP of e-commerce, and information technology (IT) director (Prencipe, 2000a, 2000b, 2001). Outside the realm of IT jobs, which is particularly relevant to our exploration of Internet sector firms, governmental research also provides support for the relationship between more traditional executive positions and underlying organizational processes and activities as summarized in the *Occupational Outlook Handbook*, which is revised and published every two years by the U.S. Bureau of Labor Statistics.

Interviews with two knowledgeable executives corroborated the arguments from the academic research and business press that executive positions provide meaningful measures of organizational capabilities. These executives held senior positions in their firms (CEO and Chief Relationships Officer). Discussions with both executives confirmed that the positions listed on the executive lists reflected important firm activities and processes; the only caveat mentioned by either executive was that executives of smaller firms sometimes fill multiple roles outside of their primary roles. In addition, the discussions corroborated the distinction between managerial and functional positions.

Aggregated across the academic research and practical conclusions, the number of managerial and functional positions captures the degree to which managerial and functional capabilities are present within the firm. For instance, the existence of a larger number of functional executive positions would indicate a firm with more established functional processes or routines rather than a firm with fewer functional executive positions. A similarity in the hierarchies of the firms within the sample is not a precondition because the presence of managerial or functional positions reflects a salient underlying set of organizational processes. We expect, and find, a degree of variation in the hierarchies within the sample given varying degrees of emphasis among organizational processes. Also, since we conceptualize managerial and functional capability at the organizational level, the turnover of individuals within positions does not destroy or nullify the presence of organizational-level capabilities.

Age and size

We measured firm age as the number of years that a firm existed, beginning with the year of founding and ending in the year the firm exited, whether

by dissolution or acquisition. We measured firm size as the annual firm revenue (in millions of dollars). Both annual sales and number of employees are common measures of firm size. For this study, annual sales represented the more relevant measure of capabilities because the presence of organizational processes that help produce revenue was our central concern.

Control variables and alternative perspectives

Control variables

We included control variables for firm and industry characteristics. First, a firm entity dummy (parent = 1, subsidiary = 0) addressed corporate-level effects. Second, a business services industry dummy variable (SIC 73; over 50% of the sample) controlled for industry segment effects. As a result of the dispersion across four-digit SIC codes (33 out of 36 SIC codes represented in our sample had frequencies of six or less), we grouped the sample according to SIC two-digit major groups for analysis. The sample included 10 SIC major groups with only three of the 10 major groups having frequencies greater than five. Sensitivity analyses showed no effect of including a dummy variable for communications industry firms (SIC 48), which had the second highest representation in the sample (about 10%), or for miscellaneous retail firms (SIC 59), which had the third highest representation (about 6%). Furthermore, additional sensitivity analyses showed that firms in the business services industry segment are similar to the other firms in the sample in regards to the number of levels in management ($p = 0.97$), the number of positions in management ($p = 0.54$), and the number of managerial ($p = 0.36$) and functional positions ($p = 0.53$). Sensitivity analyses indicated no significant influence for several other control variables, including firm productivity (sales per employee) and multiple measures of the size of a firm's executive team (number of executive positions, number of people on the executive team, or number of levels in the executive team).

Buyer versus seller perspectives on potential acquisitions

Our focal analysis of organizational capabilities takes the outlook of the struggling firm, but this perspective interconnects with the perspectives of potential buyers. We expect buyers to assess the organizational capabilities of struggling firms when considering them as potential targets. Therefore, it is important to consider other factors that will influence the evaluation of acquisition opportunities.

Both acquirer strategies and agency issues will influence acquisition decisions, including the perception and evaluation of target capabilities. First, consider how differences in acquirer diversification, market power, and divestiture strategies would affect assessments of struggling targets and their capabilities. An interest in struggling targets will vary across diversifying and consolidating acquirers. Given less industry experience and knowledge, a diversifying acquirer looking to enter a new industry environment may have less interest in a struggling target relative to a consolidating incumbent. Shifting to the capability level of analysis, varying acquisition strategy has the potential to influence the specific nature of organizational capabilities desired by the acquirer. However, an intersection of evolutionary and capabilities perspectives suggests that both diversifying and consolidating acquirers would be most interested in obtaining the valuable organizational capabilities embedded within struggling targets that would be destroyed upon dissolution, which is consistent with our conceptual model. Similarly, acquiring firms that are pursuing market power will be most interested in struggling targets that possess valuable embedded capabilities that could augment competitive advantage. Furthermore, the industry context of our study is an emerging and dynamic market. The market power view is more applicable in stable industry contexts (Dutz, 1989) and less applicable to dynamic markets (Hartman *et al*., 1993) and growth-stage markets (Anand and Singh, 1997), such as the emerging Internet subsector in the early 2000s. Moreover, the likelihood of post-acquisition divestiture, an element within the larger range of acquisition strategy, does not alter the value and desirability of organizational capabilities embedded within struggling firms. Elements of a target firm may become candidates for post-acquisition divestiture, but the template of relevant embedded organizational capabilities is accessible as a source of knowledge, and therefore a source of value, for the acquiring firm and within the market (Hoetker and Agarwal, 2007). Hence, an acquisition outcome retains its adaptive potential at the capability level, given the likelihood

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of post-acquisition divestiture by preserving relevant characteristics and knowledge of the firm-specific context in which valuable capabilities are embedded.

Second, consider agency issues as motivators of acquisitions. Self-interested managers often use acquisitions to drive growth because larger size leads to increases in manager compensation (Avery, Chevalier, and Schaefer, 1998), prestige (Firth, 1991), and job security (Amihud and Lev, 1981). Because the focus of our work centers on explaining acquisition versus dissolution outcomes among struggling firms, agency issues would be particularly problematic if the growth motive led self-interested managers to make haphazard selections from the potential pool of target firms without regard to capability endowments. Although a self-interested manager might engage in overdiversification, choosing targets without regard to organizational capabilities is unlikely because the presence of embedded, causally ambiguous organizational capabilities further entrenches these managers within the firm as architects of the complexity that offers potential sources of competitive advantage. Hence, the evolutionary and capabilities logics support the relevance of preserving value inherent in organizational capabilities susceptible to market failure via an exit by acquisition, as opposed to dissolution, even in the presence of self-interested managers. We tested for influences of ownership status (public versus private) to help control agency concerns; if agency goals influence target selection, we would expect to see more private targets because acquisitions of private firms tend to yield more excess returns (Mantecon, 2008), so that self-interested managers would seek private targets with little consideration of capability endowments. Ownership status had no significant impact.

Table 3 provides descriptive statistics and the correlation matrix. Moderate correlations exist between firm sales and the measures of managerial and functional capabilities. As one would expect, sales and the number of managerial and functional executive positions have positive correlations, but there is substantial variation in the number of executive positions, independent of firm size. Similarly, there is moderate correlation among some of the managerial and functional capability measures but, again, with substantial variation.

Table 3. Descriptive statistics and correlation matrix

	N	Min	Max	Mean (Median)	SD	DV	1	2	3	4	5	6	7	8	9	10	11	12
Dependent variable	172	0	1	0.48	0.50	1												
1. No. of levels	172	1	7	3.24	1.29	0.00	1											
2. Mgr. C-level	172	0	9	3.41	1.80	0.14	0.42	1										
3. Mgr. EVP, SVP, VP	172	0	7	1.21	1.43	0.03	0.55	0.50	1									
4. Mgr. below VP	172	0	10	2.13	2.75	0.14	0.58	0.50	0.35	1								
5. Fun. EVP, SVP, VP	172	0	9	1.45	1.70	−0.14	0.47	0.23	0.37	0.12	1							
6. Fun. below VP	172	0	8	0.44	0.98	0.05	0.14	−0.16	−0.12	−0.15	0.00	1						
7. Communications	158	0	1	0.18	0.39	−0.16	0.03	−0.10	0.01	−0.01	0.07	−0.03	1					
8. Business services	158	0	1	0.64	0.48	0.11	0.00	0.01	−0.09	−0.09	−0.01	0.13	−0.63	1				
9. Sales	137	0.30	359	32.75 (10.70)	60.61	0.22	0.21	0.43	0.36	0.36	−0.04	−0.14	−0.06	−0.15	1			
10. Employees	156	2	4,476	267 (100)	549	−0.01	0.11	0.29	0.35	0.18	0.04	−0.12	0.03	−0.16	0.62	1		
11. Age	161	1	69	5.02 (3.00)	6.27	0.24	0.07	0.11	−0.04	0.17	−0.04	0.03	−0.12	−0.02	0.05	0.05	1	
12. Entity (parent = 1)	168	0	1	0.89	0.31	0.22	0.14	0.25	0.11	0.20	0.09	0.01	0.00	0.17	0.08	0.05	0.11	1

r = 0.15 significant at $p < 0.05$

RESULTS

Owing to the nonlinear nature of the underlying logistic distribution, logistic regression coefficients do not represent the true marginal effect of a unit change in an independent variable on the dependent variable (Hoetker, 2007; Zelner, 2009). However, a significant logistic regression coefficient does suggest a nonzero marginal effect for a given independent variable, and the direction of a significant logistic regression coefficient provides information regarding the direction of the true marginal effect (Wiersema and Bowen, 2009). Hence, we used the logistic regression models in Table 4 to identify the covariates that required additional analysis to interpret the logistic regression results appropriately.

Model 1 in Table 4 serves as the baseline model. The control variables for business services industry and entity type are positive. Parents in this industry are more likely to be acquired than they are to divest subsidiaries ($p < 0.05$ in Model 1; $p < 0.05$ to 0.10 in subsequent models), possibly because e-commerce subsidiaries commonly have close ties to parent activities or because the problems that the struggling firms face are sufficiently strong that they threaten overall corporate viability. Firms in the business services industry are somewhat more likely to be acquired ($p < 0.10$), possibly because acquirers value their systemic capabilities.

Model 1 includes firm age and size to test Hypotheses 5 and 6. The logistic regression results are consistent with the predictions. We find a significant positive relationship between acquisition exit and both firm age ($\beta = 0.115$, $p < 0.05$) and sales ($\beta = 0.011$, $p < 0.05$). These results speak to the robustness of age and size effects at the lower ranges of age and size that are often characteristic of emerging industry contexts. As predicted, the relationships are monotonic as indicated by nonsignificant squared term for both firm age and size. Subsequent models report similar magnitudes and significance for the tests of Hypothesis 5 (age) and Hypothesis 6 (size). The Appendix reports the graphical analysis of marginal effects, demonstrating that age (Figure A1) and size (Figure A2) both have significant marginal effects over a wide range of the data.

Model 2 in Table 4 adds the managerial capability measures. The results provide mixed support for Hypothesis 1. Both the reported coefficient ($\beta = 0.269$, $p < 0.05$) and supporting graphical analysis of marginal effects (Appendix, Figure A3) demonstrate a significant positive relationship between C-level managerial capability and acquisition exit, consistent with Hypothesis 1. By contrast, the other managerial capability variables do not increase the likelihood of exit by acquisition, whether in the reported models or in sensitivity analyses that include only individual capability measures (even though the C-level managerial capability correlates moderately with the other two managerial capability measures; $r = 0.50$ in both cases). Both managerial capability at VP levels and below VP level have zero marginal effect on the mode of exit, as indicated by nonsignificant coefficients.

The difference in the impact of the managerial capability variables suggests that capabilities with the strongest firm-specific values have the most pervasive and greatest integrative scope across a firm's activities, which is the primary realm of C-level capability. Lower level managerial capabilities are less integrated throughout the organization, which results in a lower level of embeddedness and less susceptibility to market failure, reducing the need for acquisitions to preserve their value.

The impact of C-level managerial capabilities is intriguing because C-level executives commonly leave acquired firms within a few years of an acquisition (Seward and Walsh, 1994). Nonetheless, despite the pending departures, such executives—and their executive teams—play key roles in integrating target and acquiring firms (Haspeslagh and Jemison, 1991). Moreover, consistent with our arguments, these findings suggest that the organizational-level capabilities of the target and the knowledge they embody remain upon the departure of managers.

Model 3 replaces the managerial capability variables with the measures of functional capability, as an initial test of Hypothesis 2. The results in Model 3 do not support Hypothesis 2. The coefficient for functional capability at the VP levels is negative as expected ($\beta = -0.151$) but does not reach conventional statistical significance. This result reaches moderate significance in Model 4, however, as we discuss below.

To test Hypothesis 3, which predicts that managerial capability will be a stronger determinant of exit type than functional capability, we calculated the Vuong (1989) statistic to explore the managerial and functional capabilities models (Models 2 and 3) from the perspective of a non-nested

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Table 4. Logistic regression estimates of how organizational capabilities influence selection processes of struggling firms (172 cases; positive coefficient = more likely to exit by acquisition than by dissolution)

	1	2	3 (a)	4	5
Managerial capability (M): positions (H1 +)					
No. of C-level (e.g., CEO, COO, CFO)		0.269**		0.283**	0.272**
No. of managerial EVP, SVP, VP		−0.102		−0.037	0.004
No. of managerial below VP		−0.098		−0.088	−0.102
Functional capability (F): positions (H2 −)					
No. of functional EVP, SVP, VP			−0.151	−0.173*	−0.181
No. of functional below VP			0.026	0.038	0.210
Interactions: M × F (H4 −)					
M (EVP-SVP-VP) × F (EVP-SVP-VP)					0.028
M (EVP-SVP-VP) × F (below VP)					−0.396*
Age (H5 +)	0.115**	0.123**	0.120**	0.125**	0.139**
Sales (H6 +)	0.011**	0.011**	0.011**	0.010**	0.009**
Business services industry[b]	0.730*	0.679*	0.730*	0.680*	0.675*
Entity (1 = parent; 0 = subsidiary)	1.887**	1.704*	1.911**	1.660*	1.748*
Log likelihood	−142.91***	−139.79***	−141.37***	−138.11***	−135.75***
Log likelihood ratio v. Model 1 (df)		6.24 (3)	3.08 (2)	9.60 (5)*	14.32(7)**

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$ (one-tailed tests).
[a] Hypothesis 3 predicts that managerial capabilities have more impact on acquisition than functional capabilities. Consistent with Hypothesis 3, a Vuong statistic shows that Model 2 has greater explanatory power than Model 3 = 5.53 ($p < 0.01$).
[b] Compared to 11 other industries in the Internet sector.
Note: Sensitivity analyses found no influence of control variables for ownership status, communications industry, firm productivity, or the size of the executive team.

hypothesis test (Clarke, 2001). A Vuong test that compares the explanatory power of the managerial and functional capability models indicates that the managerial model is favored over the functional model ($V = 5.53$, $p < 0.01$), consistent with Hypothesis 3.

Model 4 includes all five measures of managerial and functional capability. This model demonstrates the robustness impact of managerial capability. C-level managerial capability (Hypothesis 1) continues to be positive and significant ($\beta = 0.283$, $p < 0.05$). Functional capability at the VP level now has a moderately significant negative impact ($\beta = -0.173$, $p < 0.10$), consistent with Hypothesis 2. The improved significance of the functional capabilities result in Model 4 suggests that the effect is partly conditional on the level of managerial capabilities (Hypothesis 4), which Model 5 addresses directly. The greater magnitude of the significant managerial capability effect (C-level) compared to the significant functional capability effect (VP level) is again consistent with Hypothesis 3.

Model 5 reports interactions between managerial and functional capability, to test Hypothesis 4. We examined each of the six possible two-way interactions. Only the interaction between managerial capability at the VP levels and functional capability below VP is significant ($\beta = -0.396$, $p < 0.10$). For simplicity, therefore, Model 5 includes only the interactions involving the managerial VP levels. Model 5 demonstrates improved explanatory power relative to Model 4, based on the log-likelihood ratio (LLR) test for nested models ($LLR = 14.32 - 9.60 = 4.72$; d.f. = 2; $p < 0.10$). Model 5 retains the positive main effect of managerial capability ($\beta = 0.272$, $p < 0.05$) at the C-level, demonstrating strong and consistent support for Hypothesis 1. The effect of functional capability at the VP level remains negative ($\beta = -0.181$), but again becomes insignificant thus offering—at best—limited support for Hypothesis 2.

Because an interaction effect in logistic regression is a nonlinear marginal effect whose value depends on the values assumed by all model variables, we conducted additional analyses to explore the true interaction effect (Ai and Norton, 2003) and to compute the value of this equation at low, mean, and high values of the moderator variable (Wiersema and Bowen, 2009). A graphical analysis showed that the interaction effect is negative when the predicted probability of acquisition exit falls between 0.10 through 0.90 (Appendix, Figure A4), with at least moderate significance when the

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Table 5. Moderating effect of functional capability below VP level on the marginal effect of managerial capability at VP levels

Value of functional capability below VP	Marginal effect of managerial capability at VP levels	Z-statistic
Low	0.054	0.73
Mean	−0.043	−0.67
High	−0.134	−1.37

probability of acquisition exit ranges from 0.20 to 0.80.

Table 5 summarizes the true interaction effect at low, mean, and high levels of functional capability below VP level, while holding other variables at their means. The interaction effect of functional capability below VP level on the relationship between managerial capability at the VP levels and acquisition exit becomes negative and significant ($p < 0.10$) only when functional capability below VP level reaches a high level. These results provide additional support for Hypothesis 4, showing that greater functional capability relative to managerial capability has a negative and moderately significant effect on acquisition exit.

In sum, the results provide at least moderate support for hypotheses concerning managerial capabilities, the interaction of managerial and functional capability, age, and size, while providing only limited support for the functional capability prediction. Struggling firms with higher levels of C-level managerial capability are more likely to exit via acquisition (Hypothesis 1, $p < 0.05$), while struggling firms with higher levels of functional capability at the VP levels are somewhat more likely to exit via dissolution (Hypothesis 2, $p \sim 0.10$). Managerial capability has more impact than functional capability in determining the mode of exit (Hypothesis 3, $p < 0.01$). Nonetheless, functional capabilities do influence the relationship between managerial capability and firm exit; specifically, an increase in functional capability below VP level relative to managerial capability at the VP levels increases the likelihood of a dissolution exit (Hypothesis 4, $p < 0.10$). Lastly, the likelihood of an exit by acquisition increases with firm age (Hypothesis 5, $p < 0.05$) and size (Hypothesis 6, $p < 0.05$).

DISCUSSION

This research addresses the role of firm-level capabilities in determining whether a firm exits by acquisition or by dissolution. Questions of firm exit are a central area of inquiry within the study of industry evolution, but the predominant selection perspective creates a conceptual and empirical blind spot by neglecting to differentiate between exit by acquisition and exit by dissolution (Agarwal *et al*., 2002). This work contributes to the industry evolution literature by unpacking organizational exit and exploring the influence of firm-level factors on the determination of exit by acquisition or exit by dissolution. In turn, the work helps resolve part of the tension in competing views of business adaptation and selection by highlighting the presence of both forces at different levels of analysis.

The findings highlight contrasting impact of managerial and functional capabilities on the exit of struggling firms. Organizationally pervasive managerial capabilities (C-level) foster the more adaptive selection outcome of exit by acquisition, as opposed to dissolution. By contrast, more localized, less embedded functional capabilities do not increase the likelihood of acquisition and have at least weak impact on dissolution exit, especially when functional capabilities are present in higher levels relative to managerial capabilities. Furthermore, time-dependent and complexity-dependent capabilities foster the more adaptive exit by acquisition because greater age and size provide opportunities to develop capabilities. The commonality across these organizational capabilities is the presence of ambiguity and embeddedness that fosters a susceptibility to market failure, in addition to marked difficulties in replication. Organizational capabilities with these characteristics represent a source of competitive advantage to the firm, in addition to representing a source of value for the broader market as indicated by the more adaptive outcomes for struggling firms that possess these capabilities. Hence, a key implication of this study is that organizational capabilities have heterogeneous impact on selection processes.

The resource-based view suggests that resources that are embedded within the firm are more likely to represent a source of competitive advantage as a result of their casual ambiguity and social

complexity (Barney, 1991). Since the dissolution of a firm would result in the destruction of embedded, firm-specific organizational capabilities, acquisition represents a more adaptive outcome for the capabilities, a potential acquirer, as well as the market as a whole by preserving the contextual template of the target's valuable organizational capabilities and the embodied tacit knowledge that would be destroyed upon dissolution (Hoetker and Agarwal, 2007). Hence, this study provides a bridge between adaptation views on organizational change (Cyert and March, 1963; Levitt and March, 1988) and alternative views of the strength of selection pressures (Hannan and Freeman, 1977; Nelson and Winter, 1982). The work supports recent research in organizational change that presents adaptation and selection as complementary and interdependent processes (Singh *et al*., 1986; Levinthal, 1991; Aldrich, 1999). In particular, acquisition is a mechanism that connects firm-level selection with capability-level adaptation.

Consequently, the adaptive potential of acquisition as a selection process extends to considering knowledge diffusion because the preservation, albeit partial, that arises through acquisition provides more opportunities for the diffusion of tacit knowledge held within a struggling firm. While some recent research shows that the mobility of managers or employees fosters knowledge diffusion (Agarwal *et al*., 2004; Rosenkopf and Almeida, 2003; Almedia and Kogut, 1999), other work highlights the context-specific nature of knowledge diffusion through employee mobility. Specifically, the presence of knowledge that is firm specific (Harris and Helfat, 1997), private (Hoetker and Agarwal, 2007), or interlinked (Ganco, 2009) resists diffusion through employee mobility. Therefore, for firm-specific organizational-level capabilities and knowledge, acquisition represents a key mechanism of knowledge diffusion in the case of struggling businesses that face firm-level selection.

Our results demonstrate that the likelihood of dissolution declines with age and size, which parallels findings from the evolutionary economics, institutional, and ecological literatures. This body of work argues that greater learning, legitimacy, and resource bases foster success and enable firms to ride out difficulties. We extend this literature both conceptually and empirically by focusing on exit events of struggling firms that have not been able to create firms successful enough to ride out difficulties, and by showing that the capability status associated with age and size influences the form of selection event.

The context in which we find these results engages research on industry shakeouts and declining industries. During the time frame of this study, the emerging Internet sector was experiencing a shakeout during its evolution as studied in the work of Steven Klepper (e.g. Klepper and Simons, 2005; Klepper, 2002; Klepper and Miller, 1995), as opposed to experiencing industry decline (Anand and Singh, 1997). Hence, our findings are applicable or generalizable to firms within dynamic settings that exhibit poor current performance. Since this dynamism could be the result of emergence, turnaround, or decline within any type of industry, these results also have implications for declining industries.

In addition to contributing to the discussion of industry evolution, the research has implications that engage a discussion of business dynamics, including dynamic capabilities and organizational learning. First, in dynamic capability theory, the results highlight the relevance of linking resource-based arguments with evolutionary theory (Helfat *et al*. 2007). The presence of market failure in the organizational capabilities that increase the likelihood of an acquisition exit supports the resource-based rationale for acquisition and provides an insight into the role of acquisition and dissolution as dynamic capability mechanisms of business and market evolution. These results indicate that the presence of market failure in these capabilities links the fate of a struggling firm to the fate of its capabilities.

Second, the results help clarify the role of organizational learning in fostering adaptive outcomes. Although acquisition of a firm in its entirety may overcome the obstacle of market failure in the discrete exchange of valuable organizational capabilities, acquisition does not guarantee the successful transfer or replication of a target's capabilities in an acquiring firm. The same embeddedness and tacitness that make a target's capabilities attractive may inhibit the ability of the acquiring firm to capture and exploit the value inherent in these capabilities. Specifically, the successful transfer and replication of target capabilities hinges on organizational learning and the absorptive capacity (Cohen and Levinthal, 1990) of the acquiring firm.

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Organizational learning involves developing, improving, and organizing routines and knowledge (Dodgson, 1993); the information processing embodied in this process results in expansion of an organization's range of behaviors (Huber, 1991). Hence, the transfer or replication of target capabilities embodies organizational learning since the acquiring firm must reorganize and expand its knowledge and behaviors to incorporate the capabilities of the target. The limited codifiability and teachability of the tacit knowledge embodied in the target's capabilities impede the transfer and replication of routines and capabilities (Zander and Kogut, 1995) and complicate the learning process. Absorptive capacity relates to the ability of a firm to recognize, assimilate, and apply new information, which is primarily a function of prior experience (Cohen and Levinthal, 1990). Given the potential demands of this learning effort, the absorptive capacity of an acquiring firm is critical for the transfer of capabilities from a target or their replication in the acquirer. Hence, organizational learning supports the adaptive outcomes of acquisition at the capability level. In turn, the adaptive outcomes at the capability level represent adaptive implications at the firm level from the perspective of the acquiring firm.

Several limits of this work can stimulate additional inquiry at the intersection of the resource-based and evolutionary perspectives. This study employs a sample of young firms in an emerging industrial sector using measures chosen for this particular context, which creates an avenue of inquiry exploring the generalizability of these findings to other contexts. In addition to exploring the boundary conditions of this study's findings, additional research could enrich understanding of the mechanisms driving different aspects of market evolution. For example, research questions that provide a finer-grained understanding of how and why organizational resources or capabilities influence organizational outcomes represent a fruitful line of inquiry. In addition, incorporating a learning perspective in investigation of research questions regarding organizational capabilities and how they change would provide the opportunity to advance understanding of the mechanics of organizational learning. Lastly, the development and investigation of resource-based research questions that delineate the predominance of opposing perspectives such as adaptation versus selection and economic versus institutional forces offer the opportunity to advance work at the intersection of resource-based thinking and evolutionary theory, as well as to engage key debates within the broader strategy literature.

Managerially, the paper speaks to the importance of acquisitions as capability-focused activities. Firms sometimes use acquisitions primarily to acquire products and/or remove competitors from the environment. While such deals may have apparent value, they typically require substantial premiums that may undercut ongoing financial returns. Acquiring firms with the goal of using their capabilities to create new products and services often requires less of an acquisition premium because there are fewer potential acquirers who can use the purchased capabilities, thereby providing greater long-term returns.

CONCLUSION

The results of this research help integrate a capability-level perspective within the study of business and industry evolution. Studying how the strength of within-firm capabilities influence exit by acquisition versus exit by dissolution reveals that industry evolution is a multilevel phenomenon. At the firm level, both acquisition and dissolution are selection events. At the capabilities level, by contrast, dissolution selects firm-specific capabilities out of the landscape, while acquisition has adaptive implications. Hence, unpacking firm exit into acquisition and dissolution outcomes enabled us to reveal and explore the adaptive implications of selection events. At the interface between adaptation and selection, the acquisition mechanism connects firm-level selection with capability-level adaptation as a result of the opportunity to preserve valuable, yet embedded, organizational capabilities: Pervasively embedded managerial capabilities encourage acquisition exits while more localized functional capabilities encourage dissolution exits. We hope that the research motivates additional studies of the interface between adaptation and selection forces in evolutionary theories of business.

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APPENDIX: FIGURES DEPICTING MARGINAL EFFECTS OF LOGISTIC REGRESSION COEFFICIENTS

Figure A1 presents the family of marginal effects and the associated z-values for firm age in model 1 of Table 4. The blue dots represent values of the marginal effect (recorded on the left axis) and the red dots represent z-values (as recorded on the right axis). The marginal effects of firm age range from 0.0001 to 0.02. The associated z-values range from 0.28 to 5.0; as shown in the figure, the z-values associated with most marginal effects exceed 1.28 ($p < 0.10$) in absolute value except at very high and low probabilities of exit by acquisition. Since the slope of the logistic distribution approaches zero at the extremes, the lack of significance at extreme probabilities is expected (Wiersema and Bowen, 2009). Graphical analyses of the marginal effects for firm age in the other models of Table 4 also are consistent with the figure. These results indicate a significant positive relationship between firm age and an acquisition exit.

Figure A2 presents the marginal effects and the associated z-values for firm sales in model 1 of Table 4. The marginal effects of firm sales range from 0.00001 to 0.002. The z-values range from 0.23 to 4.4. As shown in the figure, the z-values associated with any marginal effect exceed 1.28 in absolute value except at very high and low probabilities of exit by acquisition. The graphical analyses of the marginal effects for firm sales in the other models of Table 4 are consistent with Figure A2. These results indicate a significant positive

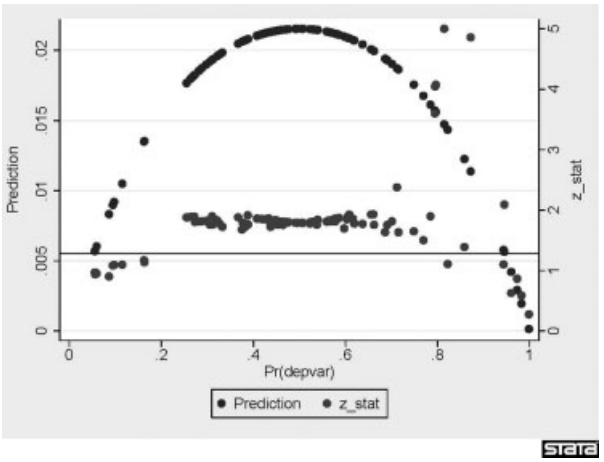

Figure A1. Marginal effect analysis: age on the probability of exit by acquisition

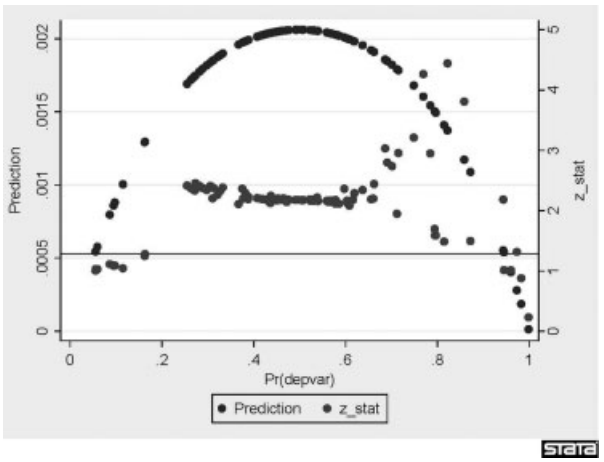

Figure A2. Marginal effect analysis: sales on the probability of exit by acquisition

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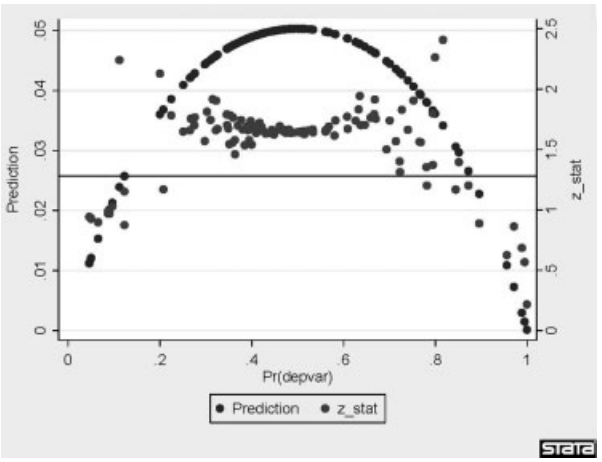

Figure A3. Marginal effect analysis: C-level managerial capability on the probability of exit by acquisition

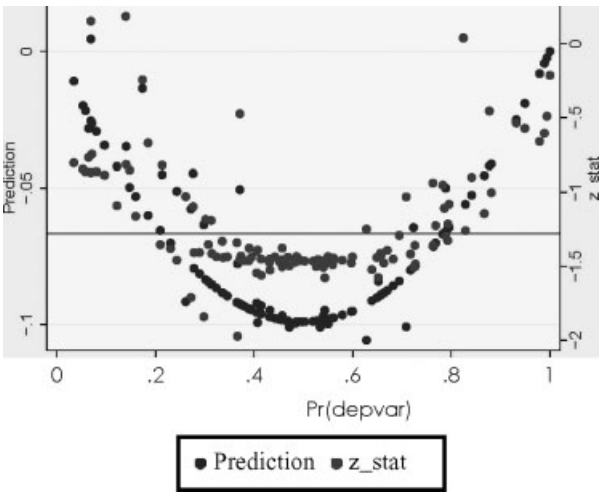

Figure A4. Interaction effect: functional capability below VP and managerial capability at the VP levels

relationship between firm size and exit by acquisition.

Figure A3 presents the marginal effects and the associated z-values for C-level managerial capability in Model 2 of Table 4. The marginal effect of C-level managerial capability ranges from 0.0002 to 0.05. The z-values range from 0.22 to 2.4. As shown in the figure, the z-values associated with most marginal effects exceed 1.28 in absolute value except at very high and low probabilities of exit by acquisition. The graphical analysis of the marginal effect of C-level managerial capability in Models 4 and 5 are also consistent with Figure A3. Hence, there is a significant positive relationship between C-level managerial capability and acquisition exit.

Figure A4 presents the interaction effect between managerial capability at the VP levels and functional capability below the VP level, from Model 5 of Table 4. The values of the true interaction have a range of −0.1 to 0.01. The z-values range from −1.97 to 0.2. As shown in the figure, the interaction effect is primarily significant when the probability of acquisition exit is in the range of 0.20 to 0.80. The results provide support for Hypothesis 4 that increased functional capability relative to managerial capability has a negative effect on acquisition exit.

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